

# VERITAS NetBackup™ 3.4 for EMC

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## System Administrator's Guide

UNIX

June 2000  
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VERITAS

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*VERITAS NetBackup for EMC System Administrator's Guide - UNIX*

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# About This Guide

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This guide describes how to install, configure and use VERITAS NetBackup for EMC on an HP800 or Solaris platform. In this guide, VERITAS NetBackup for EMC Split-Mirror backup is referred to as Split-Mirror backup software.

## Audience

This guide is intended for the:

- ◆ System administrator or the Oracle database administrator responsible for configuring the Oracle database over the Logical Volumes, and Logical Volumes over EMC Symmetrix storage devices.
- ◆ NetBackup system administrator responsible for configuring NetBackup.

This guide assumes:

- ◆ A working understanding of the NetBackup client and server software.
- ◆ A familiarity with the information in the following documents:
  - ◆ *SYMMETRIX Command Line Interface (SYMCLI) Base Component Product Guide*
  - ◆ *SYMMETRIX Application Programming Interface (SYMAPI) for Open Systems Programmer's Reference Advanced Features*
  - ◆ HP LVM Man Pages
  - ◆ *NetBackup User's Guide - UNIX*
  - ◆ *Volume Manager (VxVM) User's Guide*
  - ◆ *Volume Manager (VxVM) System Administrator's Guide*
- ◆ A thorough understanding of the following topics:
  - ◆ Oracle7 or Oracle8 database administration
  - ◆ Logical volume management
  - ◆ EMC Symmetrix/Time Finder
  - ◆ NetBackup administration



## Organization

This guide is organized as follows:

- ◆ Chapter 1, “Introduction,” describes technical features and concepts and the Split-Mirror backup of an active Oracle database.
- ◆ Chapter 2, “Installation,” explains how to install Split-Mirror backup software on Solaris 2.6, Solaris 7 or Solaris 8, and on HP-UX 11.0.
- ◆ Chapter 3, “Configuration,” describes how to configure Split-Mirror classes.
- ◆ Chapter 4, “Backup and Restore,” explains how to use NetBackup to perform backups and restores of Oracle databases.
- ◆ Chapter 5, “Troubleshooting,” gives troubleshooting hints.
- ◆ Appendix A, “Multiple Data Streams,” describes how the NetBackup Multiple Data Streams feature is used with Split-Mirror class types.
- ◆ Appendix B, “Logical Volume Managers,” describes how to configure logical volumes on HP-UX LVM and Solaris VxVM.

## Related Documents

For a more detailed listing of NetBackup documents, refer to *NetBackup Release Notes*.

If you have a UNIX server, refer to these documents:

- ◆ *NetBackup Release Notes*  
Describes the platforms and operating systems that are supported and provides operating notes that may not be in the manuals or the online help.
- ◆ *NetBackup System Administrator's Guide - UNIX*  
Explains how to configure and manage NetBackup on a UNIX system.
- ◆ *NetBackup Troubleshooting Guide - UNIX*  
Provides troubleshooting information for all NetBackup products.

If you have a Windows NT server, refer to these documents:

- ◆ *NetBackup Release Notes*  
Describes the platforms and operating systems that are supported and provides operating notes that may not be in the manuals or the online help.
- ◆ *NetBackup System Administrator's Guide - Windows NT/2000*  
Explains how to configure and manage NetBackup on a Windows server system.





- ◆ *NetBackup Troubleshooting Guide - Windows NT/2000*  
Provides troubleshooting information for all NetBackup products.

## Conventions

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

### Type Style

Table 1. Typographic Conventions

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

### Notes and Cautions

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**Note** This is a Note and is used to call attention to information that makes it easier to use the product or helps you to avoid problems.

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**Caution** This is a Caution and is used to warn you about situations that can cause data loss.

---

### Key Combinations

Some keyboard command sequences use two or more keys at the same time. For example, you may have to hold down the **Ctrl** key before you press another key. When this type of command is referenced, the keys are connected by plus signs. 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.

## 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.veritas.com/
```

For product assistance, contact VERITAS Customer Support.

US and Canadian Customers: 1-800-342-0652

International Customers: +1 (650) 335-8555

VERITAS Customer Support can also be reached through electronic mail at:

```
support@veritas.com
```



Split-Mirror backup extends the capabilities of NetBackup to include online, second host backups of Oracle databases configured on EMC Symmetrix storage devices.

This chapter includes the following topics:

- ◆ Terminology
- ◆ Features
- ◆ Requirements
- ◆ Restrictions
- ◆ Technical Overview



## Terminology

This section describes important terms.

### NetBackup

#### Automatic Backup

An automatic backup occurs without manual intervention (after the schedule has been defined by the NetBackup administrator). NetBackup uses the scheduler, `bpsched`, to determine if any backups are required. The scheduler is activated by the request daemon, `bprd`, at intervals determined by the Wakeup Interval global attribute. The backup interval is determined by the NetBackup administrator.

#### Backup Policy

Specifies how and when backups are performed for a group (class) of clients that have similar backup requirements. For details on the Split-Mirror backup policy, refer to “Split-Mirror Backup Software Policy” on page 15.

#### Backup Class

A backup class defines the backup policy for a specific group of one or more clients. A configuration can have a single class that includes all clients or there can be many classes, some of which may contain only a single client. A client must be in at least one class and can be in more than one.

The NetBackup administrator defines the properties of a class which may include such characteristics as: list of clients in the class, type of backup to perform, list of files to be included in the backup, whether to compress files during backup, and so on.

Refer to “Split-Mirror Class” on page 14 for details.

#### Full Backup

Copies to the storage media all the files and directories that are beneath a specified directory.

#### Incremental Backup

Copies to the storage media all the files and directories that have been modified since the last successful full or incremental backup.

#### Raw Partition Backup

A backup of a partition of a physical disk device. Can also refer to a logical volume if Volume Manager is used to configure virtual devices on top of physical disks.

---

**Note** NetBackup does not distinguish between full and incremental backups when backing up raw partitions. The whole partition is backed up in both cases.

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## EMC

### Symmetrix Disk Array

An integrated cached disk array designed for online data storage. A host system and Symmetrix communicate through one or more SCSI or Fibre Channel interfaces.

### Standard Device

A Symmetrix physical disk device configured as the normal data storage source. Also referred to as the primary device.

### BCV Device

A Symmetrix physical disk device that is associated with a primary device and functions as an identical data copy of the primary device. Also referred to as a mirror device or mirror.

### Device Group

A logical grouping of primary devices and their associated BCV devices that support a common function, application, or database.

### TimeFinder

A software solution which allows applications to manipulate the BCV devices, while the primary devices are online for regular host operations.

## Logical Volume Manager

A software solution that allows administrators to build virtual devices called volumes on top of physical disk devices. Volumes are then accessed by applications such as file systems and databases, in the same way as the physical disk devices would be.

### Volume Group

A collection of physical disk devices that share a common configuration. A volume group has an administrator assigned name and is established by designating a set of physical devices as its members. The physical devices form the pool of disk space. This disk space is used to define logical volumes. Also referred to as a disk group. Refer to Appendix B for more details.

### Logical Volumes

Virtual devices, which are made available to applications and databases. A logical volume is seen by users and applications as another physical device.



## Split-Mirror Backup

### Split-Mirror Class

A backup class specific to EMC that performs online, second host backups of Oracle databases.

### Primary Host

The computer system where the active Oracle database resides and where NetBackup client software is installed. Also referred to as the database host. Typically, if a volume manager is used, the Oracle database is configured over a set of logical volumes defined in a volume group. The volume group must also be defined by a corresponding Symmetrix device group. The volumes are configured over a set of primary devices. The data is then mirrored by associating the primary devices with a set of mirror devices.

### Backup Host

The computer system that is responsible for processing the backup of the Oracle database on the primary host and which has NetBackup client software installed. One or more Symmetrix device groups and volume group(s) must be configured. These groups must be identical in size and structure to the corresponding device groups and volume groups that contain the Oracle database on the primary host.

### Second Host Backup

This is a backup policy employed by Split-Mirror classes, where the backup object resides on the primary host. The actual CPU overhead, which occurs when processing the backup, occurs on the backup host.

Second host backup is made possible due to the multi-host clustering capabilities of the Symmetrix disk array. The disk array allows the individual standard and mirror devices to be shared by the primary host and backup host.

A Split-Mirror backup policy requires that at least two hosts be connected to the disk array. One host is configured to be the primary host and one host is configured to be the backup host.

### Online Database Backup

This is a backup policy that allows the Oracle database on the primary host to be brought back online as soon as the backup host has split the mirror device from the primary device. The Oracle database can remain online, processing transactions, while the backup host is backing up the data. This backup policy can dramatically reduce the database downtime for backing up a whole database.

## Multiple Data Streams

This is an attribute of Split-Mirror backup that supports multiple concurrent backup data streams from a single backup class. This attribute permits the use of more than one tape device at a time for a single Oracle backup, thereby reducing the time necessary to complete the backup operation. See Appendix A for more details.

## Split-Mirror Backup Software Policy

Uses Symmetrix TimeFinder APIs (SYMAPI) to implement the following backup policy sequence.

- a.** Place the Oracle database in backup mode.
- b.** Split the mirror device from the primary device with which it was paired.
- c.** Take the Oracle database out of backup mode.
- d.** Back up the data contained on the mirror device using the NetBackup raw partition policy.
- e.** Re-establish the mirror device as a mirror of the primary device.



## Features

The main features of Split-Mirror backup are described below.

### Split-Mirror Backup

- ◆ Online Database Backup
- ◆ Second Host Backup
- ◆ Multiple Data Streams

### NetBackup

- ◆ Full backup and restore operations.
- ◆ Media Management facilities.

All devices supported by NetBackup are available to Oracle for backup.

- ◆ Scheduling facilities.

NetBackup scheduling facilities can be used to schedule automatic and unattended Oracle backups.

This also lets you choose the times when these operations can occur. For example, to prevent interference with normal daytime operations, you could schedule database backups to execute only at night.

- ◆ Multiplexed backups.

Split-Mirror backup lets you take advantage of NetBackup's multiplexing capabilities. With multiplexing, multiple streams are directed to a single backup device. See Appendix A for more details.

- ◆ Transparent execution of both Split-Mirror and Standard file system backup operations.

All backups are executed simultaneously and transparently without any action from the administrator.

- ◆ Sharing the same devices and tapes used during other file backups.

It is possible to share the same devices and media used for other file backups or to give Oracle exclusive use of certain devices and media.

- ◆ Centralized and networked backup operations.

From the NetBackup master server, you can schedule database backups or start them manually for any client. The Oracle databases can also reside on different hosts than the devices where NetBackup stores the backups.



- ◆ Graphical User Interface.

NetBackup provides a Java interface (`jnbSA`) for configuring NetBackup and performing backups and restores.

- ◆ Menu Interface.

NetBackup has a character-based-menu interface, where `bpadm` is used for backup administration and `bp` is used for performing restores.



## Requirements

### NetBackup Master

A master server with NetBackup 3.4 or later installed.

### NetBackup Client

The following operating system platforms are supported:

- ◆ Solaris 2.6, Solaris 7, and Solaris 8
- ◆ HP-UX 11.00

There must be dual host connections to the EMC array. NetBackup for EMC software currently supports a dual host configuration where each host has a connection to the EMC Symmetrix array. Both hosts must have identical operating systems (that is, both must be Solaris or both HP-UX).

---

**Note** Single host configurations are not supported.

---

Oracle database version 7 or 8 must be installed on raw partitions, or on filesystems dedicated to the data for one Oracle instance.

There must be at least two clients with NetBackup 3.4 or later installed, which are configured as the primary host and backup host.

The Split-Mirror backup software must be installed on the backup host and the primary host.

One or more Symmetrix device groups must be configured on the primary host, with an exact replica of Symmetrix device groups configured on the backup host.

Logical volumes must be configured over the primary devices on the primary host with volumes replicated on the mirror devices on the backup host. See Appendix B for information on setting up logical volumes for NetBackup for EMC.

The following Logical Volume Managers are supported:

- ◆ HP-UX LVM for HP 11.00
- ◆ VERITAS VxVM for Solaris 2.6, Solaris 7, and Solaris 8

EMC Symmetrix TimeFinder SYMAPI version 3.2 or 4.0 must be installed on the backup host.

## Restrictions

- ◆ Each Symmetrix primary device must be associated with a unique mirror device.
  - ◆ Symmetrix primary devices must be visible to the primary host, but must not be visible to the backup host.
  - ◆ Symmetrix mirror devices must be visible to the backup host, but must not be visible to the primary host.
- ◆ On the backup host, you must configure logical volumes on mirror devices that are identical to the logical volumes configured on the primary devices on the primary host. Refer to Appendix B for Solaris VxVM and HP LVM configuration hints.
- ◆ Split-Mirror file system backups are currently not supported. Backups must be performed as raw partition backups at this time.
- ◆ Split-Mirror incremental backups are currently not supported.
- ◆ Split-Mirror backup on a single host is currently not supported.
- ◆ The Split-Mirror backup does not prevent another process from manipulating the state of the standard and mirror devices during a backup. If the status of the standard and mirror devices is changed while a backup is in process, the backup will most likely fail. It is up to the system administrator to ensure that the state of the device group does not change during the backup.

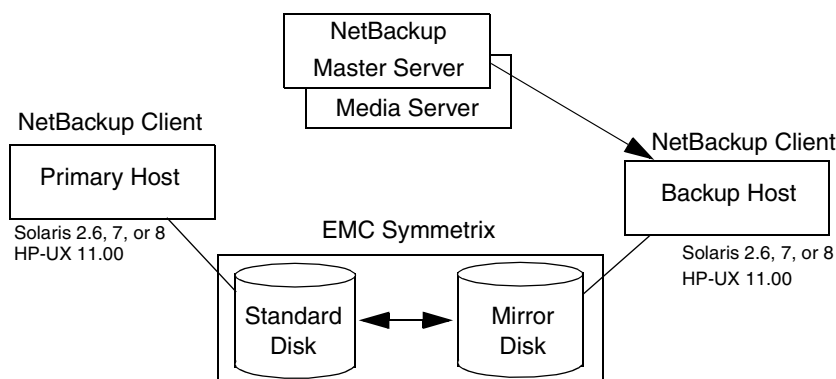


## Technical Overview

### Backup Model

Scheduled backups and immediate backups of Split-Mirror classes are initiated and processed in the same manner as Standard class backups.

This document is tailored for environments where two host systems are used to facilitate the Split-Mirror backup of an active Oracle database. Refer to the following diagram for this description.



- ◆ Primary host: the system where Oracle and the underlying database instance reside and access the primary devices.
- ◆ Backup host: the system where NetBackup is active and accesses the Split-Mirror data from mirror devices for backup.

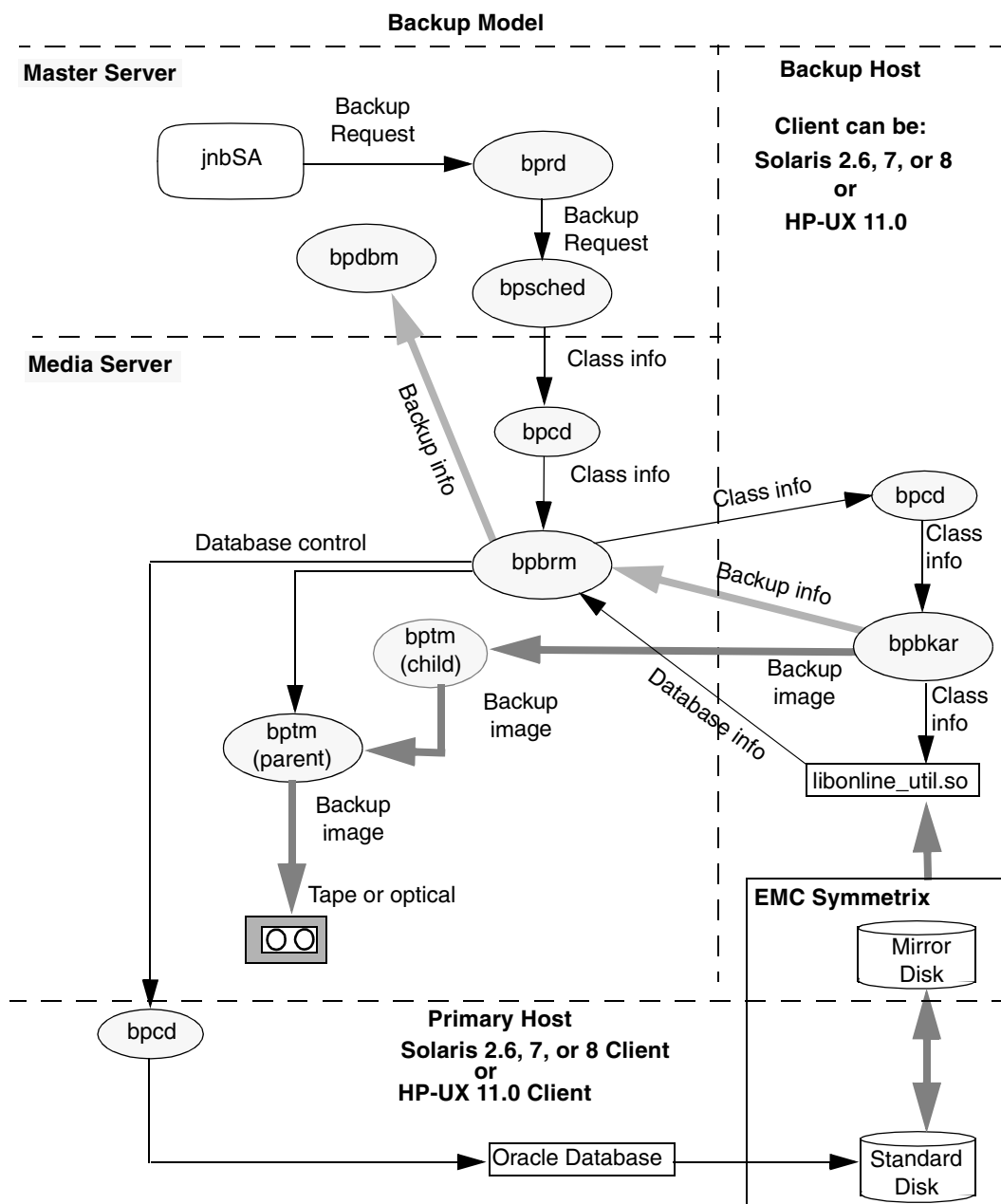
---

**Note** The backup host and the NetBackup server can be the same machine. At larger sites with multiple Oracle instances, there may be one or more NetBackup servers serving one or more clients doing Split-Mirror backups.

---

The master server has standard NetBackup server software installed and in this example is the host with the storage devices. Media servers can also be used.

The following figure shows the major NetBackup components involved with Split-Mirror backup.



## Operational Flow

Oracle backups will include a Split-Mirror backup followed by a Standard backup of the Oracle archive logs initiated by the `backup_exit_notify` script.

Split-Mirror backup performs the following tasks:

- ◆ If configured to do so by the `ESTABLISH_MIRROR_AT_START` setting, `bpbkar` synchronizes the mirrors with the primary devices of the target device group. Since the synchronization process may require a lengthy amount of time, the `BPSTART_TIMEOUT` configuration option should be adjusted accordingly. (See Chapter 3, “Configuration,” for a description of configuration flags.)
- ◆ The target Oracle database is placed in hot backup mode using `ALTER TABLESPACE BEGIN BACKUP` statements. These operations take place on the `PRIMARY_HOST` defined in the class file list.
- ◆ `bpbkar` splits the mirrors from their associated primary devices so they may be subsequently accessed to back up database information.
- ◆ `bpbkar` monitors the mirror devices until they become available for read access, and takes the database out of hot backup mode.
- ◆ `bpbkar` reads database table data from the mirror devices.
- ◆ When the backup has completed, `bpbkar` re-establishes synchronization between the mirror devices and their associated primary devices if configured to do so by the `ESTABLISH_MIRROR_AT_END` directive.

The `backup_exit_notify` script initiates a Standard backup of the Oracle archive logs.

## Operational Considerations

### Access Data on Mirror Devices

While mirror devices on the backup host are synchronized with their associated primary devices on the primary host, the data within the mirror devices cannot be accessed by the backup host in any way. Mirror devices must first be split away from their associated primary devices before data can be backed up. The split function is performed by `bpbkar` when it executes the `bpmirrorsplit` command.



### **Use of Mirror Device Data**

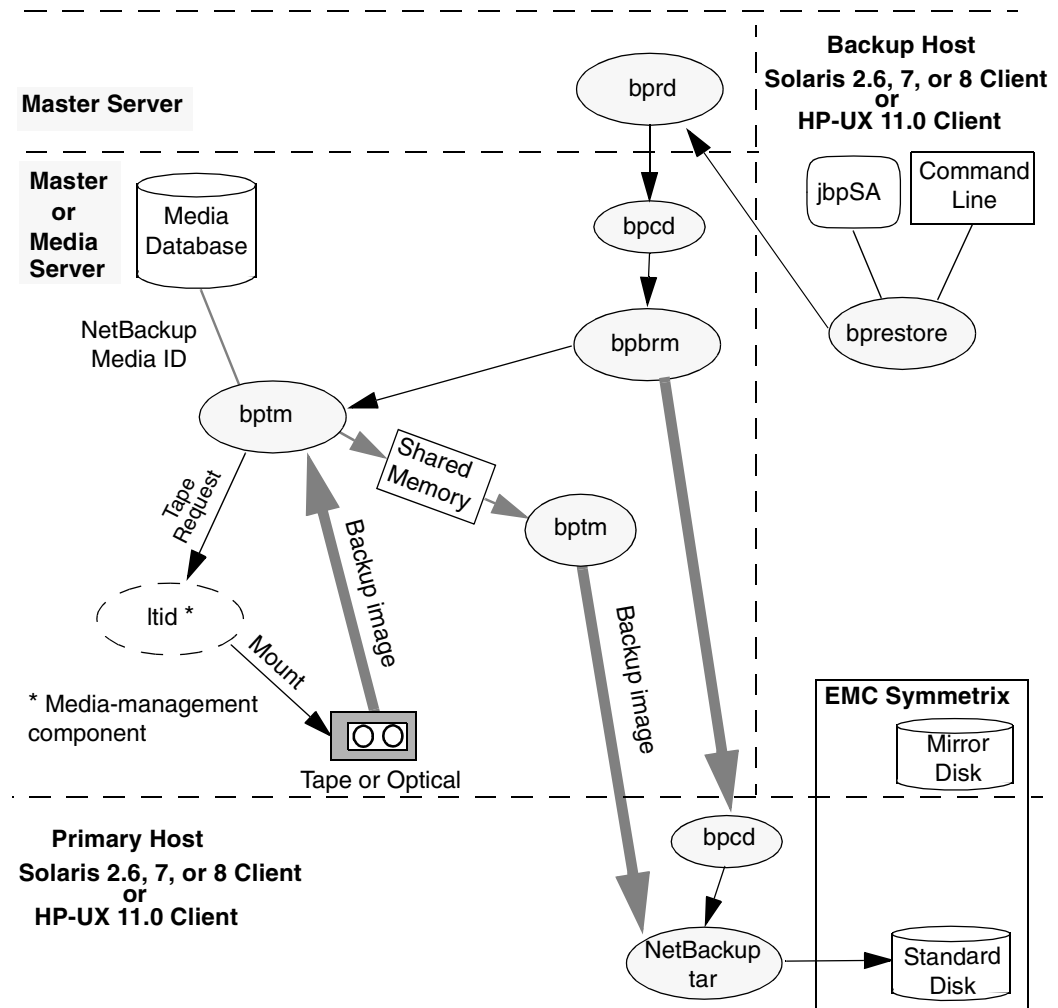
Since the data within the mirror devices is identical to the data contained on their associated primary devices, file system and like configuration data present on the devices may interfere with a full and transparent use of mirror device data by the backup host's file system and volume management software. This situation is a concern when the logical volume management software on the backup host requires the Split-Mirror data to be manually imported, or if any of the file system or logical volume manager definitions on the Split-Mirror are identical to definitions on devices local to the backup host and therefore cause a conflict.

In these situations, use of mirror devices as a source of raw data for backup will allow backup of the Split-Mirror data. The level of detail available to select backup images is limited to the raw partition name of the mirror device from the backup host's perspective.



## Restore Model

The following figure shows the major components involved in restoring files from Split-Mirror backup images using an alternate client restore.





### **Operational Flow**

During a restore, the following tasks are performed by the system administrator.

1. Shut down the database.
2. Perform a raw, alternate client restore to the primary device.
3. Restore the archive log files.
4. Restart the database.

### **Operational Considerations**

#### **Restore Mirror Device Data**

Restores to mirror devices do not automatically cause an update to the original primary device to which the mirror was paired at the time of the backup. An alternate client restore is used to directly write a backup to the primary device on the primary host.





This chapter explains how to install Split-Mirror backup on Solaris 2.6, Solaris 7, Solaris 8, and HP-UX 11.0 server and clients. This software has specific application restrictions and requirements. Please review “Requirements” on page 18 before installing this product.

## Prerequisites

You must have NetBackup 3.4 server software installed on your master server. You must also have NetBackup 3.4 client software installed on the clients that you wish to configure as primary host and backup host.

In addition, you must have the proper `SERVER =` entries in the `bp.conf` file. Edit the `bp.conf` file located in `/usr/opensv/netbackup` and add the entries to match your configuration from the following examples.

### When the Master Server and Backup Host are Different Machines

- ◆ Make sure there is a `SERVER =` entry for both the backup host and primary host in the master server’s `bp.conf` file.

For example, if server `rutabaga` has been configured as the master server, and servers `soybean` and `tofu` have been configured as the backup and primary hosts, then the `bp.conf` file for `rutabaga` should include the following entries:

```
SERVER = rutabaga.min.ov.com
SERVER = soybean.min.ov.com
SERVER = tofu.min.ov.com
CLIENT_NAME = rutabaga
```

- ◆ Make sure there is a `SERVER =` entry for the primary host in the backup host’s `bp.conf` file.

Using the same configuration example as above, the `bp.conf` file for `soybean` should include the following entries:

```
SERVER = rutabaga.min.ov.com
SERVER = soybean.min.ov.com
SERVER = tofu.min.ov.com
```



```
CLIENT_NAME = soybean
```

- ◆ Make sure there is a `SERVER =` entry for the backup host in the primary host's `bp.conf` file.

Using the same configuration example as above, the `bp.conf` file for `tofu` should include the following entries:

```
SERVER = rutabaga.min.ov.com
SERVER = soybean.min.ov.com
CLIENT_NAME = tofu
```

### **When the Master Server and Backup Host are the Same Machine**

- ◆ Make sure there is a `SERVER =` entry for the primary host in the master server's `bp.conf` file.

For example, if server `soybean` has been configured as both the master server and the backup host, and server `tofu` has been configured as the primary host, then the `bp.conf` file for `soybean` should include the following entries:

```
SERVER = soybean.min.ov.com
SERVER = tofu.min.ov.com
CLIENT_NAME = soybean
```

Make sure there is a `SERVER =` entry for the backup host in the primary host's `bp.conf` file.

Using the same configuration example as above, the `bp.conf` file for `tofu` should include the following entries:

```
SERVER = soybean.min.ov.com
CLIENT_NAME = tofu
```

## Installing NetBackup for EMC

1. Log in as root on the master server.
2. Make sure a valid license key for NetBackup for EMC has been registered by executing the following to list and add keys:

```
/usr/opensv/netbackup/bin/admincmd/get_license_key
```

3. Load from media.
  - a. Insert the CD-ROM containing the NetBackup for EMC software in the drive.
  - b. 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.

- c. To install NetBackup for EMC, execute the following:

```
./install
```

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

- ◆ Select the NetBackup for EMC option.
- ◆ Enter **q** to quit the menu.
- ◆ When asked if the list is correct, answer **y**.

4. Answer installation questions.
  - a. Choose the EMC backup host or primary host platform types you want to install.
  - b. Enter the primary (database) host name.
  - c. Enter the backup host name.
  - d. Enter **y** to configure Split-Mirror class templates on the NetBackup server.
5. Distribute the following files to the primary host's `/usr/opensv/netbackup/bin/` directory.

```
/usr/opensv/netbackup/bin/goodies/db_begin_bkup  
/usr/opensv/netbackup/bin/goodies/db_end_bkup
```



**Note** If the master server is also a client, you do not have to distribute Split-Mirror backup on the master server. This distribution is done automatically when you load the software from the media. However, you must distribute the software as explained below to the clients that will be configured as primary hosts and backup hosts.

---

**Note** In the following steps, the master must be named in the `.rhost` file on the client system in order for the remote commands to work.

---

For example:

```
cd /usr/opensv/netbackup/bin/goodies
rcp db_begin_bkup db_end_bkup \
  primary host name: /usr/opensv/netbackup/bin/
```

6. Distribute the following files to the backup host's `/usr/opensv/netbackup/bin/` directory.

```
/usr/opensv/netbackup/bin/goodies/db_begin_bkup
/usr/opensv/netbackup/bin/goodies/db_end_bkup
/usr/opensv/netbackup/bin/goodies/db_begin_streams
/usr/opensv/netbackup/bin/goodies/db_end_streams
```

For example:

```
cd /usr/opensv/netbackup/bin/goodies
rcp db_begin_bkup db_end_bkup db_begin_streams db_end_streams \
  backup host name: /usr/opensv/netbackup/bin/
```

7. Distribute the following hardware-specific library file to the backup host's `/usr/opensv/lib` directory.

```
/usr/opensv/lib/client/hardware/os/libonline_util.{sl|so}
```

Where:

*hardware* is Solaris or HP9000-800

*os* is Solaris2.6 or HP-UX11.00

HP 11.00 example:

```
cd /usr/opensv/lib/client/HP9000-800/HP-UX11.00
rcp libonline_util.sl \
  backup host name: /usr/opensv/lib
```

Solaris example:

```
cd /usr/opensv/lib/client/Solaris/Solaris2.6
```



```
rcp libonline_util.so \
backup host name: /usr/opensv/lib
```

8. Distribute the following hardware-specific binary files to the backup host's /usr/opensv/netbackup/bin directory.

```
/usr/opensv/netbackup/bin/driver/hardware/bpmirrorsplit
/usr/opensv/netbackup/bin/driver/hardware/bpmirrorsync
```

Where *hardware* is solaris or hp800.

HP example:

```
cd /usr/opensv/netbackup/bin/driver/hp800
rcp bpmirrorsplit bpmirrorsync \
backup host name: /usr/opensv/netbackup/bin/
```

Solaris example:

```
cd /usr/opensv/netbackup/bin/driver/solaris
rcp bpmirrorsplit bpmirrorsync \
backup host name: /usr/opensv/netbackup/bin/
```

## Example Solaris Installation

VERITAS NetBackup for EMC  
(sparc) 3.4

Copyright 1993 - 2000 VERITAS Software Corporation, All Rights Reserved

```
NetBackup is currently installed in /usr.
NetBackup for EMC will be installed in
/usr/opensv/lib/client and
/usr/opensv/netbackup/bin/driver.
```

Choose the EMC Backup/Primary Host platform you wish to install

Platform options

-----

1. HP9000
2. Solaris

Enter Choice (Default is 2) [1-2,?,q] 2

You have chosen to install Solaris NetBackup for EMC.

Is this okay? (y) [y,n,?]



```
Do you want to configure split-mirror class templates? (y) [y,n,?] y

Enter the Primary (database) host name (default is nut): turnip

Enter the Backup host name (default is nut): nut
Using </usr> as the package base directory.

## Processing package information.
## Processing system information.
## Verifying package dependencies.
WARNING:
    The <SUNWnetbp> package "VERITAS NetBackup" is a
    prerequisite package and should be installed.

Do you want to continue with the installation of <SUNWnbemc> [y,n,?] y
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <SUNWnbemc> [y,n,?] y

Installing VERITAS NetBackup for EMC as <SUNWnbemc>

## Installing part 1 of 1.
[ verifying class <NBemcclass> ]
/usr/openv/lib/client/Solaris/Solaris2.6/libonline_util.so
/usr/openv/netbackup/bin/driver/solaris/bpmirrorsplit
/usr/openv/netbackup/bin/driver/solaris <implied directory>
/usr/openv/netbackup/bin/driver/solaris/bpmirrorsync
[ verifying class <NBemc1class> ]
## Executing postinstall script.

turnip and nut must be the same OS level.
Supported OS levels are Solaris 2.6, Solaris 7, Solaris 8 and HP-UX11.00.

Adding class templates for split-mirror backups...

enter ^C within 5 seconds to terminate
...creating class template_split_mirror.basic
...creating schedules for class template_split_mirror.basic
...creating template template_split_mirror.basic
...creating schedules for template template_split_mirror.basic
```





```
...creating class template_split_mirror.adv
...creating schedules for class template_split_mirror.adv
...creating template template_split_mirror.adv
...creating schedules for template template_split_mirror.adv
...creating class template_split_mirror.basic.lvm
...creating schedules for class template_split_mirror.basic.lvm
...creating template template_split_mirror.basic.lvm
...creating schedules for template template_split_mirror.basic.lvm
...creating class template_split_mirror.adv.lvm
...creating schedules for class template_split_mirror.adv.lvm
...creating template template_split_mirror.adv.lvm
...creating schedules for template template_split_mirror.adv.lvm
...creating class template_split_mirror.mult.devgrp.adv
...creating schedules for class
    template_split_mirror.mult.devgrp.adv
...creating template template_split_mirror.mult.devgrp.adv
...creating schedules for template
    template_split_mirror.mult.devgrp.adv
...creating class template_split_mirror.mult.devgrp.adv.lvm
...creating schedules for class
    template_split_mirror.mult.devgrp.adv.lvm
...creating template template_split_mirror.mult.devgrp.adv.lvm
...creating schedules for template
    template_split_mirror.mult.devgrp.adv.lvm
Done creating example classes and schedules.
```

Please refer to the NetBackup for EMC System Administrator's Guide for complete details on the use and configuration of NetBackup for EMC.

Installation of <SUNWnbemc> was successful.

## Example HP-UX Installation

```
VERITAS Installation Script
Copyright 2000 VERITAS Software Corporation
```

```
Installation Options
```

```
1 NetBackup for EMC
```

```
q To quit from this script
```

```
Choose an option [q]: 1
```



Choose the EMC Backup/Primary Host platform you wish to install.

Platform Options

-----

- 1. HP9000
- 2. Solaris
- q. quit

Enter Choice 1

You have chosen to install HP9000 NetBackup for EMC.

Is this okay? (y/n) [y]

- x HP9000-800/HP-UX11.00/libonline\_util.sl, 11 bytes, 1 tape blocks
- x hp800/bpmirrorsync, 11 bytes, 1 tape blocks
- x hp800/bpmirrorsplit, 11 bytes, 1 tape blocks

Enter the Primary (database) host name (default is soybean):tofu

Enter the Backup host name (default is soybean):soybean

tofu and soybean must be the same OS level.

Supported OS levels are Solaris 2.6, Solaris 7, Solaris 8 and HP-UX11.00.

Do you want to configure split-mirror class templates? (y/n) [y]y

Adding class templates for split-mirror backups...

```
...creating class template_split_mirror.basic
...creating schedules for class template_split_mirror.basic
...creating template template_split_mirror.basic
...creating schedules for template template_split_mirror.basic
...creating class template_split_mirror.adv
...creating schedules for class template_split_mirror.adv
...creating template template_split_mirror.adv
...creating schedules for template template_split_mirror.adv
...creating class template_split_mirror.basic.lvm
...creating schedules for class template_split_mirror.basic.lvm
...creating template template_split_mirror.basic.lvm
...creating schedules for template template_split_mirror.basic.lvm
...creating class template_split_mirror.adv.lvm
...creating schedules for class template_split_mirror.adv.lvm
...creating template template_split_mirror.adv.lvm
...creating schedules for template template_split_mirror.adv.lvm
...creating class template_split_mirror.mult.devgrp.adv
...creating schedules for class
  template_split_mirror.mult.devgrp.adv
...creating template template_split_mirror.mult.devgrp.adv
...creating schedules for template
```



```
template_split_mirror.mult.devgrp.adv
...creating class template_split_mirror.mult.devgrp.adv.lvm
...creating schedules for class
  template_split_mirror.mult.devgrp.adv.lvm
...creating template template_split_mirror.mult.devgrp.adv.lvm
...creating schedules for template
  template_split_mirror.mult.devgrp.adv.lvm
Done creating example classes and schedules.
```

Please refer to the NetBackup for EMC System Administrator's Guide for complete details on the use and configuration of NetBackup for EMC.





This chapter describes how to configure Split-Mirror classes. It assumes that you have completed the installation as described in Chapter 2.

In order to configure NetBackup to properly manipulate the Oracle database and Symmetrix devices involved in backups, one or more Symmetrix device groups must be configured on the primary host, with an exact replica of Symmetrix device groups configured on the backup host. Logical volumes must be configured over the primary devices on the primary host with volumes replicated on the mirror devices on the backup host. Refer to Appendix B.

In addition, detailed information about the target Oracle database and the Symmetrix device configuration is required. Typically such information is obtained from the database administrator for the database involved, and the system administrator for the hosts involved with running the database and performing the backups. Upon collecting this information, you can start configuring Split-Mirror backup. The following topics are described in this chapter.

1. Modify the bp.conf File on the NetBackup Server
2. Modify the NetBackup Configuration Parameters
3. Define a Storage Unit
4. Add Split-Mirror Backup Classes to NetBackup
5. Multiple Data Streams File List Directives
6. Add Archive Log Backup Classes to NetBackup

If activity logging is desired, the administrator must create directories for Split-Mirror backup. Refer to “Troubleshooting Hints” in Chapter 5 for more details.



## Modify the `bp.conf` File on the NetBackup Server

NetBackup servers and clients have configuration options. The configuration parameters are defined in file `bp.conf`. Parameter changes can be made by editing this file. On the NetBackup server, the file is located in the `/usr/opensv/netbackup/` directory. Edit the file to add the following entries, if they are not already included. After changes are made to the file, restart NetBackup daemons and processes for the new parameter values to take effect.

### ALLOW\_SPLIT\_MIRROR

The `ALLOW_SPLIT_MIRROR` entry should have been added to the `bp.conf` file during the installation of Split-Mirror backup.

### VERBOSE

This option causes NetBackup to include more information in its logs.

### BPSTART\_TIMEOUT

This option specifies the number of seconds to use for the timeout while waiting for commands on a UNIX client to complete. The commands that use this timeout setting are `db_begin_bkup`, `db_end_bkup`, `bpmirrorsplit`, `bpmirrorsync` and `db_begin_streams`. An example is 1800 seconds or 30 minutes.

### BPEND\_TIMEOUT

This option specifies the number of seconds to use for the timeout while waiting for commands on a UNIX client to complete. The `db_end_streams` command uses this timeout value. An example is 1800 seconds or 30 minutes.

### CLIENT\_READ\_TIMEOUT

This option specifies the number of seconds to use for client-read timeout. An example is 1800 seconds (30 minutes).

## Modify the NetBackup Configuration Parameters

1. Log on to the backup host as root.
2. Start the NetBackup administration software by executing the following:  

```
/usr/opensv/netbackup/bin/jnbSA &
```
3. From the Configure menu, select **NetBackup System Configuration**.
4. If you are configuring for multiple data streams, set **Maximum jobs per client** to a value greater than or equal to the number of streams you plan to set up for all classes on the backup host. Also refer to the note under “Multiple Data Streams File List Directives” on page 45.

## Define a Storage Unit

1. Log on to the backup host as root.
2. Start the NetBackup administration software by executing the following:  

```
/usr/opensv/netbackup/bin/jnbSA &
```
3. Start the **Storage Unit Management** utility.
4. Define a storage unit if it does not already exist.  
From the **Storage-Unit** menu, select **New**.  
See the *NetBackup System Administrator's Guide - UNIX* or the *NetBackup System Administrator's Guide - Windows NT/2000* for a general description of this process.
5. If you are configuring for multiple data streams, set **Maximum multiplexing per drive** to a value determined by the maximum number of streams divided by the number of drives in this storage unit. Also refer to the note under “Multiple Data Streams File List Directives” on page 45.



## Add Split-Mirror Backup Classes to NetBackup

To use Split-Mirror software, you must add at least one Split-Mirror class to NetBackup.

1. Log on to the backup host as root.
2. Start the NetBackup administration software by executing the following:

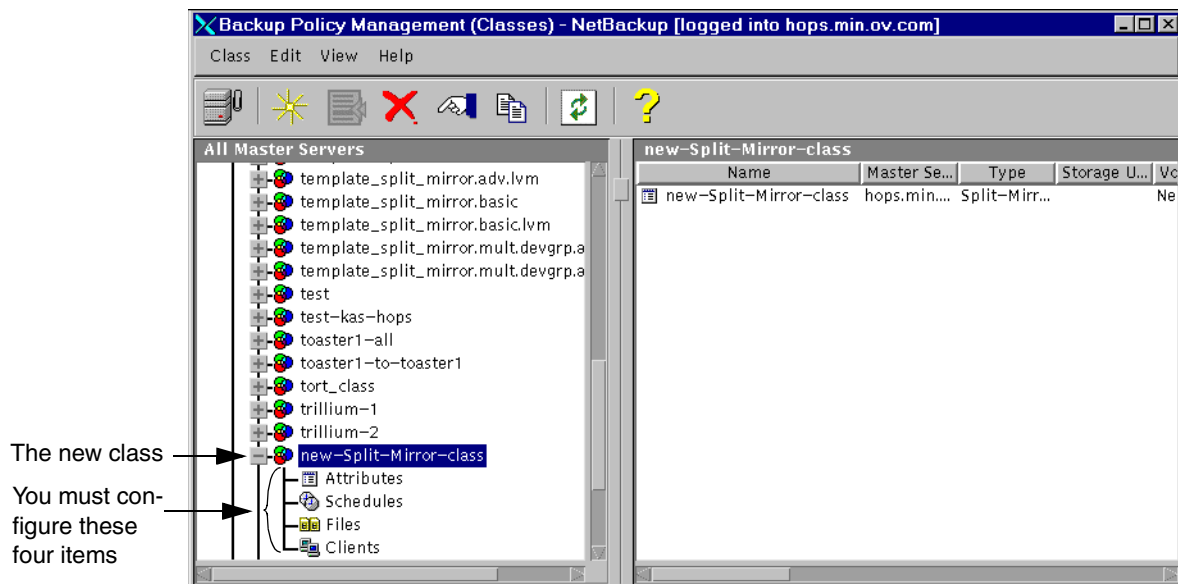
```
/usr/opensv/netbackup/bin/jnbSA &
```

3. Start the Backup Policy Management utility.
4. In the left pane, locate a Split-Mirror template.

There are Solaris VxVM and HP LVM templates (of the form `template_split_mirror.*`) for creating basic and advanced classes. If you are configuring multiple data streams or multiple device groups, use an advanced template.

5. Right click on a Split-Mirror template name, and select Copy in the pop-up.
6. Enter a name for the new class in the Copy a Class dialog and click OK.

The new class is listed in the left pane (shown below).





Only the configuration parameters unique to Split-Mirror classes are described here (under Attributes, Schedules, Clients, and Files). For a detailed discussion of configuring NetBackup classes, see the *NetBackup System Administrator's Guide - UNIX* or the *NetBackup System Administrator's Guide - Windows NT/2000*.

## Attributes

Double-click the Attributes icon beneath your Split-Mirror class (see the example screen on the previous page). The Change Attributes dialog appears.

- ◆ Set **Class type** to Split-Mirror. **Class type** is set to Split-Mirror by default when using a Split-Mirror class template.
- ◆ If you are configuring for multiple data streams, make sure to place a check in the box for **Allow multiple data streams**. Also, set **Limit jobs per class** to a value greater than or equal to the number of streams you plan to set up (refer to the note under “Multiple Data Streams File List Directives” on page 45).

## Schedules

Double-click the Schedules icon beneath your Split-Mirror class. The Add Schedule dialog appears.

- ◆ For **Type of backup**, select Full Backup. Split-Mirror backup supports only Full Backup schedule types; incremental, user backup and archive schedule types are not allowed.
- ◆ If you are configuring multiple data streams, set **Media multiplexing** to the maximum number of streams to allow for each schedule. (The actual number of streams is determined by how many NEW\_STREAM entries are in the file list. Refer to the note and the NEW\_STREAM directive under “Multiple Data Streams File List Directives” on page 45.)

## Clients

Double-click the Clients icon beneath your Split-Mirror class. The Add Client dialog appears.

- ◆ In Split-Mirror configurations, specify the backup host under **Client name**. The backup host has direct access to the mirror devices which will be used to back up the database table data.

---

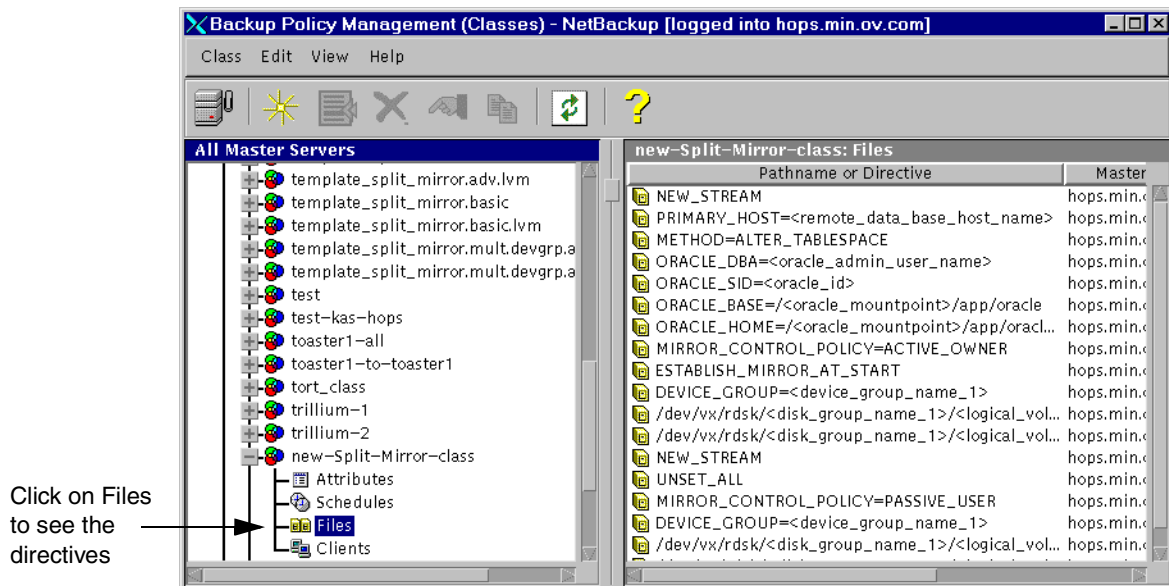
**Note** The primary host should not be specified as a client.

---



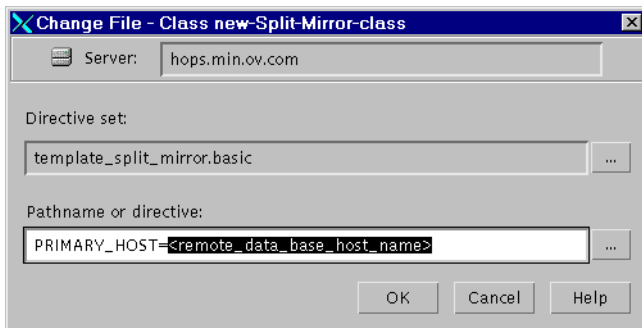
## Files

Each template file contains configuration directives. To display them, click on the Files icon beneath your Split-Mirror class name. The directives appear in the Files pane on the right (shown in the example screen, below). The Files pane lists files to be backed up and the configuration directives.



Some of the directives contain a parameter with delimiters <>. The text inside the <>'s are comments and must be replaced with text that matches your configuration.

To configure a directive, double click on it (or right-click and select Change). The Change File dialog appears.



- ◆ For each directive required by the Split-Mirror class, replace the highlighted text with a name or other specification appropriate for your site.
- ◆ To remove a directive from the list, right click on the directive in the Files pane and select Delete.

The following is a description of the directives required for Split-Mirror classes.

### Oracle File List Directives

To configure a Split-Mirror class to back up an Oracle database, the following directives are required.

---

**Note** If you are NOT backing up an Oracle database on the primary host, the following Oracle directives *must be omitted*.

---

PRIMARY\_HOST = *<remote\_data\_base\_host\_name>*

The hostname of the primary host on which database manipulation commands are executed.

ORACLE\_DBA= *<oracle\_admin\_usr\_name>*

Oracle administrator's user name, generally oracle.

ORACLE\_BASE= *</<oracle\_mountpoint>/app/oracle>*

The Oracle top-most directory.

ORACLE\_HOME= *</<oracle\_mountpoint>/app/oracle/product/release>*

The Oracle home directory.

ORACLE\_SID= *<oracle\_id>*

Oracle SID value which identifies the Oracle database to be backed up.

METHOD=ALTER\_TABLESPACE

Split-Mirror backup software uses this method to perform an online database backup.

### Split-Mirror File List Directives

To configure a Split Mirror class, the following directives are required.

MIRROR\_CONTROL\_POLICY=*<value>*

A value that indicates how much the backup class controls the mirror devices involved in the backup. This directive is required for each stream specified in the file list. If the multiple data streams feature is not enabled, MIRROR\_CONTROL\_POLICY should be defined once. Possible values are ACTIVE\_OWNER and PASSIVE\_USER.

ACTIVE\_OWNER



Indicates the backup class has primary control over the mirror device and can therefore use vendor specific mirroring control commands to split and establish mirrors without causing a potential interrupt to other applications or loss of data.

If ACTIVE\_OWNER is required for multiple data streams, the MIRROR\_CONTROL\_POLICY for the stream in control for each DEVICE\_GROUP should be set to ACTIVE\_OWNER. The stream in control is the first stream. All successor streams for that same DEVICE\_GROUP should be set to PASSIVE\_USER.

#### PASSIVE\_USER

Indicates the backup class is dependent on some external application to manipulate the mirrors and that no split nor establish control commands should be attempted. No explicit coordination between the backup class and any external application is provided. However, the backup class will enter a loop in which the availability of the mirrors is checked periodically until the devices become available or until the backup times out.

#### DEVICE\_GROUP=<device\_group\_name>

Name of the EMC Symmetrix device group that represents the Symmetrix primary devices and mirror devices which are used to store the data associated with the database to be backed up. This directive must be set for each stream for multiple data streams, even if it is the same DEVICE\_GROUP as the previous stream.

#### ESTABLISH\_MIRROR\_AT\_START

Indicates that the mirror devices should be synchronized with their associated primary devices at the start of the backup if found to be in an unsynchronized state. It is only meaningful in situations where the MIRROR\_CONTROL\_POLICY value has been set to ACTIVE\_OWNER. This directive can be defined for each new DEVICE\_GROUP specified in the file list when multiple data streams is enabled.

#### ESTABLISH\_MIRROR\_AT\_END

Indicates that the mirror devices should be synchronized with their associated primary devices at the end of the backup.

## Multiple Data Streams File List Directives

To configure a Split Mirror class for multiple data streams, the following directives are required.

---

**Note** If the Allow multiple data streams attribute is selected for Split Mirror class types, all streams must be set to Active for the Split Mirror backup to be successful. This means that all streams must be able to start at the same time (no backups can be queued waiting for others to complete). For Split-Mirror backups, make sure that the following are set to allow the number of active streams to be equal to or greater than the number of streams in the file list:

- Class attribute: Limit jobs per class
  - Schedule setting: Media multiplexing
  - Storage unit setting: Maximum multiplexing per drive
  - System configuration setting: Maximum jobs per client
- 

### NEW\_STREAM

Entries listed below this directive are associated with a particular stream until the next NEW\_STREAM in the file list. NEW\_STREAM must be the very first entry in the file list when the multiple data streams feature is used. See “Example: Split-Mirror Class, Multiple Data Streams, Multiple Device Groups” on page 49. The UNSET\_ALL directive must follow the NEW\_STREAM directive.

The first stream in the file list that has been identified by the NEW\_STREAM directive is automatically the default stream in control. All other successor streams identified by additional NEW\_STREAM directives are subordinate to the stream in control.

### UNSET\_ALL

The UNSET\_ALL directive has the same effect as UNSET but works on all directives that have been defined up to that point.

### UNSET

The UNSET directive is used to undefine a directive. This will prevent a currently defined directive string from being passed with any additional streams. The directive that was unset may be defined again in the current or later stream. This directive must be used directly after each NEW\_STREAM directive in the file list. See “Example: Split-Mirror Class, Multiple Data Streams, Multiple Device Groups” on page 49.



## Example Split-Mirror Classes

Default entries in the file list for a Split-Mirror class are installed in the file list when a Split-Mirror class template is used. Refer to “Add Split-Mirror Backup Classes to NetBackup” on page 40 for details on the templates. See the examples below for Split-Mirror classes with and without multiple data streams.

### Example: Split-Mirror Class, Single Device Group

```
Class Name:          Split_One

Class Type:          Split-Mirror
Active:              yes
Client Compress:     no
Mult. Data Streams: no
Class Priority:      0
Max Jobs/Class:     99
Residence:           SureStore450
Volume Pool:         NetBackup
Keyword:             DB_3

HW/OS/Client:       Sun4          Solaris2.6      rutabaga
```

---

**Note** The client must be set to the backup host, NOT to the primary host.

---

```
Include:  PRIMARY_HOST=turnip
          METHOD=ALTER_TABLESPACE
          ORACLE_DBA=oracle8
          ORACLE_SID=DB_3
          ORACLE_HOME=/oracle_sw_prod/oracle8/app/oracle/product/8.0.4
          ORACLE_BASE=/oracle_sw_prod/oracle8/app/oracle
          MIRROR_CONTROL_POLICY=ACTIVE_OWNER
          ESTABLISH_MIRROR_AT_START
          ESTABLISH_MIRROR_AT_END
          DEVICE_GROUP=oracle_DB_3
          /dev/vx/rdsk/oracle_DB_3/oDB3-vol-01
          /dev/vx/rdsk/oracle_DB_3/oDB3-vol-02
```

```
Schedule:          full
Type:              Full Backup
Frequency:         every 7 days
Maximum MPX:       1
Retention Level:   3 (1 month)
Residence:         (specific storage unit not required)
Volume Pool:       (same as class volume pool)
Daily Windows:
```

---

```

Sunday      16:00:00  -->  Sunday      24:00:00
Monday      16:00:00  -->  Monday      24:00:00
Tuesday     16:00:00  -->  Tuesday     24:00:00
Wednesday   16:00:00  -->  Wednesday   24:00:00
Thursday    16:00:00  -->  Thursday    24:00:00
Friday      16:00:00  -->  Friday      24:00:00
Saturday    16:00:00  -->  Saturday    24:00:00

```

### Example: Split-Mirror Class, Multiple Device Groups

```

Class Name:          Split_Multiple

Class Type:          Split-Mirror
Active:              yes
Client Compress:     no
Mult. Data Streams: no
Class Priority:      0
Max Jobs/Class:     99
Residence:           SureStore450
Volume Pool:         NetBackup
Keyword:             DB_3

HW/OS/Client:       Sun4          Solaris2.6      rutabaga

```

---

**Note** The client must be set to the backup host, NOT to the primary host.

---

```

Include:  PRIMARY_HOST=turnip
          METHOD=ALTER_TABLESPACE
          ORACLE_DBA=oracle8
          ORACLE_SID=DB_3
          ORACLE_HOME=/oracle_sw_prod/oracle8/app/oracle/product/8.0.4
          ORACLE_BASE=/oracle_sw_prod/oracle8/app/oracle
          MIRROR_CONTROL_POLICY=ACTIVE_OWNER
          ESTABLISH_MIRROR_AT_START
          ESTABLISH_MIRROR_AT_END
          DEVICE_GROUP=oracle_DB_3
          /dev/vx/rdisk/oracle_DB_3/oDB3-vol-01
          /dev/vx/rdisk/oracle_DB_3/oDB3-vol-02
          DEVICE_GROUP=oracle_DB_4
          /dev/vx/rdisk/oracle_DB_4/oDB4-vol-01
          /dev/vx/rdisk/oracle_DB_4/oDB4-vol-02

Schedule:          full
Type:              Full Backup
Frequency:         every 7 days

```



Maximum MPX: 1  
Retention Level: 3 (1 month)  
Residence: (specific storage unit not required)  
Volume Pool: (same as class volume pool)  
Daily Windows:  
    Sunday 16:00:00 --> Sunday 24:00:00  
    Monday 16:00:00 --> Monday 24:00:00  
    Tuesday 16:00:00 --> Tuesday 24:00:00  
    Wednesday 16:00:00 --> Wednesday 24:00:00  
    Thursday 16:00:00 --> Thursday 24:00:00  
    Friday 16:00:00 --> Friday 24:00:00  
    Saturday 16:00:00 --> Saturday 24:00:00

### Example: Split-Mirror Class, Multiple Data Streams, Single Device Group

Class Name: Split\_Stream\_Single

Class Type: Split-Mirror  
Active: yes  
Client Compress: no  
Mult. Data Streams: yes  
Class Priority: 0  
Max Jobs/Class: 999  
Residence: SureStore450  
Volume Pool: NetBackup  
Keyword: DB\_3

HW/OS/Client: Sun4 Solaris2.6 rutabaga

---

**Note** The client must be set to the backup host, NOT to the primary host.

---

Include: NEW\_STREAM  
    PRIMARY\_HOST=turnip  
    METHOD=ALTER\_TABLESPACE  
    ORACLE\_DBA=oracle8  
    ORACLE\_SID=DB\_3  
    ORACLE\_HOME=/oracle\_sw\_prod/oracle8/app/oracle/product/8.0.4  
    ORACLE\_BASE=/oracle\_sw\_prod/oracle8/app/oracle  
    MIRROR\_CONTROL\_POLICY=ACTIVE\_OWNER  
    ESTABLISH\_MIRROR\_AT\_START  
    ESTABLISH\_MIRROR\_AT\_END  
    DEVICE\_GROUP=oracle\_DB\_3  
    /dev/vx/rdisk/oracle\_DB\_3/ODB3-vol-01  
NEW\_STREAM  
UNSET\_ALL





```
MIRROR_CONTROL_POLICY=PASSIVE_USER
DEVICE_GROUP=oracle_DB_3
/dev/vx/rdsk/oracle_DB_3/odb3-vol-02
```

```
Schedule:          full
Type:             Full Backup
Frequency:        every 7 days
Maximum MPX:      4
Retention Level:  3 (1 month)
Residence:        (specific storage unit not required)
Volume Pool:      (same as class volume pool)
Daily Windows:
  Sunday          16:00:00 --> Sunday      24:00:00
  Monday          16:00:00 --> Monday      24:00:00
  Tuesday         16:00:00 --> Tuesday     24:00:00
  Wednesday       16:00:00 --> Wednesday  24:00:00
  Thursday        16:00:00 --> Thursday   24:00:00
  Friday          16:00:00 --> Friday     24:00:00
  Saturday       16:00:00 --> Saturday   24:00:00
```

### Example: Split-Mirror Class, Multiple Data Streams, Multiple Device Groups

```
Class Name:        Split_Stream_Multiple

Class Type:        Split-Mirror
Active:            yes
Client Compress:   no
Mult. Data Streams: yes
Class Priority:    0
Max Jobs/Class:    999
Residence:         SureStore450
Volume Pool:       NetBackup
Keyword:           DB_3

HW/OS/Client:     Sun4           Solaris2.6   rutabaga
```

---

**Note** The client must be set to the backup host, NOT to the primary host.

---

```
Include: NEW_STREAM
         PRIMARY_HOST=turnip
         METHOD=ALTER_TABLESPACE
         ORACLE_DBA=oracle8
         ORACLE_SID=DB_3
         ORACLE_HOME=/oracle_sw_prod/oracle8/app/oracle/product/8.0.4
         ORACLE_BASE=/oracle_sw_prod/oracle8/app/oracle
```



```
MIRROR_CONTROL_POLICY=ACTIVE_OWNER
ESTABLISH_MIRROR_AT_START
ESTABLISH_MIRROR_AT_END
DEVICE_GROUP=oracle_DB_3
/dev/vx/rdsk/oracle_DB_3/oDB3-vol-01
NEW_STREAM
UNSET_ALL
MIRROR_CONTROL_POLICY=ACTIVE_OWNER
ESTABLISH_MIRROR_AT_START
ESTABLISH_MIRROR_AT_END
DEVICE_GROUP=oracle_DB_4
/dev/vx/rdsk/oracle_DB_4/oDB4-vol-02
```

```
Schedule:          full
Type:              Full Backup
Frequency:         every 7 days
Maximum MPX:      4
Retention Level:  3 (1 month)
Residence:         (specific storage unit not required)
Volume Pool:      (same as class volume pool)
Daily Windows:
  Sunday  16:00:00  -->  Sunday  24:00:00
  Monday  16:00:00  -->  Monday  24:00:00
  Tuesday 16:00:00  -->  Tuesday  24:00:00
  Wednesday 16:00:00 --> Wednesday 24:00:00
  Thursday 16:00:00 --> Thursday  24:00:00
  Friday   16:00:00 -->   Friday   24:00:00
  Saturday 16:00:00 --> Saturday  24:00:00
```



## Add Archive Log Backup Classes to NetBackup

After a successful Split-Mirror backup of an Oracle database, it is necessary to back up the archived Oracle redo logs. These redo logs represent the changes made to the database while in backup mode.

The suggested method of causing the archived redo logs to be backed up with Split-Mirror backup is to use the `backup_exit_notify` script on the NetBackup master to initiate a manual backup of the archived redo logs on the primary host using a separate NetBackup class. The `backup_exit_notify` script is located in the `/usr/opensv/netbackup/bin` directory. Since the archived redo logs are typically written to file systems on the primary host, an incremental backup schedule can be used to back up only the data which has changed since the previous backup of the file system involved.

The client list should include the primary host where the database resides. The file list should include any directories that contain the Oracle archive logs. They are typically in the following directories:

```
$ORACLE_HOME/dbs  
$ORACLE_BASE/admin/$ORACLE_SID
```

Refer to “Example: Oracle Archive Log Standard Class” on page 53.

Example: Use the `backup_exit_notify` script to initiate an incremental backup of Oracle log and configuration data on the database host. The class is specified by the `-c` command line option of `bpbackup` in the `backup_exit_notify` script.



```

#!/bin/sh
# $Header: backup_exit_notify.sh,v 1.4 1999/01/21 10:51:52 glt Exp $

#bcprgrht
#*****
#* Copyright 1993 - 1999 VERITAS Software Corporation, All Rights Reserved *
#*****
#ecprgrht
#
# backup_exit_notify.sh
#
# This script is called by the NetBackup scheduler, after an individual
# client backup has completed (including media closure and image db validation.
#
# NOTE: this script will always be run in "background" mode, meaning that
# the NetBackup scheduler will NOT wait for it's completion.
#
# This script:
#   receives 5 parameters:
#     CLIENT      - the client hostname
#     CLASS       - the class label
#     SCHEDULE    - the schedule label
#     SCHEDULE_TYPE - the type of schedule: FULL INCR UBAK UARC
#     STATUS      - the backup status for this job
#     STREAM      - the backup stream number for this job
#   must be executable by the root user
#   should exit with 0 upon successful completion

OUTF=/usr/openv/netbackup/bin/BACKUP_EXIT_CALLED

# -----
# main script starts here
# -----

if [ "$#" -lt 6 ]
then
    echo `date` "backup_exit_notify expects at least 6 parameters: $" >> $OUTF
    exit 1
fi

# You may want to delete the output file elsewhere in order to
# accumulate successful backup information.
# If so, comment out the following 4 lines.
if [ -s $OUTF ]
then
    /bin/rm -rf $OUTF
fi

if [ ! -f $OUTF ]
then
    touch $OUTF
fi

echo `date` "-----" >> $OUTF
echo `date` "      CLIENT: $1" >> $OUTF
echo `date` "      CLASS: $2" >> $OUTF
echo `date` "      SCHEDULE: $3" >> $OUTF
echo `date` "SCHEDULE TYPE: $4" >> $OUTF
echo `date` "      STATUS: $5" >> $OUTF
echo `date` "      STREAM: $6" >> $OUTF
echo `date` "-----" >> $OUTF

```

Use a text editor to add the following comment lines (optional) and if statement to the `backup_exit_notify` script. Add the text before the line that reads “# might want to mail this info to someone”.

Add these lines

```
# -----
# Class-specific processing.
# -----

# Special processing for the DB_5_split_mirror backup class - check if the
# classname matches "DB_5_split_mirror", the exit status is zero, and that
# this execution of backup_exit_notify was caused by the first stream of the
# backup (the stream in control).
#

if [ "$2" = "DB_5_split_mirror" -a "$5" = 0 -a "$6" = 1 ]; then
    echo 'date' "$2 STREAM $6: Initiating backup of Oracle archive logs for DB 5." >> $OUTF
    /usr/openv/netbackup/bin/bpbackup -c DB_5_archive_log_backup -i -h db_client_host -s incr >> $OUTF
    echo "STATUS: $?" >> $OUTF
fi

#
# might want to mail this info to someone
#
# cat $OUTF | mail -s "NetBackup backup exit" sys_admin

exit 0
```

### Example: Oracle Archive Log Standard Class

Class Name: DB\_5\_archive\_log\_backup

```
Class Type: Standard
Active: yes
Client Compress: no
Follow NFS Mounts: no
Cross Mount Points: yes
Collect TIR info: no
Block Incremental: no
Mult. Data Streams: no
Class Priority: 0
Max Jobs/Class: 99
Disaster Recovery: 0
Residence: SureStore450
Volume Pool: NetBackup
Keyword: (none specified)
```

HW/OS/Client: Sun4 Solaris2.6 turnip



**Note** The client specified for the archive log standard class should be the primary host.

---

Include: /oracle\_sw\_prod/oracle8/app/oracle/product/8.0.4/dbs  
/oracle\_sw\_prod/oracle8/app/oracle/admin/DB\_3

Schedule: full  
Type: Full Backup  
Frequency: every 7 days  
Maximum MPX: 1  
Retention Level: 0 (1 week)  
Residence: (specific storage unit not required)  
Volume Pool: (same as class volume pool)  
Daily Windows:

Schedule: incr  
Type: Cumulative Incremental Backup  
Frequency: every 7 days  
Maximum MPX: 1  
Retention Level: 0 (1 week)  
Residence: (specific storage unit not required)  
Volume Pool: (same as class volume pool)  
Daily Windows:

The following topics are covered in this chapter:

- ◆ Performing a Backup
- ◆ Performing a Restore
- ◆ Checking Logs



## Performing a Backup

### Automatic Backup of a Split-Mirror Class

The most convenient way to back up raw partitions with Split-Mirror backup is to configure a Split-Mirror class and then set up schedules for automatic, unattended backups. To add new schedules or change existing schedules for automatic backups, follow the guidelines in Chapter 3 of this guide and the *NetBackup User's Guide - UNIX*.

### Manual Backup of a Split-Mirror Class

The administrator on the master server can use `jnbSA`, `xbpadm`, or `bpadm` to manually execute a backup for a Split-Mirror class. See the *NetBackup User's Guide - UNIX* for instructions.

## Performing a Restore

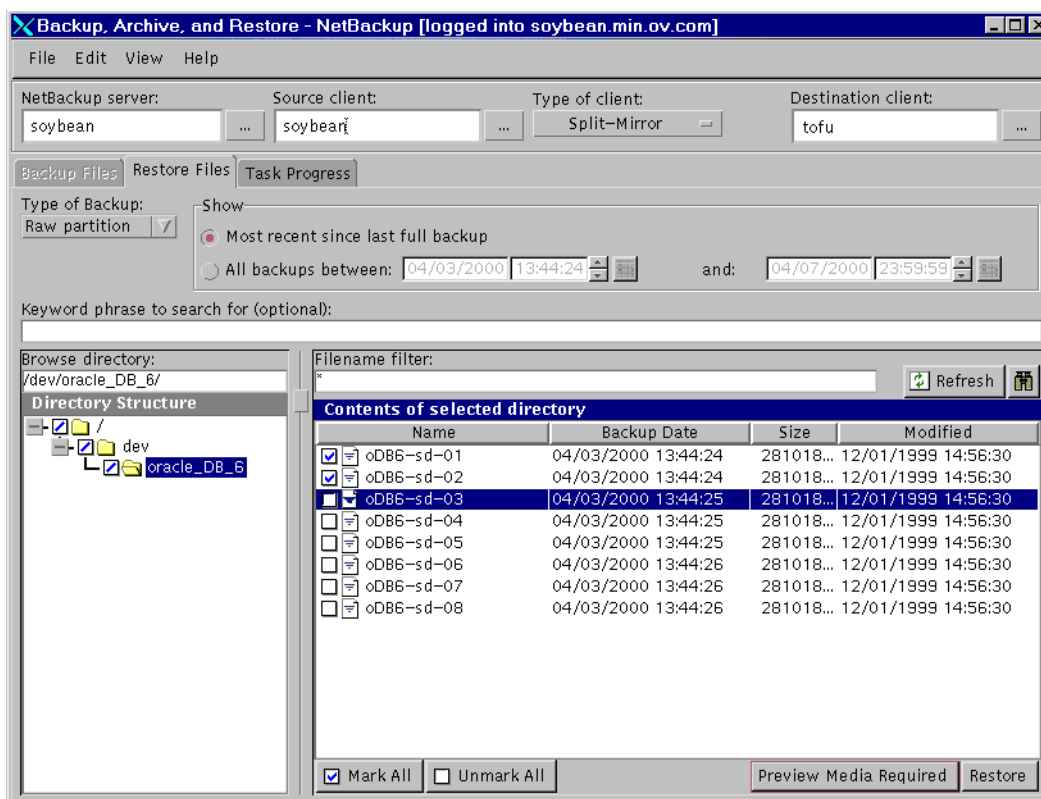
Perform an alternate client restore to restore raw partitions from a Split-Mirror backup. Refer to the *NetBackup User's Guide - UNIX* for detailed instructions.

1. Shut down the database on the primary host.
2. Initiate the alternate client restore on the master server.
  - a. Log on to the backup host as root.
  - b. Start `jbpSA` by executing the following:  

```
/usr/opensv/netbackup/bin/jbpSA &
```
3. Specify the alternate client to restore to.
  - a. Specify the name of the server in the NetBackup server box.
  - b. Specify the backup host as the Source client.
  - c. Set the Type of client to Split-Mirror.
  - d. Specify the primary host as the Destination client.
4. For Type of Backup, select Raw partition.
5. Specify the following:



- ◆ At the top of the Browse directory pane, enter the raw partition directory.
  - ◆ Under Show, select Most recent since last full backup, or All backups between and select a range.
6. Click Refresh.
  7. In the Contents of selected directory pane, click on the raw logical volumes to restore.  
Below is an example showing two volumes selected to restore.



8. Click Restore.  
The Restore Files window appears.
9. Click Start Restore.
10. Restore the archive log for Oracle.

When restoring an Oracle database, you must restore the Oracle archive logs that were backed up with a separate class and that were started by the `backup_exit_notify` script. The type of restore to use depends on the class and backup method that were specified in the `backup_exit_notify` script. (The standard file system backup is recommended.) If standard was used, a file system restore of the archive log directories on the primary host is required.

## Checking Logs

Refer to the *NetBackup Troubleshooting Guide - UNIX* or the *NetBackup Troubleshooting Guide - Windows NT/2000* for instructions on creating log directories. Also refer to Chapter 5 in this guide.

### Backup Messages

During a backup, Split-Mirror backup operations are logged to the `bpbkar` activity log directory on the client: `/usr/opensv/netbackup/logs/bpbkar`.

### Restore Messages

During a restore, Split-Mirror backup operations are logged to the `bprd` activity log directory on the master server: `/usr/opensv/netbackup/logs/bprd`.

### Split-Mirror Class Specific Messages

Messages for the Split-Mirror class are logged to the `split_mirror` log directory on the client: `/usr/opensv/netbackup/logs/split_mirror`.

### Control Messages

Split-mirror control files exist in addition to the Split-Mirror log files. The control files are located on the backup host, in `/usr/opensv/netbackup/split_mirror` in the `db_cntl`, `mirror_cntl`, and `stream_cntl` directories. The control files capture the output of specific command execution that can be used to debug a problem with a Split-Mirror backup. The control files will only remain if a Split-Mirror backup fails.

The `db_cntl` directory contains control files associated with data base manipulation commands. The `mirror_cntl` directory contains files associated with controlling the mirror device such as synchronize and split operations. The `stream_cntl` directory contains control files associated with controlling multiple data streams.

---

The control files are named with the following convention:

*command.class\_name:stream\_pid:stream\_#*

where:

*command* = Split-Mirror command being executed such as:

db\_begin\_bkup, db\_end\_bkup

bpmirrorsplit, bpmirrorsync

db\_begin\_streams, db\_end\_streams

*class\_name* = backup class name

*stream\_pid* = UNIX PID of bpsched for the stream

*stream\_#* = stream # of PID





## Prerequisites

The procedures in this chapter assume the following:

1. The following products are properly installed and configured:
  - ◆ NetBackup 3.4.
  - ◆ NetBackup 3.4 for EMC.
2. Both the NetBackup server (master and media) and client software are working properly. That is, normal operating system files can be backed up and restored from the client.

## Troubleshooting Hints

1. Add the VERBOSE option to the `bp.conf` file on the NetBackup master server.
2. The following NetBackup log directories in `/usr/opensv/netbackup/logs` can be created to help diagnose problems.
  - ◆ On the client: `split_mirror`, `bpbkar`, `bpbackup`, `bprestore`, `bplist`, and `bpcd`.
  - ◆ On the master server: `bprd`.
  - ◆ On the media server: `bpbrm` and `bptm`.
  - ◆ On the backup host: `/usr/opensv/netbackup/split_mirror`.
    - `db_cntl` (for db errors and control information)
    - `mirror_cntl` (for split/sync command information)
    - `stream_cntl` (for stream errors/control information)

NetBackup will create activity logs in the above directories if they exist. These directories can eventually require a lot of disk space, so delete them when you are finished troubleshooting.



3. Use `bpps -a` to ensure that the appropriate daemons are running.
4. Start `ltid` with the `-v` option. Check `/var/adm/messages` for media manager troubleshooting clues.

## Backup or Restore Errors

A backup or restore error can originate from either the Split-Mirror software, the NetBackup server or client, or Media Manager. We suggest that you use the steps described below when troubleshooting a failed operation.

The following explains the sequence of events when a backup or restore operation is initiated and suggests solutions for problems that can occur at each point in the sequence.

1. The operation is started.

A backup or restore can be started in any of the following ways:

- ◆ Manually from the administrator interface on the master server.
- ◆ Automatically by a NetBackup server using a scheduled full backup or restore.

If an error occurs at this point, check the All Log Entries report for the possible cause of the error.

2. If a backup or restore started successfully but eventually failed, possible errors are:

- ◆ Server/client communication problems
- ◆ Schedule error
- ◆ Media-related error
- ◆ Simultaneous control of standard and mirror devices

3. Status code: 1

If a backup or restore started successfully but failed with a status of 1, it may mean that a Symmetrix establish or restore was initiated while this backup was in progress. If a Symmetrix establish or restore is initiated while a backup is in progress on the same mirror device, the backup operation will fail.

4. Status code: 9

If you get a status of 9 (an extension package is needed, but was not installed), the client does not have the NetBackup binaries needed to do Split-Mirror backups. Verify that NetBackup for EMC has been properly installed on the master and client systems.

**5. Status code: 41**

This may mean that the mirror device is not accessible to the backup host. Make sure that the logical volume device is active and available. (Logical volumes may be deactivated following a system reboot.)

**6. Status code: 58**

Make sure the backup host and primary host are listed in the `bp.conf` file in the `/usr/opensv/netbackup` directory, where the master server is the first server listed. Example:

```
SERVER =soybean
```

```
SERVER =tofu
```

In this example, soybean is the master server and the backup host, while tofu is the primary host.

**7. Status code: 69**

If you get status 69 (invalid file list specification), look for a message such as:

```
FTL - illegal option specified in the split_mirror log on the
server. The file list entry in question will be listed directly
above this line. Review and correct any problems with the
entries in the file list.
```

This error has also been observed in the following situations:

- ◆ When a backup was attempted for a class that contains multiple data streams file list entries when the multiple data streams feature is not enabled in the class attributes.
- ◆ When a file list for multiple data streams contains multiple `MIRROR_CONTROL_POLICY=ACTIVE_OWNER` directives set for the same `DEVICE_GROUP`.
- ◆ If a class has been configured for multiple data streams but the `NEW_STREAM` directive is missing in the file list.

**8. Status code: 74**

Check the `BPSTART_TIMEOUT` setting on the NetBackup server. The `BPSTART_TIMEOUT` value specified did not allow enough time for the command to complete. The shutdown database operation may be taking too long, or the script may be waiting for other streams to be started. The commands that use this timeout value are `db_begin_bkup`, `db_end_bkup`, `bpmirrorsplit`, `bpmirrorsync` and `db_begin_streams`.



For multiple data streams, all streams must start within the `BPSTART_TIMEOUT` period specified in `bp.conf` in order for the backup to successfully complete. If some streams have to be queued because the multiplexing factors and required storage units are not appropriately set for the number of streams configured in the file list, a timeout error will occur. For example, if `Maximum multiplexing per drive` is set to 1, but the number of drives available for backup is less than the number of streams configured for the class, some of the streams would be queued causing a status of 74 (refer to the note under “Multiple Data Streams File List Directives” on page 45).

Check if all needed tape drives are working and available during backup.

### 9. Status code: 75

Check the `BPEND_TIMEOUT` setting on the NetBackup server. The `BPEND_TIMEOUT` specified did not allow enough time for the command to complete. The command that uses the `BPEND_TIMEOUT` value is `db_end_streams`.

Make sure the classes and schedules are set up with appropriate multiplexing factors and required storage units that will allow all streams to be started at the same time (refer to the note under “Multiple Data Streams File List Directives” on page 45). Check if all needed tape drives are working and available during backup.

### 10. Status code: 77

Make sure that the Oracle database on the primary host is started. This error can occur if the database is already shut down when the software attempts to shut down the database.

This error can also occur if the mirror device is not accessible to the backup host. Make sure you can access the mirror device on the backup host when the standard and mirror devices are in a split state. If you have the EMC PowerPath product installed, make sure the PowerPath device is in an Open or Alive state. If PowerPath is not running, make sure that the volume group is set to an active state.



## Multiple Data Streams

## A

The multiple data streams feature is a method of causing more than one backup to run for a given class, client and schedule. When this feature is enabled for a class, the file list is parsed and the backup is divided.

This feature can be used to create multiple parallel streams to the client. If multiplexing is set, or if there are multiple storage units and the maximum number of jobs setting allows concurrent backups, the backups created by multiple data streams will run concurrently.

Multiple data streams can be used when there are very large backups that take a long time to run. Without multiple data streams, items in the file list are backed up serially. With multiple data streams, items in the file list are backed up in parallel.

The `NEW_STREAM` directive is used to specify that a new stream is to be created at this point. For Split Mirror classes, the `NEW_STREAM` directive must be set in the first line of the file list. With the `NEW_STREAM` directive on the first line of the file list, the manual stream mode is entered. This is the only mode supported for Split Mirror class types. If you have two raw logical volume path names between `NEW_STREAM` words, then both file paths will be in one backup stream.

For example:

```
NEW_STREAM
/dev/o_DB_5/1vol1
/dev/o_DB_5/1vol2
NEW_STREAM
UNSET_ALL
/dev/o_DB_5/1vol3
/dev/o_DB_5/1vol4
```

The list above would produce two backups with `/dev/o_DB_5/1vol1` and `/dev/o_DB_5/1vol2` in one stream and `/dev/o_DB_5/1vol3` and `/dev/o_DB_5/1vol4` in the other stream.

The end of each stream is defined by the start of a new stream. The last stream in the file list is terminated by the end of the file list. Placing a `NEW_STREAM` at the end of the file list (in the example above) would end the second stream and start a third which would be empty.



---

There are two other directives used by the multiple data streams feature: UNSET and UNSET\_ALL. These are used in conjunction with other directives defined for specific client types.

The client-specific directives are passed to the client along with the entire line. When they are encountered, the line is passed to the client with the current stream, and all subsequent streams, until that reserve word is redefined or undefined. If the directive is encountered again, its value is redefined.

The UNSET directive is used to undefine a directive. This will prevent a currently defined directive string from being passed with any additional streams. The directive that was unset may be defined again in the current or a later stream.

UNSET\_ALL has the same effect as UNSET but works on all directives that have been defined up to that point. The UNSET\_ALL directive must be entered directly after each NEW\_STREAM directive except the first NEW\_STREAM directive in the file.

See Chapter 3 for examples of Split Mirror classes for multiple data streams.

# Logical Volume Managers

# B

## HP-UX LVM for HP 11.00 Hints

On the backup host, you must configure logical volumes on mirror devices that are identical to the logical volumes configured on the primary devices on the primary host. The example below shows how to set up a simple configuration of five logical volumes configured over one standard and mirror device group. Refer to the `lvm` man page for a description of these commands.

The following values are used in the examples below:

```
lvm volume group name: o_DB_5
logical volume name: oDB5-sd-0X
physical volume of standard device on primary host: /dev/rdisk/c1t0d0
physical volume of mirror device on backup host: /dev/rdisk/c1t8d0
```

1. On the primary host, create the logical volumes for your application, and export the mapfile to be used on the backup host import. For example, issue the following commands on your primary host.

```
pvcreate -f /dev/rdisk/c1t0d0
mkdir /dev/o_DB_5
mknod /dev/o_DB_5/group c 64 0x050000
vgcreate /dev/o_DB_5 /dev/dsk/c1t0d0
lvcreate -n oDB5-sd-01 -C y -L 532 /dev/o_DB_5
lvcreate -n oDB5-sd-02 -C y -L 532 /dev/o_DB_5
lvcreate -n oDB5-sd-03 -C y -L 532 /dev/o_DB_5
lvcreate -n oDB5-sd-04 -C y -L 532 /dev/o_DB_5
lvcreate -n oDB5-sd-05 -C y -L 532 /dev/o_DB_5
vgexport -m mapfile -s -p -v /dev/o_DB_5
```

Copy the mapfile created by `vgexport` to the backup host to be used for the `vgimport` on the backup host.

2. The backup host can import an LVM volume group onto the system that was exported from the primary host. The HP-UX LVM `vgchgid` command is used to change the LVM Volume Group ID for importing.



For example, use the following set of commands to import a volume group on the backup host:

```
vgchgid /dev/rdisk/c1t8d0
mkdir /dev/o_DB_5
mknod /dev/o_DB_5/group c 64 0x050000
vgimport -m mapfile /dev/o_DB_5 /dev/dsk/c1t8d0
vgchange -a y /dev/o_DB_5
```

where `mapfile` is the `mapfile` generated by the export on the backup host.

## VERITAS VxVM for Solaris 2.6, 7, or 8 Hints

On the backup host, you must configure logical volumes on mirror devices that are identical to the logical volumes configured on the primary devices on the primary host. The example below shows how to set up a simple configuration of five logical volumes configured over one standard and mirror device group. Refer to the `vxvm` man page for a description of these commands.

The following values are used in the examples below:

```
vxvm volume group name: o_DB_5
logical volume name: oDB5-sd-0X
physical volume path of standard device: /dev/rdisk/c1t0d0
physical volume path of mirror device: /dev/rdisk/c1t8d0
offset: physical offset on disk where logical volume resides
len: length of logical volume in bytes
```

1. On the primary host, create logical volumes for your application. You must first create an EMC Symmetrix device group that contains a primary device. The primary device must be visible to the primary host and must be associated with the mirror device that is visible to the backup host. Refer to the EMC Symmetrix documentation for information on creating device groups.

```
vxdiskadd c1t0d0
vxdg init o_DB_5 c1t0d0
```

```
vxmake -g o_DB_5 sd oDB5-sd-01 disk=c1t0d0 offset=0 len=551760
vxmake -g o_DB_5 sd oDB5-sd-02 disk=c1t0d0 offset=551760 len=551760
vxmake -g o_DB_5 sd oDB5-sd-03 disk=c1t0d0 offset=1103520 len=551760
vxmake -g o_DB_5 sd oDB5-sd-04 disk=c1t0d0 offset=1655280 len=551760
vxmake -g o_DB_5 sd oDB5-sd-05 disk=c1t0d0 offset=2207040 len=551760
```

```

vxmake -g o_DB_5 plex oDB5-plex-01 sd=oDB5-sd-01
vxmake -g o_DB_5 plex oDB5-plex-02 sd=oDB5-sd-02
vxmake -g o_DB_5 plex oDB5-plex-03 sd=oDB5-sd-03
vxmake -g o_DB_5 plex oDB5-plex-04 sd=oDB5-sd-04
vxmake -g o_DB_5 plex oDB5-plex-05 sd=oDB5-sd-05

vxmake -g o_DB_5 vol oDB5-vol-01 plex=oDB5-plex-01 usetype=gen
vxmake -g o_DB_5 vol oDB5-vol-02 plex=oDB5-plex-02 usetype=gen
vxmake -g o_DB_5 vol oDB5-vol-03 plex=oDB5-plex-03 usetype=gen
vxmake -g o_DB_5 vol oDB5-vol-04 plex=oDB5-plex-04 usetype=gen
vxmake -g o_DB_5 vol oDB5-vol-05 plex=oDB5-plex-05 usetype=gen

vxvol init zero oDB5-vol-01
vxvol init zero oDB5-vol-02
vxvol init zero oDB5-vol-03
vxvol init zero oDB5-vol-04
vxvol init zero oDB5-vol-05

```

2. On the backup host, create the logical volumes for your application as an exact replication of the logical volumes on the primary host. This can be done by repeating the commands above with the mirror device on the backup host, or by using the following commands to import the logical volumes on the backup host. You must first create an EMC Symmetrix device group that contains a mirror device. The mirror device must be visible to the backup host, and must be associated with the primary device that is visible to the primary host. The device group must have the same name as the device group on the primary host. Refer to the Symmetrix documentation for configuring device groups. The standard and mirror devices must have been established and split before using the import command shown below.

```

vxdbg -C import o_DB_5

vxvol start oDB5-vol-01
vxvol start oDB5-vol-02
vxvol start oDB5-vol-03
vxvol start oDB5-vol-04
vxvol start oDB5-vol-05

```





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---

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