VERITAS NetBackup™ 3.4 for SAP

System Administrators Guide

UNIX

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VERITAS

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Preface

This guide describes how to install, configure and use VERITAS NetBackup SAP Extension for Oracle on a UNIX platform. In this guide, VERITAS NetBackup for SAP on UNIX Extension for Oracle is referred to as NetBackup for SAP on UNIX.

For specific information about the NetBackup Server software, refer to:

- *NetBackup System Administrator's Guide - UNIX*, if you have a UNIX server,

  or

- *NetBackup System Administrator's Guide - Windows NT/2000* if you have a Windows NT server.

This document is the same as `NetBackup_AdminGuide_SAP_Unix.pdf` distributed with the NetBackup for SAP on UNIX software.

Audience

This guide is intended for the:

- Oracle database system administrator responsible for configuring and using the SAP system to back up and restore Oracle databases.
- The NetBackup system administrator responsible for configuring NetBackup.

A system administrator is defined as a person with system administrator privileges and responsibilities.

This guide assumes:

- A basic understanding of system administration.
- You have a working understanding of NetBackup client and server software.
- You are familiar with the information covered in the following NetBackup manuals:
  - *NetBackup System Administrator's Guide - UNIX* or *NetBackup System Administrator's Guide - Windows NT/2000*
  - *NetBackup Troubleshooting Guide - UNIX* or *NetBackup Troubleshooting Guide - Windows NT/2000*
- A thorough understanding of the SAP environment.

Organization

This guide is organized as follows:

- The Introduction contains an overview of NetBackup for SAP on UNIX terminology and a technical overview of the NetBackup for SAP on UNIX `backint` interface.
- Installation provides instructions on installing NetBackup and the NetBackup for SAP on UNIX software.
- Configuration has instructions for configuring your installation. You will also find troubleshooting and debugging instructions in the this chapter.
- Using NetBackup for SAP on Windows NT provides operating instructions for your installing of NetBackup for SAP on UNIX.
- The Troubleshooting chapter describes the various Troubleshooting tools available with NetBackup for SAP on UNIX.

The manual also contains the following Appendices.

- Appendix A, "NetBackup for SAP `backint` Command Line" describes the `backint` command line.
- Appendix B, "`backint -i in_file` Contents" describes the `in_file`.

- Appendix C, "`backint -o out_file` Contents" describes the contents of the `out_file`.
- Appendix D, "Environment Variable" describes the environmental variables.
- Appendix E, "`bp.conf` File" describes the `bp.conf` file.
- Appendix F, "`backint -p par_file` or `initSID.utl` Contents" describes the contents of the `par_file`.

In addition to these chapters, there is a glossary of terms that you may encounter when using and discussing NetBackup.

Related Documents

The following documents provide related information. For a more detailed listing of NetBackup documents, refer to *NetBackup Release Notes*.

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

- *NetBackup System Administrator's Guide - UNIX*

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

- *NetBackup Media Manager System Administrator's Guide - UNIX*

  Explains how to configure and manage the storage devices and media on UNIX NetBackup servers. Media Manager is part of NetBackup.

- *NetBackup Troubleshooting Guide - UNIX*

  Provides troubleshooting information for UNIX-based NetBackup products. You can also refer to www.veritas.com knowledge base for tech notes.

If you have a Windows NT/2000 server, refer to these documents:

- *NetBackup System Administrator's Guide - Windows NT/2000*

  Explains how to configure and manage NetBackup on a Windows NT/2000 server system.

- *NetBackup Media Manager System Administrator's Guide - Windows NT/2000*

  Explains how to configure and manage the storage devices and media on Windows NT/2000 NetBackup servers. Media Manager is part of NetBackup.

- *NetBackup Troubleshooting Guide - Windows NT/2000*

  Provides troubleshooting information for Windows NT/2000-based NetBackup products. You can also refer to www.veritas.com knowledge base for tech notes.

For this product, you may also need the following manuals from Oracle Corporation:

- *Oracle Enterprise Backup Utility Installation and Configuration Guide*

For this product, you may also need the following manuals from SAP Corporation:

- *BC SAP Database Administration: Oracle*

You may also need the following manual from SAP AG:

- *BC-BRI BACKINT Interface R/3 System*, Release 3.x and 4.x

Conventions

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

Type Style

Table 1. 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.
Sans 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 and is used to call attention to information that makes it easier to use the product or helps you to avoid problems.

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`

Introduction 1

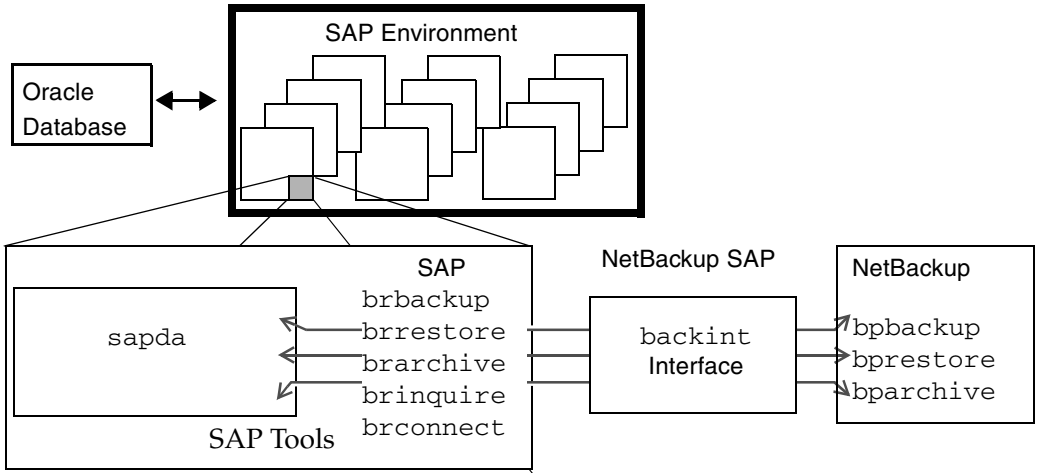
NetBackup for SAP on UNIX integrates the database backup and recovery capabilities of SAP Tools with the backup and recovery management capabilities of NetBackup and its Media Manager.

This chapter introduces NetBackup for SAP on UNIX and how it relates to both SAP Tools and NetBackup. This following topics introduce NetBackup for SAP on UNIX.

- Terminology for NetBackup for SAP on UNIX
- Features of NetBackup for SAP on UNIX
- Technical Overview of NetBackup for SAP on UNIX
- Changes Between 3.2 and 3.4

Terminology for NetBackup for SAP on UNIX

This section explains important terms that may be new to an SAP for Oracle database administrator or a NetBackup administrator. Refer to the following graphic when reviewing the terminology in this section.



NetBackup

This section describes NetBackup terms as they apply to NetBackup for SAP on UNIX.

NetBackup	NetBackup backs up and restores files, directories, raw partitions, and databases on client systems that have SAP databases.
NetBackup schedule	NetBackup schedules control NetBackup operations such as: when backups can occur, the type of backup (full, incremental) to perform, and how long NetBackup retains the image (retention level).
Administrator directed backups	NetBackup administrators are able to perform remote backups of all files, directories, databases, and raw partitions contained on client systems within a client/server network.
User-directed backups and restores	NetBackup for SAP on UNIX users are able to perform backups of all files, directories, databases, and raw partitions contained on client systems within a client system.
Graphical interfaces	Graphical user interfaces are available for both users and administrators.
Media Manager	The Media Manager provides complete management and tracking of all devices and media used during backups and restores.

SAP Tools

The SAP Environment consists of many modules and applications. One small piece of the SAP Environment is the SAP Tools. SAP Tools provide:

- backup and recovery function for an Oracle database,
- Oracle administration by communicating with NetBackup through NetBackup for SAP on UNIX.

`sapdba`	`sapdba` is a menu-driven utility, with menus designed to reflect the user's point of view. `sapdba` provides easy access to `brbackup`, `brarchive`, `brrestore` for database backup/restore. The tool can restore a backup of an entire database or reset the database to a previous state.
`brbackup`	This command brings database servers on-line or off-line, checks the status of SAP files, and places database tablespaces into BACKUP mode to guarantee their data consistency. `brbackup` provides on-line or off-line backup of control files, data files, and on-line redo log files. It also keeps a profile and log of each backup. `brbackup` uses the NetBackup software, through NetBackup for SAP on UNIX, for: ◆ SAP datafile backups ◆ datafile and on-line log backups ◆ error handling
`brarchive`	This command archives Oracle off-line redo log files by communicating with the NetBackup for SAP on UNIX `backint` interface. These files are copied by Oracle in its archiving directory. `brarchive` ensures that duplicates of these logs are available and that original files are not deleted prematurely. This command also keeps a profile and log of each archive.
`brrestore`	This command recovers database data files, control files, and on-line redo log files through the NetBackup for SAP on UNIX `backint` interface. `brrestore` ensures that sufficient space is available prior to restoring these files, and removes files that will be overwritten during the recovery. This command also provides a query mode.
SAP script	This is a small script that contains SAP commands such as `brbackup` and `brrestore`.

`backint` Interface — The NetBackup for SAP on UNIX `backint` interface communicates instructions from SAP Tools to NetBackup. The `backint` interface is the implementation of the SAP system's *BC-BRI BACKINT Interface* specification.

Backup Function — The backup function of the `backint` interface supports and defines the SAP `brbackup` and `brarchive` tools to NetBackup. `brbackup/brarchive` communicate with the `backint` interface through an *in_file* and an *out_file* parameter. The *in_file* parameter includes a list of files to be backed up or archived. The *out_file* parameter reports the status for each file and assigns a Backup ID (BID) to each file. In the event of a partial backup, this function will identify successfully backed up files to the user.

Restore Function — The restore function of the `backint` interface supports and defines the `brrestore` tool to NetBackup. It communicates with the `backint` interface through the *in_file* parameter and *out_file* parameter. The *in_file* parameter includes a list of files to be restored through NetBackup. It also includes the Backup ID (BID) assigned during the backup function. The *out_file* parameter contains the status of the restore for each file. When the NetBackup restore operation is complete, the restore function lists successfully restored files. It will also list BIDs used during the operation.

The BID is assigned by NetBackup during the backup function. It may identify one or more backup runs, a single file backup or a group of files. During a backup function, the BID is submitted to the *out_file* parameter. During the restore and inquiry functions, the BID can only be set in the *in_file* parameter. For more details, refer to "NetBackup for SAP on UNIX backint Command Line" on page 87.

If the BID is not set, the restore function will use the BID of the last backup. As an option, this function can also include a list of directories into which files will be restored. For more details, refer to "backint -i in_file Contents" on page 89.

Inquiry Function — The inquire function supports and defines the `sapdba` tool to NetBackup. `sapdba` uses the *in_file* parameter and the *out_file* parameter to collect backup information. The *in_file* parameter contains optional BIDs and filenames.

If only a #NULL is received on the *in_file* parameter, a list of BIDs will be generated to the *out_file* parameter. If a BID is received, a list of files belonging to the BID is generated. If a filename is entered along with the #NULL, a list of BIDs containing that file will be listed.

Features of NetBackup for SAP on UNIX

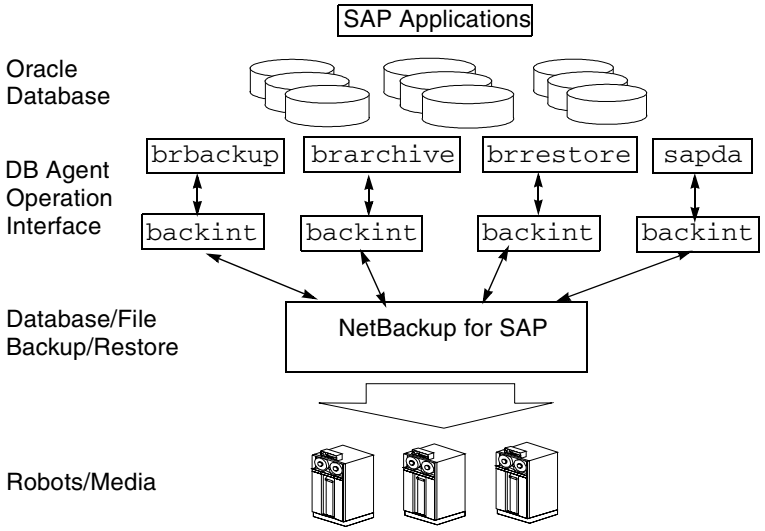
This section describes the NetBackup for SAP on UNIX main features.

Feature	Description
Media and device management	All devices supported by Media Manager are available to NetBackup for SAP on UNIX.
Scheduling facilities	NetBackup scheduling facilities on the master server can be used to schedule automatic and unattended SAP backups. This also lets you choose the times when these operations can occur. For example, to prevent interference with normal daytime operations, you can schedule your database backups to occur only at night.
Multiplexed backups and restores	NetBackup for SAP on UNIX lets you take advantage of NetBackup's multiplexing capabilities. Multiplexing directs multiple data streams to one backup device, thereby reducing the time necessary to complete the operation.
Transparent execution of both SAP and regular file system backup and restore operations	All backups and restores are executed simultaneously and transparently without any action from the NetBackup administrator. A database administrator can execute database backup and restore operations through NetBackup or use SAP Tools as if NetBackup were not present. An administrator or any other authorized user can use NetBackup to execute database backups and restores.
Sharing the same devices and tapes used during other file backups	It is possible to share the same devices and media used for other backups or to give SAP 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 SAP databases can also reside on hosts that are different from the devices on which NetBackup stores the backups.

Feature	Description
Graphical user interfaces	NetBackup provides the following graphical user interfaces for client users and administrators: ◆ Client user interface on Java, `jbpSA` ◆ Client user motif interface, `xbp` ◆ Administrator user interface on Java, `jnbSA` ◆ Administrator user interface, `xbpadm` ◆ Administrator user interface on Windows NT/2000 A database administrator or NetBackup administrator can start backup or restore operations for SAP from the NetBackup graphical user interface on the master server.
Parallel backup and restore operations	NetBackup for SAP on UNIX supports the parallel backup and restore capabilities of the SAP Tools. This permits the user to run more than one tape device at a time for a single SAP backup or restore, thereby reducing the time necessary to complete the operation.

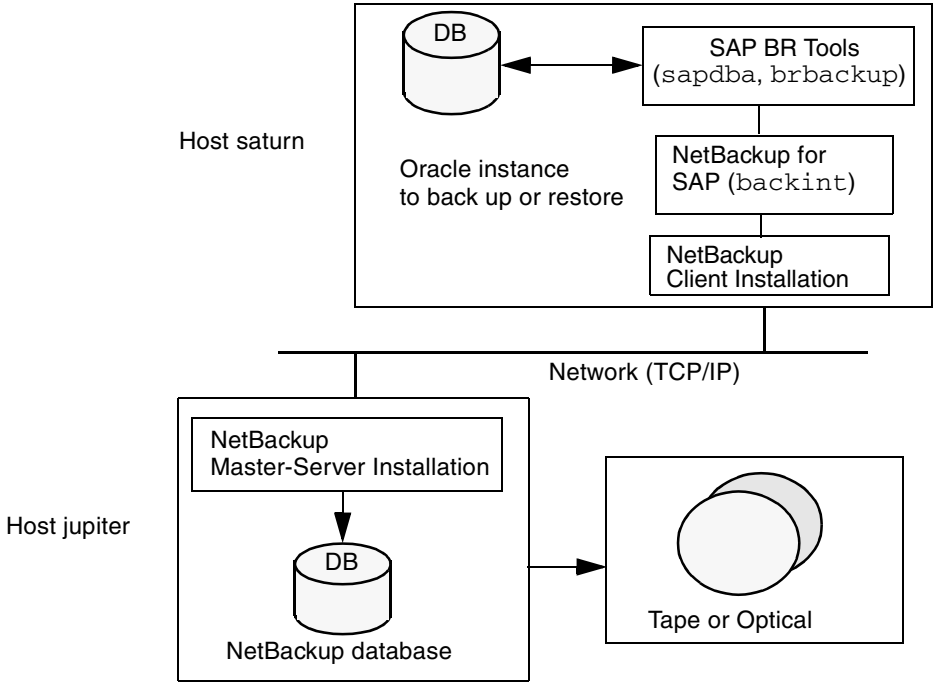
Technical Overview of NetBackup for SAP on UNIX

The following figure illustrates the components and architecture for SAP and NetBackup.



SAP Tools act as database agents, responsible for all database related tasks. These database agents (`bpbackup`, `bparchive`, and `bprestore`) communicate with NetBackup through the NetBackup for SAP on UNIX `backint` interface. The `sapdba` component of SAP Tools also accesses the backup catalog used by NetBackup in order to determine the status of the valid backups.

The example network below shows the major components in a NetBackup for SAP on UNIX `backint` interface configuration.



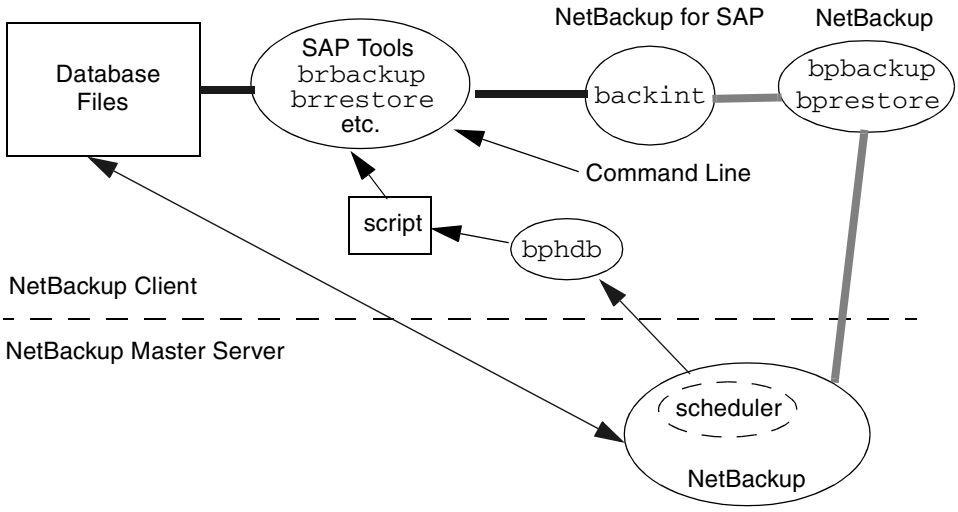
The host with the database must be a NetBackup client and have NetBackup for SAP on UNIX, SAP software, and Oracle software installed.

The storage devices are connected to the NetBackup master server. A NetBackup media server can access the storage devices through the master server. Both the master server and the media server must have NetBackup server software installed.

Using NetBackup requires that the administrator create an SAP script with commands for controlling database backup or recovery. For example, an SAP script to back up Oracle databases would have a `brbackup` command. A separate SAP script is needed for each type of operation (see "Create Scripts" on page 55 for more information on these SAP scripts).

Sequence of Operation

NetBackup users or schedules start database backups or restores by selecting an SAP script. A NetBackup process called `bphdb` starts the SAP script on the client. The SAP application then starts the requested operation on the databases.



For a backup, `brbackup` calls the NetBackup for SAP on UNIX `backint` interface. From this point the operation is similar to a user-directed backup.

A restore works in essentially the same manner except that the NetBackup for SAP on UNIX `backint` interface issues a `bprestore` command, causing NetBackup to retrieve the data from secondary storage and send it to the client.

Changes Between 3.2 and 3.4

The following are the changes that occurred between release 3.2 and 3.4.

SAP agent dual-stream capability	The NetBackup 3.4 SAP agent supports sending dual streams of archive log data to NetBackup. This allows the creation of identical backup copies for redundancy and off-site vaulting. This feature is for both UNIX and NT and is set through to parameters in the `.utl` file. See "class_log" on page 105 and "sched_log" on page 105.
SAP agent auto retry of failed streams	The NetBackup 3.4 SAP agent supports re-initiating a failed stream in a multi-stream configuration before reporting a failed backup job to SAPDBA. The number of retries can be set in the SAP `backint` utl file. This feature is for both UNIX and NT and is set through one parameter in the `.utl` file. See "retry_backup" on page 105.
Eliminate `backint.time` file for UNIX `backint`	The UNIX `backint` no longer used the `backint.time` file to retrieve database files. At 3.2 this file was used to track all the SAP backups. The `backint.time` contains backup ids and start/end times for each backup. This file was eliminated because of support and recovery issues. For the current implementation there will now be multiple backup id (BID) for each backup which will be tracked by SAP. The number of BIDs will depend on the number of drives and the type of backup that is being performed. If 5 drives are specified in the `.utl` file for an offline backup then 5 different BIDs will be reported to SAP. So the number BIDs is determined by the number of images used for each backup. For anonline backup `backint` will create an image for each file, therefore a different BID will be created for each file backed up. With this new implementation the backint.time is only need to recover backup that were generated before 3.4. Once all of the images in the backint.time file have expired this file can be removed and the backint_dir parameter in the `init`*`SID`*`.uti` file can be removed.
Standard class is no longer supported	The ability to backup to a standard class type is no longer supported. An SAP class type must be created to perform an SAP backup.

Installation 2

This chapter describes the NetBackup for SAP on UNIX installation procedure. It includes a section on installation prerequisites. It also contains sections on installing Oracle7 Enterprise Backup Utility and Oracle8 Recovery Catalog.

To determine which SAP version levels are supported, refer to the Database Extension Matrix in the *NetBackup Release Notes*.

Installation Prerequisites

Before installing NetBackup for SAP on UNIX, be sure to complete the following procedures:

1. Install NetBackup server software on the server.

   The NetBackup server platform can be any of those that NetBackup supports.

   For a DataCenter installation, refer to the *NetBackup DataCenter Installation Guide - UNIX* or the *NetBackup DataCenter Installation Guide - Windows NT/2000*.

2. Install the NetBackup client software on the client where you will be backing up the databases.

   For a DataCenter installation, refer to the *NetBackup DataCenter Installation Guide - UNIX* for installation instructions on UNIX clients.

Now you are ready to install NetBackup for SAP on UNIX on the client where you will be backing up the databases. Refer to the next section for detailed instructions on installing NetBackup for SAP on UNIX.

Install NetBackup for SAP on UNIX

There are two ways to install database extension software.

- Remote Installation

  Loads the software on a master server. The user will then push the database software out to affected clients.

  Refer to the following section.

- Local Installation

  Loads and installs the software only to the local machine.

  Refer to “Local Installation of NetBackup for SAP on UNIX” on page 18.

Remote Installation of NetBackup for SAP on UNIX

During a remote installation, NetBackup for SAP on UNIX files are loaded onto the current machine, which must be a master server. The software will then be distributed to the clients and installed.

Before performing a remote install, make sure:

- There is adequate disk space on each client that will receive the software.

  Less than one megabyte of additional disk space is required in the client's *install_path*`/netbackup` directory. However, more disk space may be necessary at run time.

- NetBackup version 3.4 client software is installed and operational on each SAP client.

  This also means that the directory *install_path*`/netbackup` already exists on each SAP client.

Remote Install Procedure

1. Log in as the root user on the server.

   If you are already logged in, but are not the root user, execute the following command.

   ```
   su - root
   ```

2. Make sure a valid license key for NetBackup for SAP on UNIX has been registered.

   Use the command *install_path*`/netbackup/bin/admincmd/get_license_key` to list and add keys.

3. Insert the CD-ROM into the drive.

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

   `cd /CD_mount_point`

5. Load the software on the server by executing the `install` script.

   `./install`

   The following prompt will appear:

   ```
   Do you want to do a local installation? (y/n) [n]
   ```

   a. Answer **`n`**.

      You are presented with a menu of all database extensions available on the CD-ROM.

   b. Select the NetBackup for SAP option.

   c. Enter **`q`** to quit selecting options.

      A prompt will appear asking if the list is correct.

   d. Answer **`y`**.

      The `install` script identifies the types of client software loaded during the installation of the NetBackup server. By default, any matching NetBackup for SAP on UNIX software will automatically be loaded. If there are more platforms available, the script displays a menu giving you the opportunity to add more client types to the default list. Once the list is complete, database extension version files, compressed tar files and the `install_dbext` script are copied to directory *install_path*`/netbackup/dbext`.

6. Distribute and install the NetBackup for SAP on UNIX software on each client.

Note It is expected that the NetBackup version level (for example, 3.4) running on each client that you wish to update matches the version level of the database extension being installed.

   a. Execute the command to distribute the NetBackup for SAP on UNIX software to the clients. This command varies, depending upon the type of install you will perform.

      There are two types of installs.

      - *initial install*
        Use an initial install if the clients you intend to update have not been configured into classes of type SAP.

- *upgrade install*
  Use an upgrade install if all the clients you intend to update already have been configured into classes of type SAP.

Initial Install Procedure

1. Execute the following command to create a file containing a list of clients currently configured in the NetBackup database.

   cd *install_path***/netbackup/bin**
   ./admincmd/bpclclients -allunique -noheader > *filename*

   where *filename* is the name of the file to contain the list of unique clients. If no clients have been configured in the NetBackup database, and therefore *filename* is empty, create *filename* using the same format as that generated by `bpclclients`.

   `bpclclients` generates output in following format:

   hardware operating_system client_name

   where

   hardware is the hardware name. For examples, execute the `ls` command in directory *install_path*`/netbackup/client`.

   operating_system is the operating system name. For examples, execute the `ls` command in directory *install_path*`/netbackup/client/`*hardware*.

   client_name is the name of the client.

   For example, the contents of *filename* might look like this:

   ```
   Solaris Solaris2.6 curry.min.ov.com
   RS6000 AIX4.3 cypress
   ```

2. Edit *filename*.

   This is an optional step. Use it if the contents of *filename* need to be changed. Edit *filename* to contain only those clients you wish to update with NetBackup for SAP on UNIX software.

3. Specify *filename* on the `update_dbclients` command.

   For example:

   cd *install_path***/netbackup/bin**
   ./update_dbclients SAP -ClientList *filename*

   Only clients listed in *filename* will be updated.

Upgrade Install Procedure

Execute the following command.

cd *install_path*/**netbackup/bin**
./update_dbclients SAP ALL ALL

This command will look at all possible clients and only update the ones currently in an SAP class type.

Instead of `ALL ALL`, you may use `-ClientList` *filename* as explained in "Initial Install Procedure" on page 15.

Note With an initial or upgrade install, some clients may be skipped and not updated. Possible reasons are:
- the client is a PC client (which cannot be updated from a UNIX server),
- NetBackup for SAP on UNIX does not support that client's platform type,
- the NetBackup for SAP on UNIX software for that client type was not loaded onto the server in step 5,
- (if using the `ALL ALL` method) the client does not belong to an SAP class type.
All skipped clients are available in a file whose name is displayed by `update_dbclients`.

b. The number of updates required to distribute the software to the clients is displayed.

If more than one update will occur, you will see the following prompt:

`Enter the number of simultaneous updates you wish to take place. 1` *max dflt*

where:

max is the maximum number of simultaneous updates that is allowed. The value displayed will be a number ranging from 1 to 30.

dflt is the default number the program will use if you press Enter. The value displayed will be a number ranging from 1 to 15.

Example 1

If three client updates will be performed, the *max* and *dflt* values shown would be 3.

Example 2

If 50 client updates will be performed, the *max* value shown would be 30 and the *dflt* value shown would be 15.

`update_dbclients` will start the number of updates that you specify. If this number is less than the total number of client updates to be performed, new updates will start as the previous updates finish until all of the updates have been completed.

Based on your answer, the time it will take to update the clients is displayed, followed by this question:

```
Do you want to upgrade the clients now? (y/n) [y]
```

c. Enter **`y`** or **`n`** for the prompt.

If you answer **`n`**, `update_dbclients` will quit and leave the list of clients it would have updated in a file. This file can later be used by the `-ClientList` parameter mentioned previously.

Answer **`y`** to continue the installation process.

If the `update_dbclients` command was successful in distributing the software to the client, it will automatically run the `install_dbext` script on the client. If `install_dbext` has successfully completed, there will be a version file in directory *`install_path`*`/netbackup/ext` that contains the version of NetBackup for SAP on UNIX that was installed and an installation timestamp. The `update_dbclients` command displays a note on whether the update was successful for each client. When the `update_dbclients` command has completed, it displays a file name that contains a complete log of what happened for each client. If the update failed for any client, the log file should be examined to determine the problem.

Local Installation of NetBackup for SAP on UNIX

During a local installation, the NetBackup for SAP on UNIX files are extracted and installed. The local machine can be a client or a master server that also happens to be a client.

Before performing a local install, make sure:

- The local machine has adequate disk space.

  Less than one megabyte of additional disk space is required in the *install_path*`/netbackup` directory. However, more disk space may be necessary at run time.

- NetBackup version 3.4 client software is installed and operational.

  This also means that the *install_path*`/netbackup` directory already exists.

Local Install Procedure

1. Log in as the root user on the machine.

   If you are already logged in, but are not the root user, execute the following command.

   ```
   su - root
   ```

   - If the local machine is a client, go to step 3.
   - If the local machine is a server, go to step 2.

2. Make sure a valid license key for NetBackup for SAP on UNIX has been registered.

   Use the command *install_path*`/netbackup/bin/admincmd/get_license_key` to list and add keys.

3. Insert the CD-ROM into the drive.

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

   ```
   cd /CD_mount_point
   ```

5. Load and install the software by executing the `install` script.

Note It is expected that the NetBackup version level (for example, 3.4) running on the local machine matches the version level of the database extension being installed.

```
./install
```

The following prompt will appear:

```
Do you want to do a local installation? (y/n) [n]
```

a. Answer **y**.

You are presented with a menu of all database extensions available on the CD-ROM.

b. Select the NetBackup for SAP option.

c. Enter **q** to quit selecting options.

A prompt will appear asking if the list is correct.

d. Answer **y**.

The following actions will occur:

- The version file, compressed tar file and `install_dbext` script will be loaded to directory *install_path*`/netbackup/dbext`.
- The `install` script will automatically execute the `install_dbext` script.
- If `install_dbext` has successfully completed, there will be a version file in directory *install_path*`/netbackup/ext/` that contains the version of NetBackup for SAP on UNIX that was installed and an installation timestamp.

Configuration 3

Before attempting to configure NetBackup for SAP on UNIX, complete the installation procedure as described in the Installation chapter.

The following is the configuration procedure.

1. Create Link to backint
2. Configure the Media Manager
3. Maximum Jobs per Client Global Attribute
4. Add SAP Class to NetBackup
5. Create Scripts
6. Configure the initSID.utl File
7. Configure the initSID.sap File
8. Test Configuration Settings
9. Test Multiple Drives and Files

The following sections in this chapter describe each of these steps in detail.

Create Link to backint

SAP requires that all SAP Tools be located in a predetermined directory. The directory path is as follows:

/usr/sap/*SID*/sys/exe/run

where *SID* is a unique name for an Oracle database instance. *SID* is also known as System ID.

The directory should contain the following commands:

- brarchive
- brbackup
- brconnect
- brrestore
- brtools
- sapdba

So, to follow SAP convention we need to link backint from the NetBackup install directory to SAP's tool directory. For example, if the oracle instance name is CER, then the following command needs to be executed:

ln -s *install_path*/netbackup/bin/backint
/usr/sap/CER/SYS/exe/run/backint

Configure the Media Manager

Use the Media Manager to configure tapes or other storage units for a NetBackup for SAP on UNIX configuration.

- Refer to the *Media Manager for NetBackup System Administrator's Guide - UNIX* if the NetBackup server is UNIX.
- Refer to the *Media Manager for NetBackup System Administrator's Guide - Windows NT/2000* if the NetBackup server is Windows NT/2000.

The number of volumes required will depend on the devices used, the size of the SAP databases that you are backing up and the frequency of backups.

Maximum Jobs per Client Global Attribute

The Maximum jobs per client global attribute value is figured with the following formula.

`Max Jobs per Client =` *Number of Drives* `x` *Number of Classes*

Where:

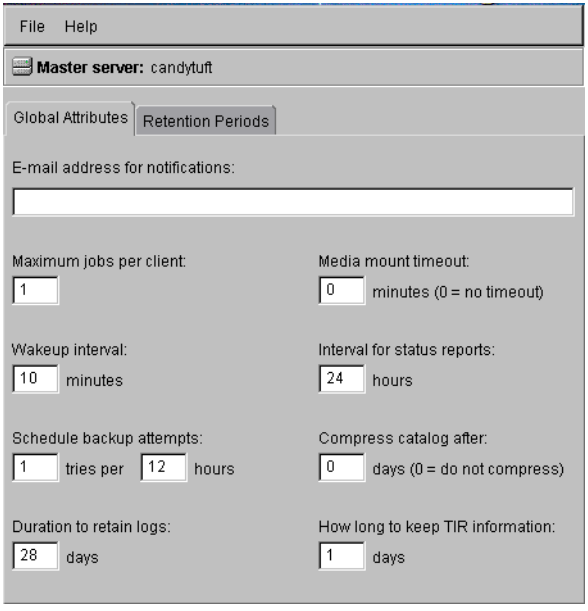
- *Number of Drives* is the number of concurrent `bpbackup` jobs. These jobs are defined by the drive parameter in the `init`*SID*`.utl` file.
- *Number of Classes* is the number of classes that may back up this client at the same time. This number can be greater than one. For example, a client may be in two classes in order to back up two different databases. These backup windows may overlap.

NetBackup Administration - Java Interface

Use this procedure to set the Maximum Jobs per Client global attribute on the NetBackup Administration - Java Interface for HP or Solaris operating systems.

1. On the Configure menu in the NetBackup Administration dialog box, click NetBackup System Configuration. The System Configuration dialog box appears.

2. In the Master Server dialog box, click the Global Attributes tab.



The default value is 1 for Maximum jobs per client.

3. Change the Maximum jobs per client value to a value equal to the maximum number of backups allowed per client.

Tip To avoid any problems, we recommend that you enter a value of 99 for the Maximum jobs per client global attribute.

`xbpadm` Interface

Use this procedure to set the Maximum Jobs per Client global attribute on a UNIX NetBackup master server.

1. Log onto the server as root.
2. Start the NetBackup `xbpadm` administrator interface.
   - If the `DISPLAY` variable is set, type:

     ```
     /usr/openv/netbackup/bin/goodies/xbpadm &
     ```

   - If the `DISPLAY` variable is not set, use the `-d` option:

     ```
     /usr/openv/netbackup/bin/goodies/xbpadm -d (your_machine_name):0 &
     ```

   The NetBackup Administration dialog box will open.
3. From the File menu, click Change NetBackup Configuration. The NetBackup Configuration dialog box will appear.

   The default value is 1 for Maximum jobs per client.
4. Change the Maximum jobs per client value to a value equal to the maximum number of backups allowed per client.

Tip To avoid any problems, we recommend that you enter a value of 99 for the Maximum jobs per client global attribute.

5. Click OK.

NetBackup Administration - Windows NT/2000 Interface

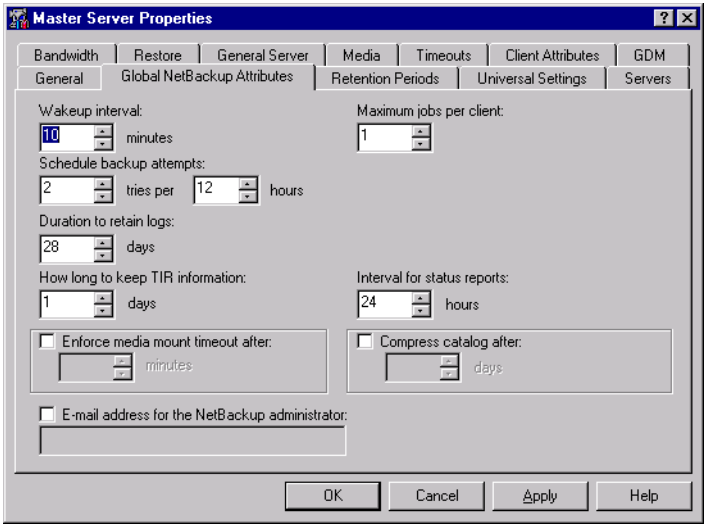
Use this procedure to set the Maximum Jobs per Client global attribute on a Windows NT/2000 server or on the NetBackup Administration Client host.

1. On the Start menu in the NetBackup Administration window, click Configure NetBackup. The Configure-NetBackup dialog box appears.

2. In the left pane, right-click on the server and on the shortcut menu click Properties (Read/Write).

   The Master Server Properties dialog box appears.

3. In the Master Server Properties dialog box, click the Global NetBackup Attributes tab.



   The default value is 1 for Maximum jobs per client.

4. Change the Maximum jobs per client value to a value equal to the maximum number of backups allowed per client.

Tip To avoid any problems, we recommend that you enter a value of 99 for the Maximum jobs per client global attribute.

Add SAP Class to NetBackup

NetBackup classes define the criteria for the backup. These criteria include:

- clients and the NetBackup for SAP on UNIX script files to be executed on the clients
- storage unit and media to use
- backup schedules

Procedures in this section describe how to configure a class for NetBackup for SAP on UNIX on a NetBackup server. There are other attributes for a class to consider. Refer to the *NetBackup System Administrator's Guide - UNIX* or the *NetBackup System Administrator's Guide - Windows NT/2000* for details on how to configure all the attributes.

NetBackup Administration - Java Interface Server

Use this procedure to configure a class on the NetBackup Administration - Java Interface on HP or Solaris operating systems.

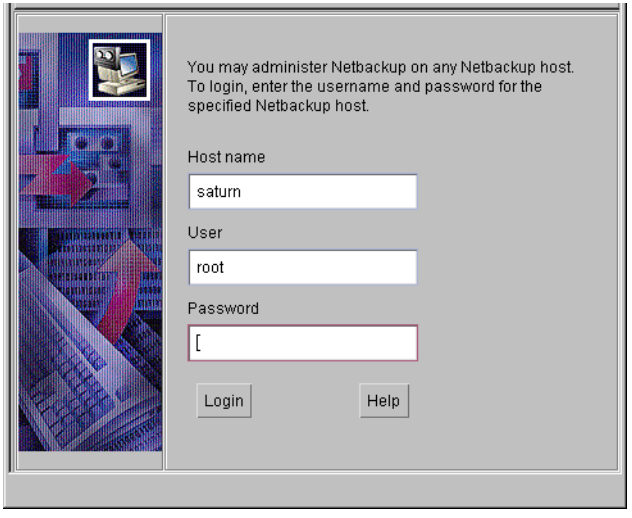
1. Log onto the server as root.
2. Start the NetBackup administrator interface by entering:

   install_path`/netbackup/bin/jnbSA &`

   For additional usage information, enter:

   `jnbSA -h`

   The Login dialog box appears.

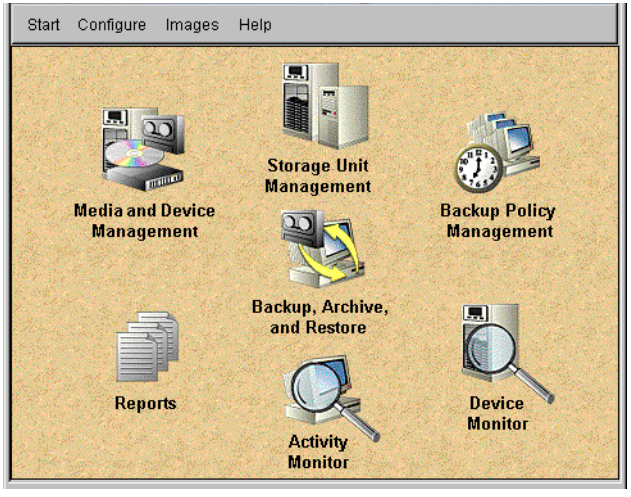


3. Type the password.

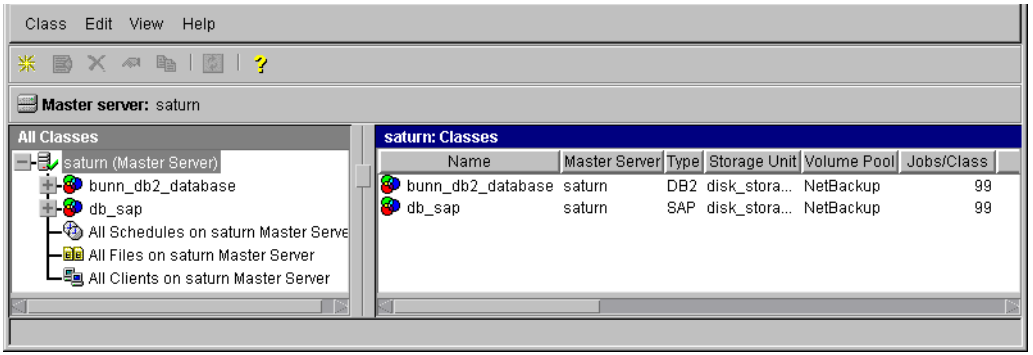
4. Press Login.

   The Login dialog closes and the NetBackup Assistant displays.

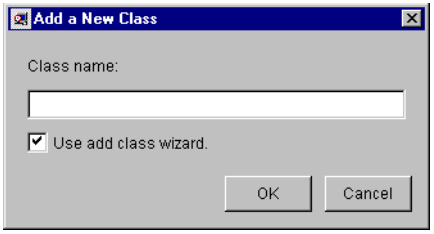
5. Click Close. The launch screen displays.



6. Click the Backup Policy Management icon. The Backup Policy Management (Classes) - NetBackup dialog appears.



7. On the Edit menu click New. The Add a New Class dialog box appears.



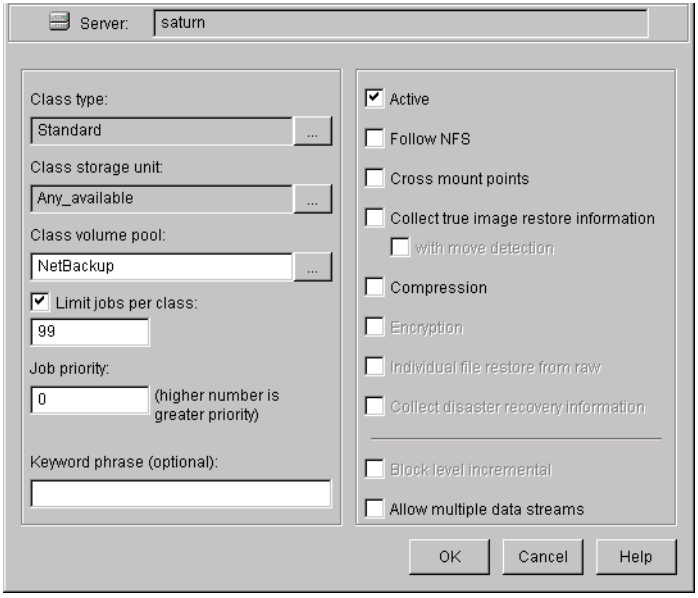
The class wizard automates the class configuration process. To configure classes without using the class wizard, use the following instructions.

8. Clear the Use add class wizard check box.

9. Type the new class name in the Class name box.

Note This class name can be specified in the `init`*SID*`.utl` file on the client.

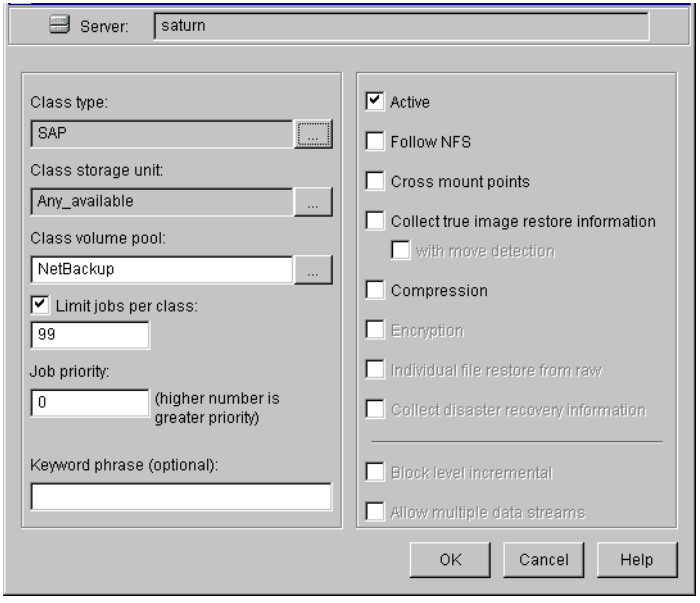
10. Click OK. The Change Attributes dialog box appears.



a. Select the SAP class type for SAP.

b. Click OK

The Change Attributes dialog box will change as follows.



Refer to the following table to configure class attributes.

Class storage unit:
: Select the storage unit for this class. A storage unit is a group of one or more storage devices configured to store information from a backup.

Class volume pool:
: Select the volume pool for this class. A volume pool is a group of volumes (removable media) configured for use by NetBackup only. These volumes are protected from being used by other applications.

Limit jobs per class:
: Type the maximum number of concurrent jobs for this class. If the Limit jobs per class checkbox is clear, the maximum number of backup and restore jobs that NetBackup will perform concurrently for this class can be up to a limit of 999. To specify a lower limit, select the checkbox and specify a value from 1 to 999 (the default is 99).

Job priority
: Select a value for the job priority NetBackup will assign to automatic backup jobs for this class. When a drive becomes available, NetBackup assigns it to the first client in the highest priority class.

Keyword phrase:
: For NetBackup for SAP on UNIX, the keyword phrase entry *must not be specified*.

Active
: Select the checkbox to perform scheduled operations defined in this class. The class must be active for NetBackup to execute automatic backup schedules or allow user backups or archives.

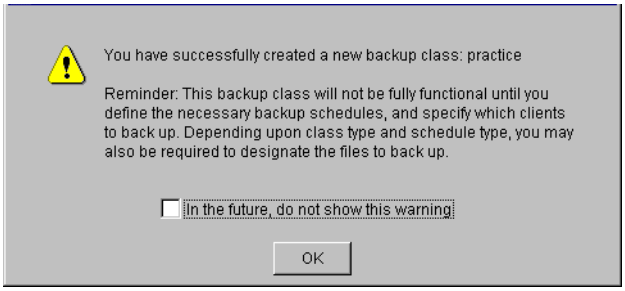
Follow NFS
: Select the checkbox to follow the Network file system.

Cross mount points
: Select the checkbox to control whether NetBackup crosses file system boundaries during a backup or archive on UNIX clients.

Compression
: Select the checkbox to specify software compression for backups of this class.

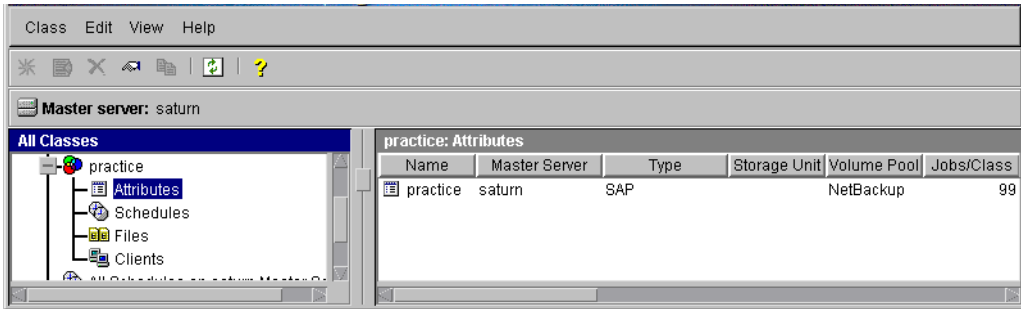
Encryption
: Select the checkbox to specify encryption for backups of clients in this class.

c. Click OK to close the Change Attributes dialog box. The following Warning appears.



d. Click OK to close the Warning box.

Notice that the newly created class appears in the All Master Servers pane in the Backup Policy Management (Classes) - NetBackup dialog box.



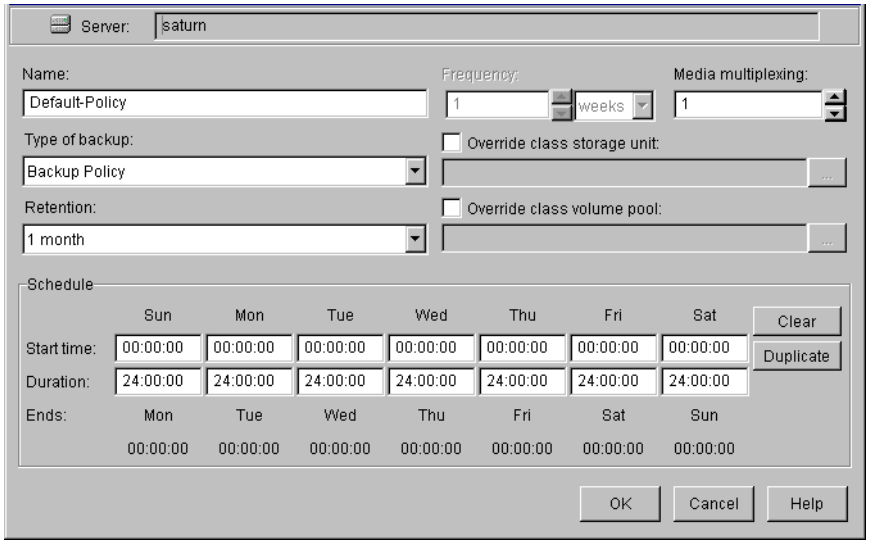
Also notice that the configuration settings you entered in the Change Attributes dialog box are displayed in the *class: Attributes* pane. Use the scroll bar at the bottom of the *class: Attributes* pane to view all settings.

11. Refer to the following instructions to configure schedules for your class.

a. Click Schedules in the All Master Servers pane of the Backup Policy Management (Classes) - NetBackup dialog box.

Notice that a Default-Policy appears in the practice:Schedules pane.

b. Double-click the Default-Policy schedule. The Change Schedules dialog box appears.



c. Configure a *Backup Policy* schedule.

All SAP database operations are performed through NetBackup for SAP on UNIX using a *Backup Policy* schedule. This includes those backups started automatically.

You must configure a *Backup Policy* schedule for each SAP class you create. If you do not do this, you will not be able to perform a backup. To help satisfy this requirement, a *Backup Policy* schedule named Default-Policy is automatically created when you configure a new class.

Refer to the following table when configuring *Backup Policy* schedules.

Name:
: Each schedule requires a unique name.

Note The *Backup Policy* schedule name can be specified in the `init`*SID*`.utl` file on the client.

Type of backup:
: A *Backup Policy* schedule enables user-controlled NetBackup operations performed on the client.

Retention:
: The retention period for a *Backup Policy* schedule refers to the length of time that NetBackup keeps backup images. Set the time period to

retain at least two full backups of your database. In this way, if one full backup has been lost, you will have another full backup to fall back on. For example, if your database is backed up once every Sunday morning, you should select a retention period of at least 2 weeks. For SAP, expired backup information is managed manually through the `sapdba` utility. The utility can be called as follows:

```
sapdba -cleanup
```

The utility looks at the `expir_period_brbackup` and the `expir_period_brarchive` variable in the `init`*`SID`*`.dba` file to determine what backup/restore log information should be deleted. The value for the two variables is the number of days to retain backup information. For example, if `expir_period_brbackup 7` is true, then any backup information older than seven days from the current date will be deleted when `sapdba -cleanup` is executed. These two variables should be set to the same as the retention period for the *Backup Policy* schedule. See the *SAP Database Administration Guide: Oracle* for more information.

Note When images are expired from the NetBackup database by the retention period, there is no communication between NetBackup and SAP. Therefore, it will be necessary to use the `sapdba` utility to clean up the SAP log directories.

Media Multiplexing

The media multiplexing box sets the number of jobs from this schedule that NetBackup can multiplex onto any one drive.

Start:

Specifies the day and time when the backup windows will open.

Duration:

Specifies the period of time (backup window) during which the backup job can take place.

The backup window for a *Backup Policy* schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the *Backup Policy* schedule starts processes that are required for all NetBackup for SAP on UNIX backups, including those started automatically.

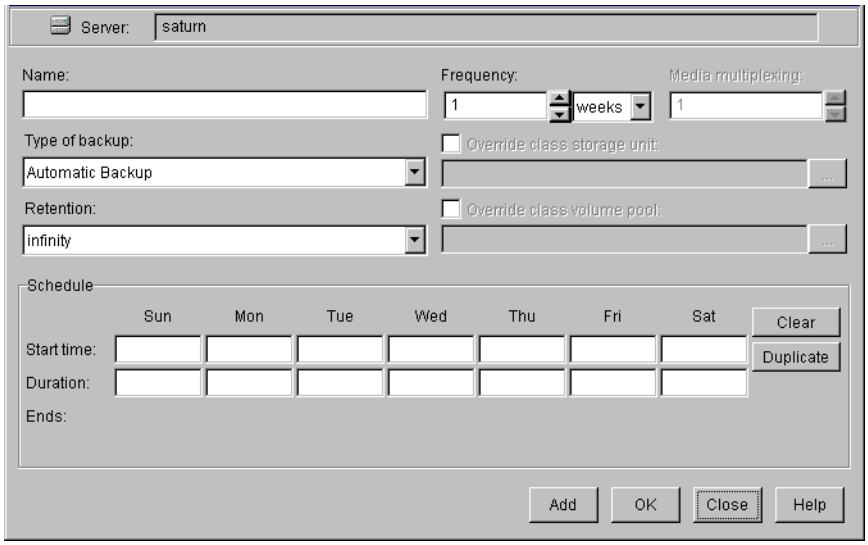
For example, assume that you:
- expect users to perform NetBackup operations during business hours, 0800 to 1300.
- configured automatic backups to start between 1800 and 2200.

The *Backup Policy* schedule must have a start time of 0800 and a duration of 14 hours.

Tip Set the time period for the *Backup Policy* schedule for 24 hours per day, seven days per week. This will ensure that your NetBackup for SAP on UNIX operations are never locked out due to the *Backup Policy* schedule.

d. Configure an *Automatic Backup*

Double-click on Schedules in the All Master Servers pane of the Backup Policy Management (Classes) - NetBackup dialog box. The Add Schedule - Class *classname* property sheet appears.



Refer to the following table when configuring *Automatic Backup* schedules.

Name:

Each schedule requires a unique name.

Type of backup:

An *Automatic Backup* schedule specifies the dates and times when NetBackup will automatically start backups by running the SAP scripts in the order that they appear in the file list. If there is more than one client in the SAP class, the SAP scripts are executed on each client.

Caution The settings for Retention Period and Frequency are significantly different for database extensions than they are for other NetBackup class types. Please review the following descriptions for Retention Period and Frequency carefully.

Retention:

The retention period for an *Automatic Backup* schedule controls how long NetBackup keeps records of when scheduled backups have occurred. Note that this is different than with a *Backup Policy* schedule.

The NetBackup scheduler compares the latest record to the frequency to determine whether a backup is due. This means that if you set the retention period to expire the record too early, the scheduled backup frequency will be unpredictable. However, if you set the retention

period to be longer than necessary, the NetBackup catalog will accumulate unnecessary records. Therefore, set a retention period that is *longer* than the frequency setting for the schedule.

For example, if the frequency setting is set to one week, set the retention period to be more than one week.

Frequency

Refers to the time period to wait between backups.

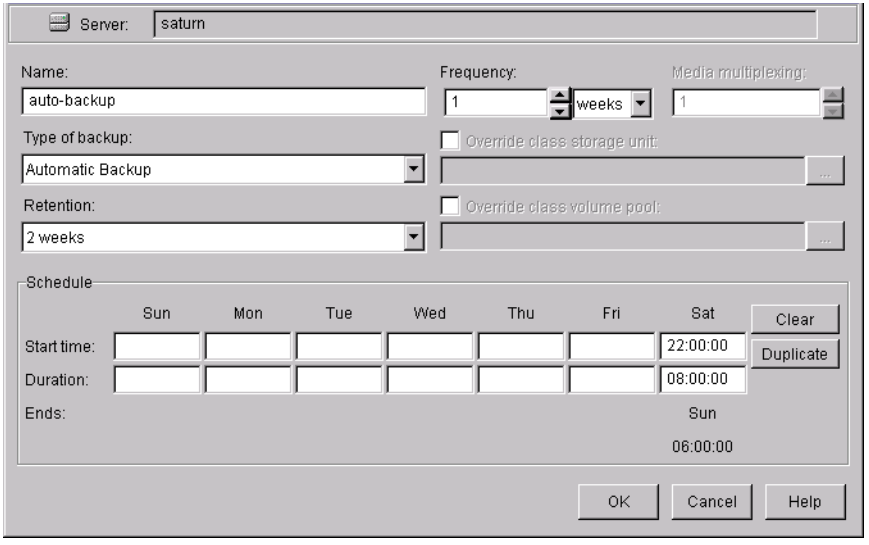
Start:

Specifies the day and time when the backup windows will open.

Duration:

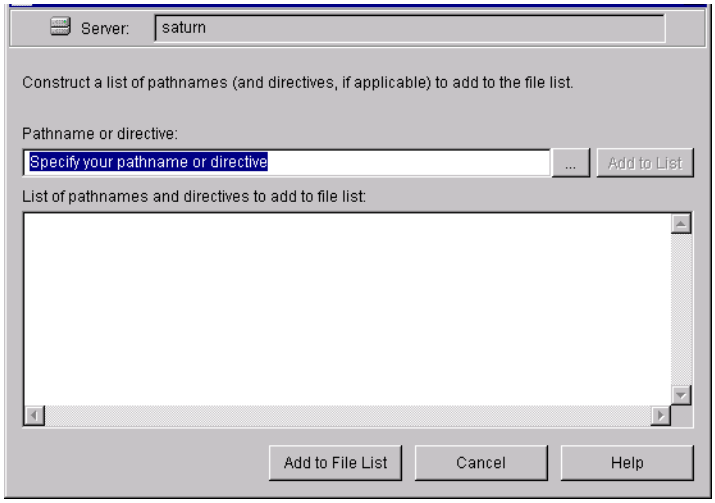
Specifies the period of time (backup window) during which the backup job can take place.

The following illustrates how an *Automatic Backup* schedule might be configured.



12. Refer to the following instructions to configure the list of SAP scripts.

a. Double-click on Files in the All Master Servers pane of the Backup Policy Management (Classes) - NetBackup dialog box. The Add File Class appears.



The File list in a database class has a different meaning than for other classes. Normally, in a Standard class, you would list files and directories to be backed up. But since you are now configuring a database class, you will list SAP scripts.

Refer to “Instructions for Modifying Scripts” on page 55 for details.

b. Type the SAP script. Specify the full pathname.

For example:

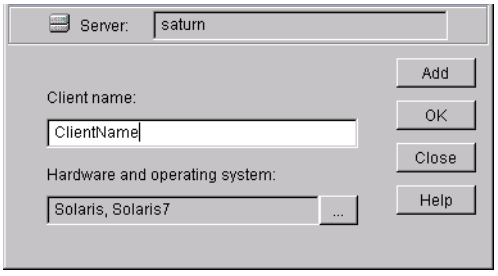
install_path`/netbackup/ext/db_ext/sap/scripts/sap_online_backup.cmd`

Note Be sure that the scripts listed here are installed on each client in the Client list.

c. Click Add.

13. Since all SAP scripts specified in the file list execute during automatic backups, you must make sure that only one type of backup is executed on the same database. Refer to the following instructions to configure the Client list.

a. Double-click on Clients in the All Master Servers pane of the Backup Policy Management (Classes) - NetBackup dialog box. The Add Client Class dialog box appears.



b. Type the name of the client. This client should have:

- the database installed
- NetBackup for SAP on UNIX installed
- the backup or restore SAP script(s)

c. Click Add to add the client to the client list.

d. Click OK.

The Add Client Class dialog box will close. The NetBackup Administration dialog box will remain open.

`xbpadm` Interface

Use these procedures to configure a class on a UNIX NetBackup master server.

1. Log onto the server as root.
2. Start the NetBackup `xbpadm` administrator interface.
   - If the `DISPLAY` variable is set, type:

     `/usr/openv/netbackup/bin/goodies/xbpadm &`
   - If `DISPLAY` variable is not set, use the `-d` option:

     `/usr/openv/netbackup/bin/goodies/xbpadm -d (`*your_machine_name*`):0 &`

   The NetBackup Administration dialog box will open.
3. Create a new class.
   a. On the Actions menu, select New, then Classes. The Creating a Class dialog box will open.
   b. In the Class Name box, type the new class name.

      When you configure the SAP class on your NetBackup installation, you will use a unique class name.
   c. Under Select one of, select New Class. The Class Type list box will enable.
   d. Select the SAP class from the list box.
   e. Click OK. The Changing Class dialog box will open.

Note This class name can be specified in the `init`*SID*`.utl` file on the client.

4. Check the Class Attribute settings.

   Refer to the following table to configure class attributes.

   Class storage unit:
   : Select the storage unit for this class. A storage unit is a group of one or more storage devices configured to store information from a backup.

   Class volume pool:
   : Select the volume pool for this class. A volume pool is a group of volumes (removable media) configured for use by NetBackup only. These volumes are protected from being used by other applications.

Limit jobs per class:
: Type the maximum number of concurrent jobs for this class. If the Limit jobs per class checkbox is clear, the maximum number of backup and restore jobs that NetBackup will perform concurrently for this class can be up to a limit of 999. To specify a lower limit, select the checkbox and specify a value from 1 to 999 (the default is 99).

Job priority
: Select a value for the job priority NetBackup will assign to automatic backup jobs for this class. When a drive becomes available, NetBackup assigns it to the first client in the highest priority class.

Keyword phrase:
: For NetBackup for SAP on UNIX, the keyword phrase entry *must not be specified*.

Active
: Select the checkbox to perform scheduled operations defined in this class. The class must be active for NetBackup to execute automatic backup schedules or allow user backups or archives.

Follow NFS
: Select the checkbox to follow the Network file system.

Cross mount points
: Select the checkbox to control whether NetBackup crosses file system boundaries during a backup or archive on UNIX clients.

Compression
: Select the checkbox to specify software compression for backups of this class.

Encryption
: Select the checkbox to specify encryption for backups of clients in this class.

5. Refer to the following instructions to configure the schedules for your class.

a. Click Schedules to change the display.

b. Click New to open the Creating a Schedule dialog box.

c. In the Name of Schedule box, type the new schedule name.

d. Click OK. The Creating a Schedule dialog box will open.

e. Configure a *Backup Policy* schedule.

All SAP backup and restore operations are performed through NetBackup for SAP on UNIX using a *Backup Policy* schedule. This includes those backups started automatically.

You must configure a *Backup Policy* schedule for each SAP class you create. If you do not do this, you will not be able to perform a backup. To help satisfy this requirement, a *Backup Policy* schedule named Default-Policy is automatically created when you configure a new class.

Refer to the following table when configuring *Backup Policy* schedules.

Name:
: Each schedule requires a unique name.

Note The *Backup Policy* schedule name can be specified in the `init`*SID*`.utl` file on the client.

Type of backup:
: A *Backup Policy* schedule enables user-controlled NetBackup operations performed on the client.

Retention:
: The retention period for a *Backup Policy* schedule refers to the length of time that NetBackup keeps backup images. Set the time period to retain at least two full backups of your database. In this way, if one full backup has been lost, you will have another full backup to fall back on. For example, if your database is backed up once every Sunday morning, you should select a retention period of at least 2 weeks. For SAP, expired backup information is managed manually through the `sapdba` utility. The utility can be called as follows:

```
sapdba -cleanup
```

The utility looks at the `expir_period_brbackup` and the `expir_period_brarchive` variable in the `init`*SID*`.dba` file to determine what backup/restore log information should be deleted. The value for the two variables is the number of days to retain backup information. For example, if `expir_period_brbackup 7` is true, then any backup information older than seven days from the current date will be deleted when `sapdba -cleanup` is executed. These two variables should be set to the same as the retention period for the *Backup Policy* schedule. See the *SAP Database Administration Guide: Oracle* for more information.

Note When images are expired from the NetBackup database by the retention period, there is no communication between NetBackup and SAP. Therefore, it will be necessary to use the `sapdba` utility to clean up the SAP log directories.

Media Multiplexing

The media multiplexing box sets the number of jobs from this schedule that NetBackup can multiplex onto any one drive.

Start:

Specifies the day and time when the backup windows will open.

Duration:

Specifies the period of time (backup window) during which the backup job can take place.

The backup window for a *Backup Policy* schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the *Backup Policy* schedule starts processes that are required for all NetBackup for SAP on UNIX backups, including those started automatically.

For example, assume that you:
- expect users to perform NetBackup operations during business hours, 0800 to 1300.
- configured automatic backups to start between 1800 and 2200.

The *Backup Policy* schedule must have a start time of 0800 and a duration of 14 hours.

Tip Set the time period for the *Backup Policy* schedule for 24 hours per day, seven days per week. This will ensure that your NetBackup for SAP on UNIX operations are never locked out due to the *Backup Policy* schedule.

f. Configure an *Automatic Backup*.

Refer to the following table when configuring *Automatic Backup* schedules.

Name:

Each schedule requires a unique name.

Type of backup:

An *Automatic Backup* schedule specifies the dates and times when NetBackup will automatically start backups by running the SAP scripts in the order that they appear in the file list. If there is more than one client in the SAP class, the SAP scripts are executed on each client.

Caution The settings for Retention Period and Frequency are significantly different for database extensions than they are for other NetBackup class types. Please review the following descriptions for Retention Period and Frequency carefully.

Retention:
: The retention period for an *Automatic Backup* schedule controls how long NetBackup keeps records of when scheduled backups have occurred. Note that this is different than with a *Backup Policy* schedule.

  The NetBackup scheduler compares the latest record to the frequency to determine whether a backup is due. This means that if you set the retention period to expire the record too early, the scheduled backup frequency will be unpredictable. However, if you set the retention period to be longer than necessary, the NetBackup catalog will accumulate unnecessary records. Therefore, set a retention period that is *longer* than the frequency setting for the schedule.

  For example, if the frequency setting is set to one week, set the retention period to be more than one week.

Frequency
: Refers to the time period to wait between backups.

Start:
: Specifies the day and time when the backup windows will open.

Duration:
: Specifies the period of time (backup window) during which the backup job can take place.

6. Refer to the following instructions to configure the Files list for your class.

Perform this procedure if unattended schedule backups are going to be performed. Otherwise this step can be skipped.

a. Click Files.

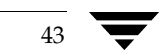
The Files list in a database class has a different meaning than for other classes. Normally, in a Standard class, you would list files and directories to be backed up. But since you are now configuring a database class, you will list SAP scripts.

Refer to "Create Scripts" later in this chapter for details on creating a script.

b. Specify the full path name for a SAP script in the file list. For example:

install_path`/netbackup/ext/db_ext/sap/scripts/sap_online_backup.cmd`

Note Be sure that the scripts listed here are installed on each client in the Client list.



7. Refer to the following instructions to configure the Clients list for your class.

   a. Click Clients to change the display.

   b. Click New to open the Adding Clients dialog box.

   c. Select the hardware and operating system from the Hardware and Operating System: scroll box.

   d. Type the name of the client. This client should have:

      - the database installed
      - NetBackup for SAP on UNIX installed
      - the backup or restore SAP script(s)

Note The Install NetBackup Client Software checkbox will install NetBackup client software on a remote client. There is no option to install NetBackup for SAP on UNIX software. Refer to the installation instructions in this guide to install NetBackup for SAP on UNIX.

   e. Click OK.

8. Click OK.

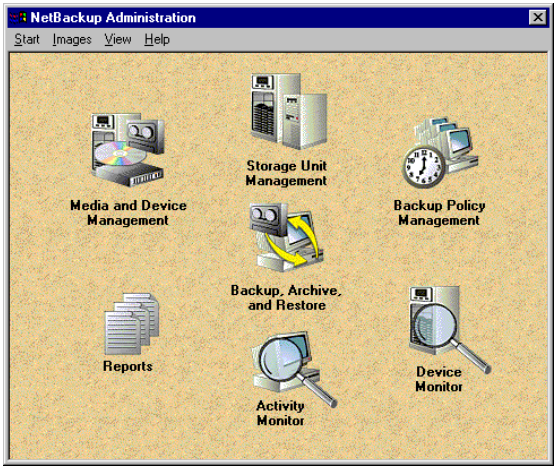
The Changing Class dialog box will close. The NetBackup Administration dialog box will remain open.

NetBackup Administration - Windows NT/2000 Interface

Use this procedure when configuring a class from a Windows NT/2000 server or from the NetBackup Administration Client host.

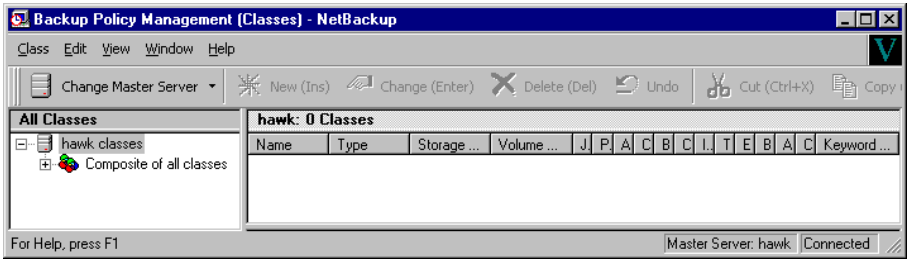
1. Log onto the server as Administrator.

2. From the Start menu, select Programs, VERITAS NetBackup, NetBackup Administration. The NetBackup Administration interface appears.



3. Click the Backup Policy Management icon.

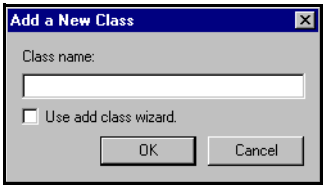
   The Backup Policy Management (Classes) - NetBackup dialog appears.



4. Perform the following steps to add a new class.

   The class wizard automates the class configuration process. To configure classes without using the class wizard, perform the following steps.

a. On the Class menu click New. The Add a New Class dialog box appears.



b. Confirm that the Use add class wizard check box is not checked.

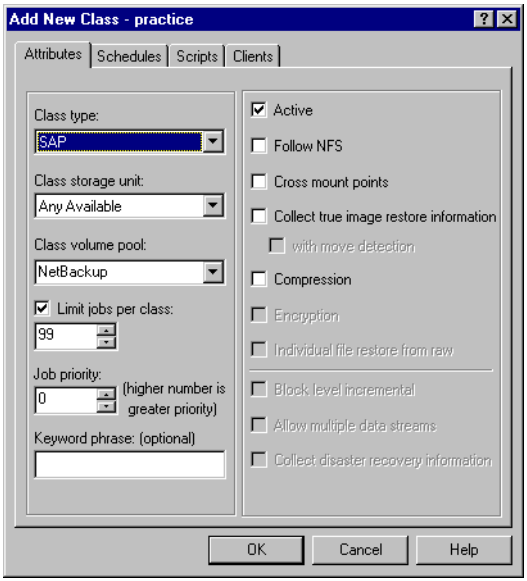
c. Type the new class name in the Class name box.

Note This class name can be specified in the `init`*SID*`.utl` file on the client.

d. Click OK. The Add New Class dialog box appears. The class name you specified appears in the title bar.

5. Use the following instructions to configure the general attributes for the class.

a. Select the SAP class type.



Refer to the following table to configure class attributes.

Class storage unit:
: Select the storage unit for this class. A storage unit is a group of one or more storage devices configured to store information from a backup.

Class volume pool:
: Select the volume pool for this class. A volume pool is a group of volumes (removable media) configured for use by NetBackup only. These volumes are protected from being used by other applications.

Limit jobs per class:
: Type the maximum number of concurrent jobs for this class. If the Limit jobs per class checkbox is clear, the maximum number of backup and restore jobs that NetBackup will perform concurrently for this class can be up to a limit of 999. To specify a lower limit, select the checkbox and specify a value from 1 to 999 (the default is 99).

Job priority
: Select a value for the job priority NetBackup will assign to automatic backup jobs for this class. When a drive becomes available, NetBackup assigns it to the first client in the highest priority class.

Keyword phrase:
: For NetBackup for SAP on UNIX, the keyword phrase entry *must not be specified*.

Active
: Select the checkbox to perform scheduled operations defined in this class. The class must be active for NetBackup to execute automatic backup schedules or allow user backups or archives.

Follow NFS
: Select the checkbox to follow the Network file system.

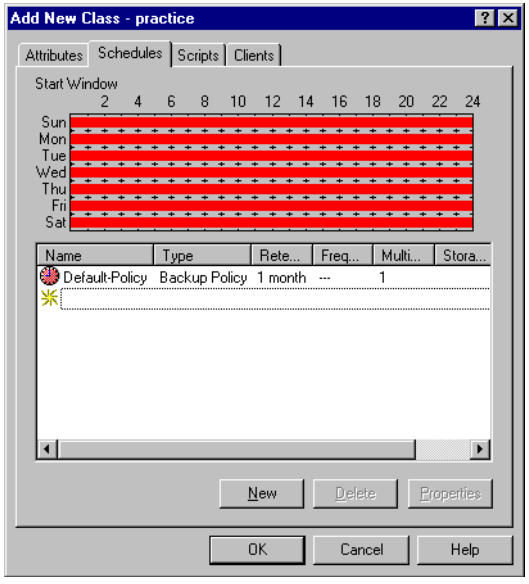
Cross mount points
: Select the checkbox to control whether NetBackup crosses file system boundaries during a backup or archive on UNIX clients.

Compression
: Select the checkbox to specify software compression for backups of this class.

Encryption
: Select the checkbox to specify encryption for backups of clients in this class.

6. Use the following instructions to configure the class schedules.

a. Click Schedules tab. The Schedules property sheet appears.



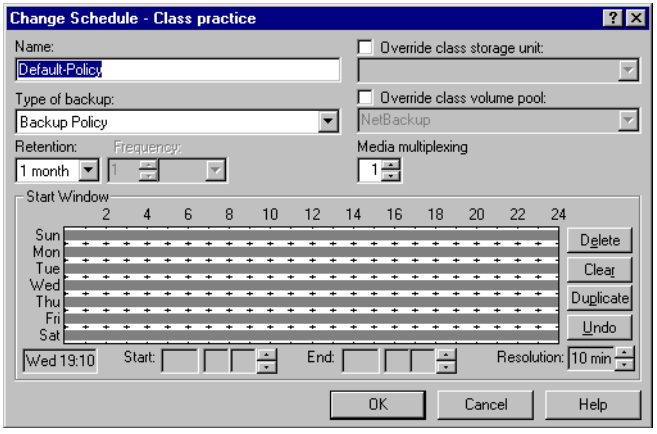
b. Configure a *Backup Policy* schedule.

All SAP database operations are performed through NetBackup for SAP on UNIX using a *Backup Policy* schedule. This includes those backups started automatically.

You must configure a *Backup Policy* schedule for each SAP class you create. If you do not do this, you will not be able to perform a backup. To help satisfy this requirement, a *Backup Policy* schedule named Default-Policy is automatically created when you configure a new class.

c. Double-click on Backup Schedule in the Add New Class dialog box.

The Change Schedules dialog box appears.



Refer to the following table when configuring *Backup Policy* schedules.

Name:

Each schedule requires a unique name.

Note The *Backup Policy* schedule name can be specified in the `init`*SID*`.utl` file on the client.

Type of backup:

A *Backup Policy* schedule enables user-controlled NetBackup operations performed on the client.

At least one *Backup Policy* schedule must be configured in each SAP class. The Default-Policy schedule is configured as a *Backup Policy* schedule.

Retention:

The retention period for a *Backup Policy* schedule refers to the length of time that NetBackup keeps backup images. Set the time period to retain at least two full backups of your database. In this way, if one full backup has been lost, you will have another full backup to fall back on. For example, if your database is backed up once every Sunday morning, you should select a retention period of at least 2 weeks.
For SAP, expired backup information is managed manually through the `sapdba` utility. The utility can be called as follows:

```
sapdba -cleanup
```

The utility looks at the `expir_period_brbackup` and the `expir_period_brarchive` variable in the `init`***SID***`.dba` file to determine what backup/restore log information should be deleted. The value for the two variables is the number of days to retain backup information. For example, if `expir_period_brbackup 7` is true, then any backup information older than seven days from the current date will be deleted when `sapdba -cleanup` is executed. These two variables should be set to the same as the retention period for the *Backup Policy* schedule. See the *SAP Database Administration Guide: Oracle* for more information.

Note When images are expired from the NetBackup database by the retention period, there is no communication between NetBackup and SAP. Therefore, it will be necessary to use the `sapdba` utility to clean up the SAP log directories.

Media Multiplexing

The media multiplexing box sets the number of jobs from this schedule that NetBackup can multiplex onto any one drive.

Start:

Specifies the day and time when the backup windows will open.

End:

Specifies the day and time when the backup windows will close.

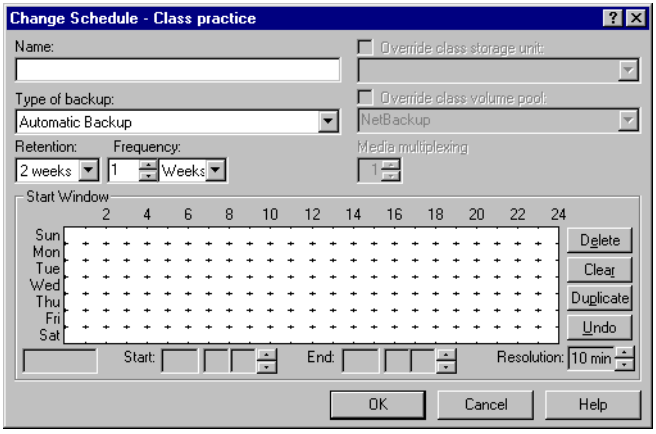
The backup window for a *Backup Policy* schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the *Backup Policy* schedule starts processes that are required for all NetBackup for SAP on UNIX backups, including those started automatically.

For example, assume that you:
- expect users to perform NetBackup operations during business hours, 0800 to 1300.
- configured automatic backups to start between 1800 and 2200.

The *Backup Policy* schedule must have a start time of 0800 and a duration of 14 hours.

Tip Set the time period for the *Backup Policy* schedule for 24 hours per day, seven days per week. This will ensure that your NetBackup for SAP on UNIX operations are never locked out due to the *Backup Policy* schedule.

7. Click New to configure an *Automatic Backup* schedule. The Change Schedules dialog box appears.



Refer to the following table when configuring *Automatic Backup* schedules.

Name:

Each schedule requires a unique name.

Type of backup:

An *Automatic Backup* schedule specifies the dates and times when NetBackup will automatically start backups by running the SAP scripts in the order that they appear in the file list. If there is more than one client in the SAP class, the SAP scripts are executed on each client.

Caution The settings for Retention Period and Frequency are significantly different for database extensions than they are for other NetBackup class types. Please review the following descriptions for Retention Period and Frequency carefully.

Retention:

The retention period for an *Automatic Backup* schedule controls how long NetBackup keeps records of when scheduled backups have occurred. Note that this is different than with a *Backup Policy* schedule.

The NetBackup scheduler compares the latest record to the frequency to determine whether a backup is due. This means that if you set the retention period to expire the record too early, the scheduled backup frequency will be unpredictable. However, if you set the retention period to be longer than necessary, the NetBackup catalog will accumulate unnecessary records. Therefore, set a retention period that is *longer* than the frequency setting for the schedule.

For example, if the frequency setting is set to one week, set the retention period to be more than one week.

Frequency

Refers to the time period to wait between backups.

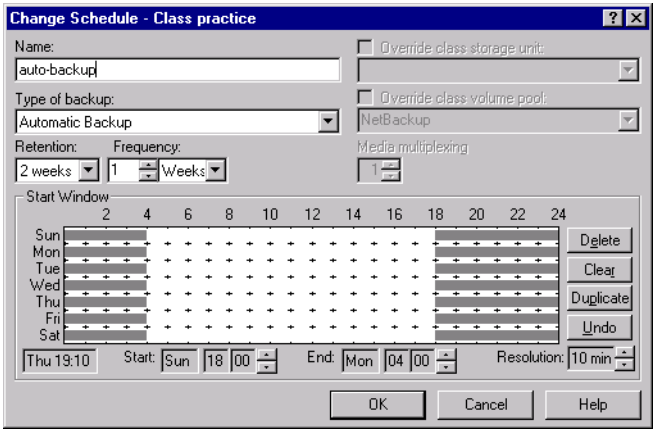
Start:

Specifies the day and time when the backup windows will open.

End:

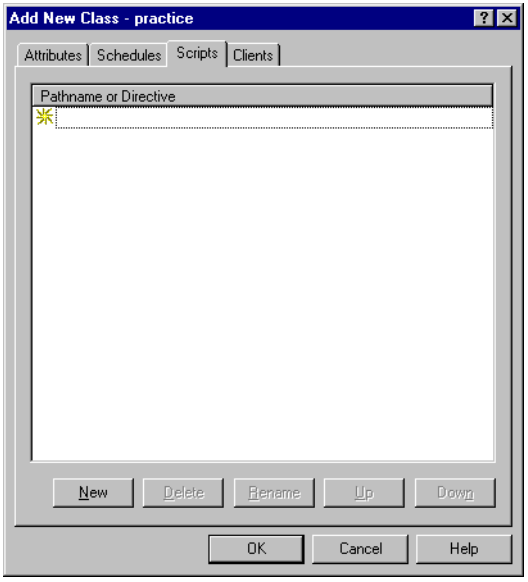
Specifies the day and time when the backup windows will close.

The following illustrates how an *Automatic Backup* schedule might be configured.



8. Refer to the following instructions to configure the list of scripts.

a. Click Scripts tab. The Scripts property sheet appears.



The File list in a database class has a different meaning than for other classes. Normally, in a Standard class, you would list files and directories to be backed up. But since you are now configuring a database class, you will list SAP scripts.

Refer to “Instructions for Modifying Scripts” on page 55 for details.

b. Click New.

c. Type the SAP script. Specify the full pathname for the SAP script in the file list.

For example:

install_path`/netbackup/ext/db_ext/sap/scripts/sap_online_backup.cmd`

Note The SAP scripts script must be modified to suit your needs. Also, the SAP scripts must be installed on each machine that is in the client list.

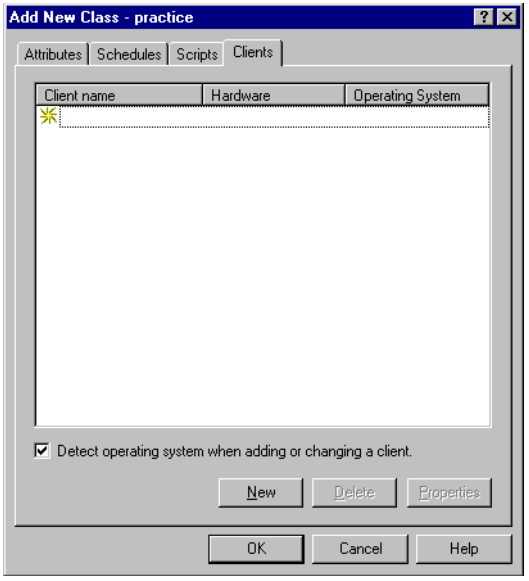
d. Click Add.

Since all SAP scripts specified in the file list execute during automatic backups, you must make sure that only one type of backup is executed on the same database. NetBackup will automatically start backups by running the SAP scripts in the order that they appear in the file list.

Note Be sure that the scripts listed here are installed on each client in the Client list.

9. Refer to the following instructions to configure the Client list.

a. Click Clients tab. The Clients property sheet appears.



b. Click New. The Client Names box appears.

c. Type the name of the client that has:

- the database installed
- NetBackup for SAP on UNIX installed
- the backup or restore SAP script

d. Specify the hardware and operating system for the client.

e. Click Add to add the client to the client list.

10. Click OK.

The Changing Class dialog box will close. The NetBackup Administration dialog box remains open.

Create Scripts

The following example scripts were included with the NetBackup for SAP on UNIX installation:

```
sap_offline_backup
sap_online_backup
sap_redo_log_backup
```

These scripts were installed in the following directory:

install_path`/netbackup/ext/db_ext/sap/scripts`

Be sure to modify these scripts for your environment.

Although each script can have multiple SAP Tools operations, a separate script is required for each type of operation. For example, you need separate scripts for backups and restores.

Caution Always specify the correct script when configuring automatic backups or when starting operations through NetBackup. NetBackup for SAP on UNIX will not generate an error if a restore script is used for a backup operation or a backup script is used for a restore operation.

Instructions for Modifying Scripts

Note If you do not include an su - user (user is the SAP administrator account) in your scripts, they will not run with the proper permissions and environmental variables. The result will be problems with your database backups or restores.

1. If necessary, copy the example scripts to a different directory on your client. SAP scripts can be located anywhere on the client.

2. Set the access permissions of these scripts to 775.

   ```
   chmod 775 <script_name>
   ```

3. Modify the `sap_offline_backup` script.

   a. Use a text editor to open the `sap_offline_backup` script. The following example uses the `vi` text editor.

      ```
      vi sap_offline_backup
      ```

      The following will appear.

```
#!/bin/sh

#bcpyrght
#***************************************************************************
#* Copyright 1993 - 1999 VERITAS Software Corporation, All Rights Reserved *
#***************************************************************************
#ecpyrght

#
#This environment variable are created by Netbackup (bphdb)
#

echo "SAP_SCHEDULED = $SAP_SCHEDULED"
echo "SAP_USER_INITIATED = $SAP_USER_INITIATED"
echo "SAP_SERVER = $SAP_SERVER"
echo "SAP_CLASS = $SAP_CLASS"

RETURN_STATUS=0

CMD_LINE=""

#
# If SAP_SERVER exists then export it to make it available to backint
#
if [ -n "$SAP_SERVER" ]
then
        CMD_LINE="$CMD_LINE export SAP_SERVER=$SAP_SERVER;"
fi

#
# If SAP_CLASS exists then export it to make it available to backint
#
if [ -n "$SAP_CLASS" ]
then
        CMD_LINE="$CMD_LINE export SAP_CLASS=$SAP_CLASS;"
fi

#
# Full offline backup
#

CMD_LINE="$CMD_LINE brbackup -c -d util_file -t offline -m all"

#
# The username on the "su" command needs to be replaced with the correct
# user name.
#
```

```
echo "Execute $CMD_LINE"
su - orasap -c "$CMD_LINE"

RETURN_STATUS=$?

exit $RETURN_STATUS
```

b. Follow the instructions in the `sap_offline_backup` script.

Note Test the scripts you just created. Refer to "Test Configuration Settings" on page 65.

Script Parameters

A number of parameters are necessary in SAP scripts to enable SAP utilities to perform backup and restore operations. The parameters can come from one of three sources:

- Environmental Variables
- Parameter File (`init`*SID*`.sap` & `init`*SID*`.utl`), where *SID* is the instance.
- NetBackup Configuration File (`bp.conf`)

The different parameter sources can be used to create different SAP scripts to perform different database backup/restore tasks. For example, the *$SAP_CLASS* can be defined in an SAP script to perform different types of backups (on-line, off-line, or redo logs).

It is also important to note that some environmental variables are created locally when an SAP script is executed through NetBackup's Automatic Scheduler.

When NetBackup's Automatic Scheduler calls an SAP script, the following environmental variables are created.

$SAP_CLASS	Name of the NetBackup SAP class.
$SAP_SERVER	Name of the NetBackup server.
$SAP_SCHEDULED	Set to `1` if this is an automatic backup (Scheduled SAP).
$SAP_USER_INITIATED	Set to `1` if this is a user-initiated backup (SAP backup is started from the master server)

When an SAP script is started from the Java interface, all of the same variables are created except for *$SAP_CLASS* variable.

Example 1: Full Off-line Database Backup

Sample SAP script location:

install_path`/netbackup/ext/db_ext/sap/scripts/sap_offline_backup`

The following SAP script uses an `su` command to log into an SAP administrator user account from root. The `su` command executes a `brbackup` command to perform an off-line database backup. Use the `export` command to make *$SAP_SERVER* and *$SAP_CLASS*, which are created by `bphdb` in root, available to the NetBackup for SAP on UNIX `backint` interface process.

```
#!/bin/sh
echo "SAP_SCHEDULED = $SAP_SCHEDULED"
echo "SAP_USER_INITIATED = $SAP_USER_INITIATED"
echo "SAP_SERVER = $SAP_SERVER"
echo "SAP_CLASS = $SAP_CLASS"
RETURN_STATUS=0
CMD_LINE=""
if [ -n "$SAP_SERVER" ]
then
        CMD_LINE="$CMD_LINE export SAP_SERVER=$SAP_SERVER;"
fi
if [ -n "$SAP_CLASS" ]
then
        CMD_LINE="$CMD_LINE export SAP_CLASS=$SAP_CLASS;"
fi
CMD_LINE="$CMD_LINE brbackup -c -d util_file -t offline -m all"
echo "Execute $CMD_LINE"
su - orasap -c "$CMD_LINE"
RETURN_STATUS=$?
exit $RETURN_STATUS
```

Note The above SAP script may need to be modified to work correctly. Make sure the `su` command logs into the correct user, and the desired environmental variables are being exported.

Example 2: Full On-line Database Backup

Sample SAP script location:

install_path`/netbackup/ext/db_ext/sap/scripts/sap_online_backup`

The SAP script contains instructions to start the `brbackup` and `brarchive` commands.

```
#!/bin/sh
echo "SAP_SCHEDULED = $SAP_SCHEDULED"
echo "SAP_USER_INITIATED = $SAP_USER_INITIATED"
echo "SAP_SERVER = $SAP_SERVER"
echo "SAP_CLASS = $SAP_CLASS"
RETURN_STATUS=0
EX_CMD_LINE=""
if [ -n "$SAP_SERVER" ]
then
        EX_CMD_LINE="$CMD_LINE export SAP_SERVER=$SAP_SERVER;"
fi
if [ -n "$SAP_CLASS" ]
then
        EX_CMD_LINE="$CMD_LINE export SAP_CLASS=$SAP_CLASS;"
fi
CMD_LINE="$EX_CMD_LINE brbackup -c -d util_file_online -t online -m all"
echo "Execute $CMD_LINE"
su - orasap -c "$CMD_LINE"
RETURN_STATUS=$?
if [ $RETURN_STATUS -eq 0 ]
then
    CMD_LINE="$EX_CMD_LINE brarchive -c -d util_file -sd"
    echo "Execute $CMD_LINE"
    su - orasap -c "$CMD_LINE"
    RETURN_STATUS=$?
fi
exit $RETURN_STATUS
```


Example 3: Backup of Offline Redo Log Files

Sample SAP script location:

install_path`/netbackup/ext/db_ext/sap/scripts/sap_redo_log_backup`

This SAP script contains instructions to start the `brarchive` command:

```
#!/bin/sh
echo "SAP_SCHEDULED = $SAP_SCHEDULED"
echo "SAP_USER_INITIATED = $SAP_USER_INITIATED"
echo "SAP_SERVER = $SAP_SERVER"
echo "SAP_CLASS = $SAP_CLASS"
RETURN_STATUS=0
CMD_LINE=""
if [ -n "$SAP_SERVER" ]
then
        CMD_LINE="$CMD_LINE export SAP_SERVER=$SAP_SERVER;"
fi
if [ -n "$SAP_CLASS" ]
then
        CMD_LINE="$CMD_LINE export SAP_CLASS=$SAP_CLASS;"
fi
CMD_LINE="$CMD_LINE brarchive -c -d util_file -sd"
echo "Execute $CMD_LINE"
su - orasap -c "$CMD_LINE"
RETURN_STATUS=$?
exit $RETURN_STATUS
```

Configure the init*SID*.utl File

Configure the NetBackup for SAP on UNIX by modifying the `backint -p par_file` or the `initSID.utl` file. These are text files submitted to the NetBackup for SAP on UNIX `backint` interface by SAP Tools with the `-p` ***par_file*** parameter. The name of the ***par_file*** is specified on the ***util_par_file*** parameter in the profile file (see "Configure the initSID.sap File" on page 63). SAP Tools determines the name of the ***par_file*** through the profile file.

1. Create a Parameter File.

   Copy the parameter file from the NetBackup directory to the `$ORACLE_HOME/database` directory. If the Oracle instance is SAP, copy the NetBackup example `.utl` file to `initSAP.utl` as follows:

   ```
   cp install_path/netbackup/ext/db_ext/sap/scripts/initSAP.utl \
       /oracle/SAP/dbe/initSAP.utl
   ```

   If a parameter file already exists, make sure the original copy is saved.

2. Set the parameter to the desired value.

   Modify `initSAP.utl` with a text editor. Set parameter ***class, schedule, client, server,*** and ***drives*** to valid values. The following steps set the ***class*** parameter.

   a. Use a text editor to open the `initSAP.utl` file.

   b. Find the following line.

   ```
   class std
   ```

   c. Copy and paste this line under the original

   ```
   #class std
   class std
   ```

   d. Comment out the original line.

   ```
   #class std
   class std
   ```

   e. Change `std` to `SAP_Backup`.

   ```
   #class std
   class SAP_Backup
   ```

   Repeat Step 2 for each parameter you would like to change. For example:

   ```
   class     SAP_backup
   schedul   Default-Policy
   client    puffin
   ```


```
server    puffin
drives    1
switch_list  /$ORACLE_HOME/sapbackup/.switch.lis
switch_sem   /$ORACLE_HOME/sapbackup/.switch.sem
switch_log   /$ORACLE_HOME/sapbackup/.switch.log
```

Note Oracle substitution character (? or @) and environmental variable ($ORACLE_HOME) are not allowed in the *par_file* file.

Configure the init*SID*.sap File

Configure the SAP software by notifying the SAP Tools that you are using the NetBackup for SAP on UNIX backint interface. This is done by modifying a few parameters in the SAP profile file. The *backup_dev_type* parameter needs to be set equal to *util_file* and the *util_par_file* parameter needs to point to the init(*SID*).utl file.

1. Locate the Profile file.

   The profile file needs to be configured to tell the SAP Tools to use the NetBackup for SAP on UNIX backint interface. In $ORACLE_HOME/database, find the existing init*SID*.sap configuration file. For example, if the instance is SAP, you will find initSAP.sap. If one does not exist, copy the sample file from NetBackup as follows:

   ```
   cp install_path/netbackup/ext/db_ext/sap/scripts/initSAP.sap \
       /oracle/SAP/dbe/initSAP.sap
   ```

2. Save the Original Profile

   Since the profile file needs to be modified, it is important to save a copy of the original. If problems are encountered, restore the old configuration file. One way to save it is to copy the existing init*SID*.sap configuration file to initSAP.sap.org as follows:

   ```
   cd $ORACLE_HOME
   cd dbs
   ls initSAP.sap
   cp initSAP.sap initSAP.sap.org
   ```

3. Set parameter *backup_dev_type*.

   a. Use a text editor to open the initSAP.sap file.

   b. Find the following line.

   ```
   backup_dev_type = tape
   ```

   c. Copy and paste this line under the original.

   ```
   backup_dev_type = tape
   backup_dev_type = tape
   ```

   d. Comment out the original line.

   ```
   #backup_dev_type = tape
   backup_dev_type = tape
   ```


e. Change *tape* to *util_file*.

```
#backup_dev_type = tape
backup_dev_type = util_file
```

4. Set parameter *util_par_file*.

The next step is to continue to modify text file initSAP.sap with a text editor and set the parameter *util_par_file* equal to the backint parameter file. The backint parameter file is the same file modified in the "Configure the initSID.utl File" on page 32. This can be done by the following:

a. Find the following

```
#util_par_file = <file path>
```

b. Copy and paste this line under the original.

```
#util_par_file = <file path>
#util_par_file = <file path>
```

c. Uncomment the original line.

```
#util_par_file = <file path>
util_par_file = <file path>
```

d. Optional: Change the *util_par_file* to the absolute path of the parameter file.

```
#util_par_file = <file path>
util_par_file =?/database/init@.utl
```

Here is what these changes look like:

```
backup_dev_type = util_file
util_par_file = ?/database/init@.utl
```

Note When the profile file is interpreted by the SAP Tools, the ? and @ characters will be substituted with the value assigned to the environmental variables $ORACLE_HOME and $ORACLE_SID respectively.

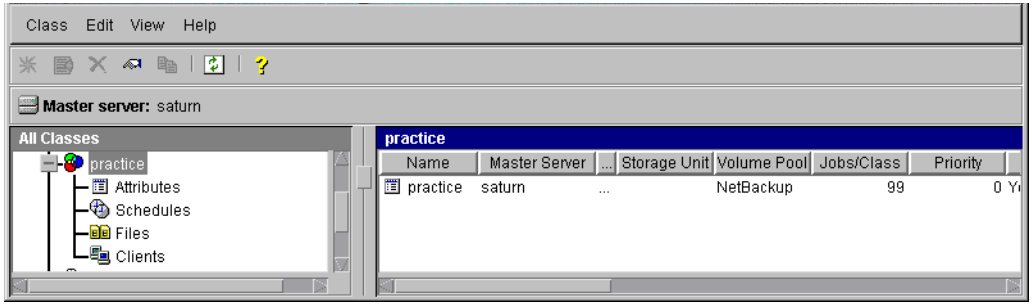
Test Configuration Settings

After you have configured the master server for NetBackup for SAP on UNIX, you should test the configuration settings. For a description of status codes, refer to the *NetBackup Troubleshooting Guide - Windows NT/2000* if you are using a Windows NT/2000 server or the *NetBackup Troubleshooting Guide* if you are using a UNIX server.

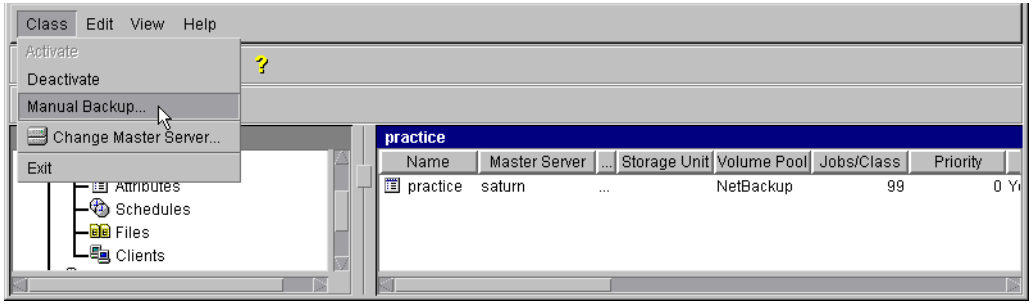
NetBackup Administration - Java Interface

Use this procedure to test a class configuration on the NetBackup Administration - Java Interface for HP or Solaris operating systems.

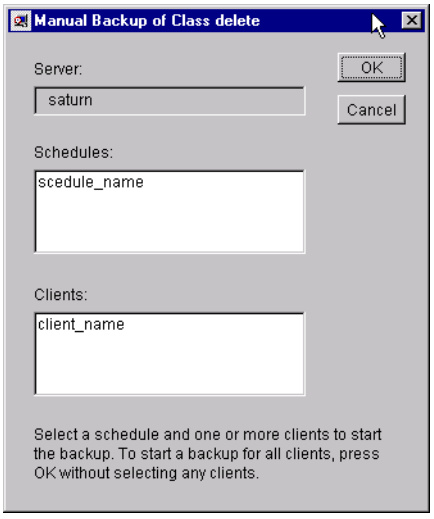
1. Log onto the server as root.
2. Start the NetBackup administrator interface.
3. Click the Backup Policy Management icon. The Backup Policy Management (Classes) - NetBackup dialog appears.
4. Select a class to back up.



5. On the Class menu, click Manual Backup.



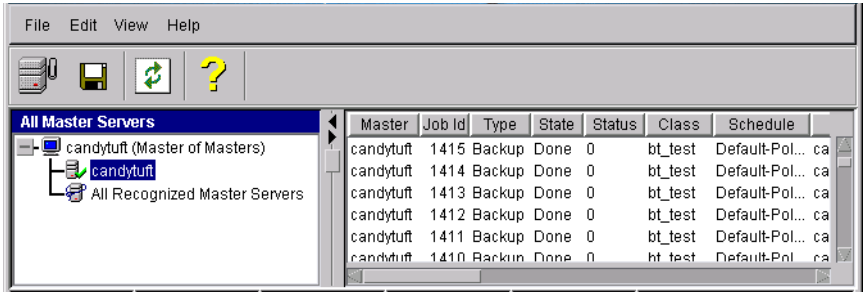
The Manual Backup dialog box appears.



The Schedule pane contains the name of a schedule configured for the class you are going to test. The Client pane contains the name of the client(s) listed in the class you are going to test.

6. Follow the instructions on the dialog box.

7. Click Activity Monitor on the NetBackup Administration interface to open the Activity Monitor dialog box.



If the test does not exit with a successful status, refer to the Troubleshooting chapter.

`xbpadm` Interface

Use this procedure to test a class configuration on a UNIX NetBackup master server.

1. Log onto the server as root.
2. Start the NetBackup `xbpadm` administrator interface.
   - If the `DISPLAY` variable is set, type:

     `/usr/openv/netbackup/bin/goodies/xbpadm &`
   - If the `DISPLAY` variable is not set, use the `-d` option:

`/usr/openv/netbackup/bin/goodies/xbpadm -d (`*your_machine_name*`):0 &`

   The NetBackup Administration dialog box will open.
3. Under Classes, select the SAP class you configured.
4. Under Actions, select Manual Backup. The Manual Backup dialog box will appear.
   a. Select a schedule in the Schedules pane.
   b. Select a client in the Clients pane.
   c. Click OK. The Manual Backup dialog box will close.
5. Under File, select Job Monitor. The Job Monitor dialog box will appear. A status code will display in the Status column.

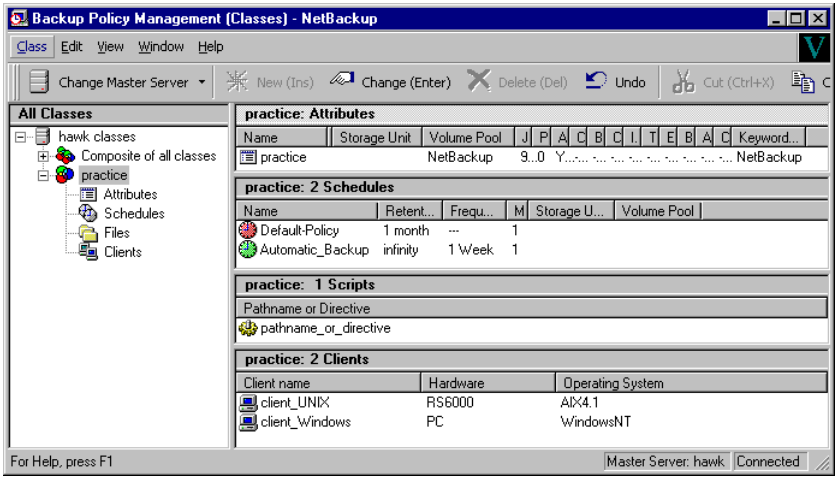
Note The jobs listed in the Job Monitor dialog box include one job for the overall database backup and multiple default-policy jobs which depended on the need of drives have been specified.

If the test does not exit with a successful status, refer to the Troubleshooting chapter.

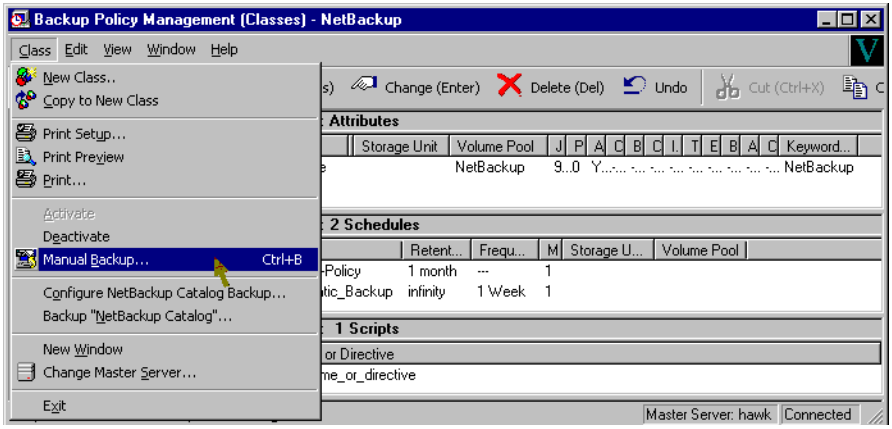
NetBackup Administration - Windows NT/2000 Interface

Use this procedure to test a class configuration from a Windows NT/2000 server or from the NetBackup Administration Client host.

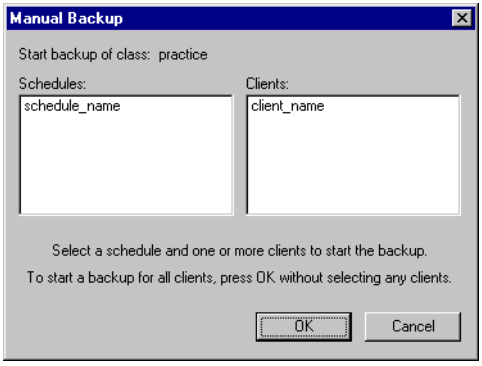
1. Log onto the server as Administrator.
2. Start the NetBackup administrator interface.
3. Click the Backup Policy Management icon. The Backup Policy Management (Classes) - NetBackup dialog appears.
4. Select a class to back up.



5. On the Class menu, click Manual Backup.



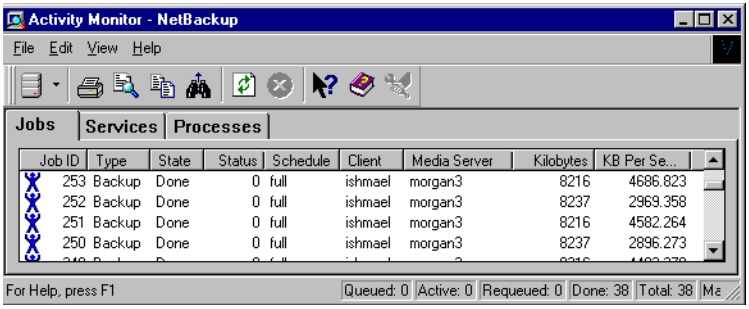
The Manual Backup dialog box appears.



The Schedule pane contains the name of a schedule configured for the class you are going to test. The Client pane contains the name of the client(s) listed in the class you are going to test.

6. Follow the instructions on the dialog box.

7. Click Activity Monitor on the NetBackup Administration interface to open the Activity Monitor dialog box.



If the test does not exit with a successful status, refer to the Troubleshooting chapter.

Test Multiple Drives and Files

To test multiple drives, you must have:

- more than one tablespace to back up
- multiple tape drives to write to at the same time

You can also use the MPX value to simulate multiple tape drives.

1. Complete the configuration of NetBackup, NetBackup for SAP on UNIX, and SAP Tools as described previously in this chapter.

2. Change the number of drives in `$ORACLE_HOME/dbs/initSAP.utl` to equal the number of tape drives (MPX value X number of tape drives = drives). Refer to "drives" on page 98 for examples.

   ```
   drives 2
   ```

When you perform a backup, you should see two or more backups running, depending upon how many drives you have identified in the `$ORACLE_HOME/dbs/initSAP.utl` parameter file. The number of drives in the utility file should match the number of drives multiplied by the MPX value. The NetBackup for SAP on UNIX `backint` interface will wait for all backups to complete before reporting success or failure to `brbackup`.

Using NetBackup for SAP on UNIX 4

When all installation and configuration is complete, you can start SAP backups and restores through NetBackup.

This chapter contains the following sections:

- Performing a Backup
- Performing an Archive
- Performing a Restore

Caution Always specify the correct SAP script when configuring automatic backups or when starting operations through NetBackup (see "Create Scripts" on page 55). NetBackup for SAP on UNIX will not generate an error if a restore SAP script file is used for a backup operation or a backup SAP script is used for a restore operation.

Performing a Backup

This section contains the following information.

- Backup of an SAP Class
- Using SAP to Back Up

Backup of an SAP Class

The most convenient way to back up your database is to set up schedules for automatic backups. When the NetBackup scheduler invokes a schedule for an automatic backup, the SAP scripts run:

- In the same order as they appear in the file list
- On all clients that have them (that is, matching path names)

The SAP scripts will start the database backup.

To add a new schedule or change an existing schedule for automatic backups, follow the guidelines in "Maximum Jobs per Client Global Attribute" on page 23.

In this example, we will use a schedule named *sap_offline_schedule* to perform a database backup once a week between 6 pm (18:00) on Friday night and 6 am (06:00) Saturday morning. The schedule for these backups will require an `sap_offline_backup` script and an SAP class. When the `sap_offline_backup` script detects the *sap_offline_schedule* schedule, it starts a full backup of the database by performing a database dump.

1. Create SAP script for SAP scheduled backups

   This script will call `brbackup` to perform the backup. It also will use the $SAP_CLASS environment variable by exporting it to set the class type.

Note The $SAP_CLASS is set up only if the backup is initiated from the server (automatically by the NetBackup schedules).

The `sap_offline_backup` script is an example SAP script used for scheduled backups of a database.

install_path`/netbackup/ext/db_ext/sap/scripts/sap_offline_backup`

The contents of this SAP script is shown below.

```
#!/bin/sh

#bcpyrght
#***************************************************************************
#* Copyright 1993 - 1999 VERITAS Software Corporation, All Rights Reserved *
#***************************************************************************
#ecpyrght

#
#This environment variable are created by Netbackup (bphdb)
#

echo "SAP_SCHEDULED = $SAP_SCHEDULED"
echo "SAP_USER_INITIATED = $SAP_USER_INITIATED"
echo "SAP_SERVER = $SAP_SERVER"
echo "SAP_CLASS = $SAP_CLASS"

RETURN_STATUS=0

CMD_LINE=""

#
# If SAP_SERVER exists then export it to make it available to backint
#
if [ -n "$SAP_SERVER" ]
then
        CMD_LINE="$CMD_LINE export SAP_SERVER=$SAP_SERVER;"
fi

#
# If SAP_CLASS exists then export it to make it available to backint
#
if [ -n "$SAP_CLASS" ]
then
        CMD_LINE="$CMD_LINE export SAP_CLASS=$SAP_CLASS;"
fi

#
# Full offline backup
#

CMD_LINE="$CMD_LINE brbackup -c -d util_file -t offline -m all"

#
# The username on the "su" command needs to be replaced with the correct
```


```
# user name.
#
echo "Execute $CMD_LINE"
su - orasap -c "$CMD_LINE"

RETURN_STATUS=$?

exit $RETURN_STATUS
```

2. Add an *Automatic Backup* schedule.

3. Add *sap_offline_schedule* to the existing sap_backup class.

4. Name the example class SAP_backup and configure it

Note The hardware, client name, and volume pool will most likely be different for your installation.

5. Specify the name of the `sap_offline_backup` script for the database in the File List.

install_path`/netbackup/ext/db_ext/sap/scripts/sap_offline_backup`

6. Test Automatic Schedule manually.

7. The final step is to manually execute the schedule to make sure it works. Go to "Test Configuration Settings" on page 65 for details.

Using xbp to Backup

The following describes how to use xbp to backup your database. Refer to the *NetBackup User's Guide - UNIX* for detailed instructions on using xbp to backup the database.

1. Log in as the SAP administrator or as root.

   If a different user account is used, change the su- command to the SAP administrator.

2. Execute xbp on the client to which you want to backup a database.

   install_path/netbackup/bin/xbp

3. In the Directory to Search Box, type the path name of the location of the SAP scripts. For example:

   install_path/netbackup/ext/db_ext/sap/scripts/

4. From the File menu, click Browse File System for Backup Scripts. The xbp dialog box appears.

5. Select the backup script from the Files pane.

6. On the Backup menu, click Backup Database Using Selected Scripts. The xbp_confirm dialog box appears.

7. Click OK.

   A NetBackup process called bphdb starts the SAP script on the client.

8. View the status of the script execution.

   a. On the Backup menu, click Report Progress Of Backup.... The xbp_progress dialog box will appear.

   b. Select the log file for your backup.

      The Contents of Selected Log File pane displays only the status of the script execution. A status =0 message indicates that the script was successfully completed. Go to Step 9 for a detailed status report. For a status other than 0, refer to the Troubleshooting section of this manual.

9. View the log file for the NetBackup operation.

   a. Change directories to the bphdb log directory.

      ```
      cd /usr/openv/netbackup/logs/bphdb
      ```


b. Open the log file with the tail option.

```
tail -f log.mmddyy
```

A `Backup completed SUCCESSFULLY` message indicates a successfully completed NetBackup operation.

Using SAP to Back Up

There are two ways to start a backup:

- `sapdba` utility menu
- `brbackup` command line

When the backup is started through the `sapdba` utility or the `brbackup` command, `brbackup` status messages will appear on the console. These messages report when the database server is started, or stopped. They also report when the backup mode of the tables is changed. The NetBackup for SAP on UNIX `backint` interface is then started by the `brbackup` command. `brbackup` submits the files to be backed up.

The NetBackup for SAP on UNIX `backint` interface will generate messages for each `bpbackup` program, and will show a progress log for each. Debugging messages and `bpbackup` log messages will also be displayed. During the file-online mode, each database file is backed up, one at a time. The NetBackup for SAP on UNIX `backint` interface handles coordination with `brbackup` using a semaphore file.

Once all files are backed up, the full file list is displayed in the format required by the NetBackup for SAP on UNIX `backint` interface specification as to success or failure. This format includes a Backup ID (BID) to be used for later restores. SAP Tools will maintain its own log of the backup session. The standard NetBackup logs will keep track of the images created. The NetBackup for SAP on UNIX `backint` interface only needs to keep track of the BID date and time. This allows cross-referencing by `brrestore`.

`sapdba` Off-line Backup

1. Complete the configuration of NetBackup, NetBackup for SAP on UNIX, and SAP Tools as described in "Maximum Jobs per Client Global Attribute" on page 23.
2. As user sapadm, stop SAP by executing the `stopsap R3` command.
3. Start `sapdba`.

```
SAPDBA V4.0B - SAP Database Administration

           ORACLE version: 8.0.5.0.0
           ORACLE_SID    : SAP
           ORACLE_HOME   : /oracle/SAP
           DATABASE      : shut down
           SAPR3         : not connected

a - Startup/Shutdown instance    h - Backup database
b - Instance information         i - Backup offline redo logs
c - Tablespace administration    j - Restore/Recovery
d - Reorganization               k - DB check/verification
e - Export/import                l - Show/Cleanup
f - Archive mode                 m - User and Security
g - Additional functions         n - SAP Online Help

q - Quit

Please select ==> h
```


4. Select the Backup database menu item by typing in `h`.

```
                                Backup database

                                    Current value
a - Backup function                 Normal backup
b - Parameter file                  initSAP.sap
c - Backup device type              util_file
d - Objects for backup              all
e - Backup type                     offline_force
g - Query only                      no
h - Special options ...

i - Standard backup                 yes
j - Backup from disk backup
k - Restart backup
l - Make part. backups compl.

S - Start BRBACKUP
q - Return

Please select  ==> d
```

5. Select an Object for backup by selecting `g` and typing `PSAPUSER1D`.

   You will see the backup type is `util_file`, the backup type is `offline_force`, and tablespace is `PSAPUSER1D`.

```
                                Backup database

                                    Current value
a - Backup function                 Normal backup
b - Parameter file                  initSAP.sap
c - Backup device type              util_file
d - Objects for backup              PSAPUSER1D
e - Backup type                     offline_force
g - Query only                      no
h - Special options ...

i - Standard backup                 yes
j - Backup from disk backup
k - Restart backup
l - Make part. backups compl.

S - Start BRBACKUP
q - Return

Please select  ==>S
```

6. Start the backup by typing `s`.

   If everything is correct, you will first see `sapdba` and its command, `brbackup`, perform housekeeping on the Oracle database. `brbackup` will then start the NetBackup for SAP on UNIX `backint` interface. When the backup is complete, the NetBackup for SAP on UNIX `backint` interface generates a list of files that tells `sapdba/brbackup` that the backup was successful.

`brbackup` On-line Backup

You can use `brbackup` instead of `sapdba` to perform database backups. In this example we will do an on-line backup. You can change the `backup_mode` by changing the `initSAP.sap` parameter file or specifying `-t online` on the `brbackup` command.

Here is what these changes look like in `initSAP.sap`:

```
backup_type = online_file
```

This backup mode allows `sapdba/brbackup` to use a semaphore file with the NetBackup for SAP on UNIX `backint` interface. This provides better on-line backup when doing very large files, since only the necessary tablespaces are placed in backup mode. When NetBackup is ready to process another file, it notifies `brbackup`. You can change the `backup_mode` to `online` to test this mode.

1. Complete the configuration of NetBackup, NetBackup for SAP on UNIX, and SAP Tools as described in "Configuration" on page 21.

2. As the SAP administrator user, call `brbackup`.

   ```
   brbackup -d util_file_online -t online -m all
   ```

Performing an Archive

An archive is executed in a similar fashion as a backup. The `brarchive` command creates multiple successful backups before deleting the redo log file. NetBackup for SAP on UNIX is used for each archive run.

Performing a Restore

Using xbp to Restore

The following describes how to use `xbp` to restore your database. Refer to the *NetBackup User's Guide - UNIX* for detailed instructions on using `xbp` to restore database backups.

1. Log in as the SAP administrator or as root.

   If a different user account is used, change the `su -` command to the SAP administrator.

2. Execute `xbp` on the client to which you want to restore a database.

   install_path`/netbackup/bin/xbp`

Note You cannot restore a database to a remote machine.

3. In the Directory to Search Box, type in the path name of the location of the SAP scripts. For example:

   install_path`/netbackup/ext/db_ext/sap/scripts/`

4. From the File menu, click Browse File System for Restore Scripts. The xbp dialog box appears.

5. Select the restore script from the Files pane.

6. On the Restore menu, click Restore Database Using Selected Scripts. The xbp_confirm dialog box appears.

7. Click OK.

   A NetBackup process called `bphdb` starts the SAP script on the client.

8. View the status of the script execution.

a. On the Restore menu, click Report Progress Of Restore.... The xbp_progress dialog box will appear.

b. Select the log file for your restore.

The Contents of Selected Log File pane displays only the status of the script execution. A status `=0` message indicates that the script was successfully completed. Go to Step 9 for a detailed status report. For a status other than 0, refer to the Troubleshooting section of this manual.

9. View the log file for the NetBackup operation.

a. Change directories to the `bphdb` log directory.

```
cd /usr/openv/netbackup/logs/bphdb
```

b. Open the log file with the tail option.

```
tail -f log.mmddyy
```

A `Restore completed SUCCESSFULLY` message indicates a successfully completed NetBackup operation.

Using sapdba to Restore

To restore a partial or full database, the `sapdba` system should be used to maintain the list of valid restores for specific tablespace or complete database restores. Refer to *BC SAP Database Administration* for restore examples.

Before restoring either individual tablespaces or full databases, the user is prompted prior to deleting an existing copy of the target file. `sapdba` will then invoke the `brrestore` command. `brrestore` submits the BID and filename list to the NetBackup for SAP on UNIX `backint` interface. The `backint` interface will cross-reference the exact date and time to when the backup was made and uses NetBackup to recover the file. The `backint` interface monitors the progress of the restore and reports status back to `brrestore`. Upon completion, the `backint` interface saves a copy of the NetBackup restore logs for auditing purposes. `sapdba` then provides required database recovery, such as media recovery, and restarts the database server.

Troubleshooting 5

NetBackup, NetBackup for SAP on UNIX, and the SAP Tools all provide reports on database operations. These reports are useful for finding errors associated with those applications.

NetBackup Reports

The NetBackup server and client software allow you to set up detailed activity logs for troubleshooting problems that occur outside of either NetBackup for SAP on UNIX or the SAP Tools. See the *NetBackup Troubleshooting Guide* or the *NetBackup Troubleshooting Guide - Windows NT/2000* for a complete description of activity logs. Also see the *install_path*`/usr/openv/netbackup/logs/README.debug` file.

Note These logs do not reveal errors that occur during the execution of the SAP Tools, unless those errors also affect NetBackup for SAP on UNIX. Your best sources for SAP error information are the logs provided by the SAP.

Enable the NetBackup for SAP on UNIX logs by performing the following steps.

1. Create the following directories on the client:

   install_path`/netbackup/logs/bphdb`
   install_path`/netbackup/logs/backint`

   `% cd` *install_path*`/netbackup/logs`
   `% mkdir bphdb`
   `% mkdir backint`

2. Set the access permissions to 777 on these log directories.

   `% chmod 777 bphdb`
   `% chmod 777 backint`

The following sections describe the logs created when you create the log directories. Use a text editor to view the contents of the logs.

bphdb Directory on the Client

The *install_path*`/netbackup/logs/bphdb` directory contains the following types of logs. These logs are a good starting place to determine what type of error occurred.

`sap_stdout.`*mmddyy*

Unless redirected elsewhere, NetBackup places SAP script output in this file.

`sap_stderr.`*mmddyy*

Unless redirected elsewhere, NetBackup places SAP script errors in this file.

`log.`*mmddyy*

`bphdb` is the NetBackup Database Backup binary. This log contains debugging information for the `bphdb` process. NetBackup for SAP on UNIX uses this client process for SAP script execution. It is invoked when an automatic backup schedule is executed.

backint Directory on the Client

The *install_path*/netbackup/logs/backint directory contains the following execution log.

log.*mmddyy*

This log contains debugging information and execution status for the SAP processes linked to the library provided with NetBackup for SAP on UNIX.

NetBackup Server Reports

NetBackup provides other reports that are useful in isolating problems. One such report is All Logs Entries on the server. See the *NetBackup System Administrator's Guide* for a description of this and other reports.

sapdba Logs and Messages

The SAP Tools log provides information on the SAP part of the operation. This is the log the database administrator must check to determine the ultimate success or failure of the database backups and restores.

The sapdba utility log can view backup and restore logs. You can find them in the sapdba menu option: Show/Cleanup; Show log files/profiles. The same log information can be found in a few directories for brbackup/brrestore log information and brarchive log information.

Backup and Restore Folder

$ORACLE_HOME\sapbackup

This directory contains files that represent different types of backups and restores.

back*SID*.log - summary log
encode timestamp.xyz - detail logs

where

SID = a unique name for an Oracle database instance. Also known as System ID.

encoded timestamp = a timestamp used in each detail log name which guarantees unique filenames

x = a (all), p (partial)

y = n (online), f (offline)

z = f (utility_file_backup)

xyz = rsb (restore backup files)

xyz = rsa (restore archive files)

xyz = rsf (restore individual files)

Archive Folder

$ORACLE_HOMEsapbackup

This directory contains files that represent different types of archives.

encode timestamp.sve	original saved
encode timestamp.svd	original saved and deleted
encode timestamp.cpy	original copied/saved a second time
encode timestamp.cpd	original copied/saved a second time and deleted
encode timestamp.dcp	deleted which were saved twice
encode timestamp.dsv	deleted which were saved

NetBackup for SAP on UNIX `backint` Command Line

A

The `backint` command line uses the following syntax.

`backint -u` *user id* `-f` *function* `[-t` *type*`] -p` *par_file* `[-i` *in_file*`] [-o` *out_file*`]`

`-u` *user id*	UID for backup utility user. No default. Required option.
`-f` *function*	This is a required parameter for the `backint` interface. It defines a key value that performs different functions between SAP and NetBackup. One of the following options is required.
`backup`	This is an optional parameter value for the `-f` *function* parameter. It supports and defines `brbackup` and `brarchive` to NetBackup. If backup is specified, NetBackup will perform a backup for SAP.
`restore`	This is an optional parameter value for the `-f` *function* parameter. It supports and defines `brrestore` to NetBackup. If restore is specified, then NetBackup will perform a restore for SAP.
`inquiry`	This is an optional parameter value for the `-f` *function* parameter. It supports and defines `sapdba` to NetBackup. This option is used by `sapdba` when a recovery is performed to get backup information for NetBackup.
`-t` *type*	This is an optional parameter for the `backint` command. It defines backup type, backup of individual files, and character special devices. If it is not specified the default value is `file`.
`file`	This is the default parameter value for the `-t` *type* parameter. It defines when to perform a backup, restore and inquiry function with datafiles, and special character devices. Backups from directories are not supported.
`file_online`	This is an optional parameter value for the `-t` *type* parameter. It allows `brbackup` to set tablespace into #BEGIN/#END backup mode when a related file backup takes place. It is used for on-line backups only. The architecture is based on three control files defined in the `-p` *par_file* parameter.

`-p` *par_file*

This is a required parameter for the `backint` command. It is a text file that contains comments, parameters (required and optional), and parameter values. These parameters determine the backup and restore procedure between NetBackup and SAP Tools.

Comments are denoted by `#` in the first column. Any other character in the first column is considered a valid parameter.

A required parameter must be specified with a valid value before the NetBackup for SAP on UNIX `backint` interface will execute correctly. An optional parameter can be commented out by a `#` in the first column. If the optional parameters are specified, they must have valid values for the NetBackup for SAP on UNIX `backint` interface to execute correctly. If an invalid parameter name is found, the NetBackup for SAP on UNIX `backint` interface will report a warning message and will continue executing. For details on input file contents, refer to the following `-i` *`in_file`* parameter.

The SAP Tools parameter file (profile file; `init`***SID***`.sap`) specifies the location of this *par_file*. An example of this file is located in:

install_path`/netbackup/ext/db_ext/sap/scripts/initSAP.utl`

For details on input file contents, refer to "backint -p par_file or initSID.utl Contents" on page 97 of this manual.

`-i` *in_file*

This is an optional parameter for the `backint` command. It is a text file, the contents of which may vary, depending on the NetBackup for SAP on UNIX `backint` interface function initiated. If this parameter is not specified, the contents of this file is data from standard input. For details on input file contents, refer to "backint -i in_file Contents" on page 89 of this manual.

`-o` *out_file*

This is an optional parameter for the `backint` command. It is a text file that contains process messages for a function. If it is not specified, the output will go to standard output. For details on output file contents, refer to "backint -o out_file Contents" on page 91 of this manual.

`backint -i` *in_file* Contents B

The contents of the input text file will change depending on the function initiated by the NetBackup for SAP on UNIX `backint` interface.

Backup Function

For the **backup** function, you may have the following entries.

file1	Set of file names to be saved.
special_file1 size1	Character special (raw) device files and the file size used by Oracle.

Restore Function

For the **restore** function, you may have the following entries.

backup_id file1 [*dest_dir1*]	BIDs of backups. Names of files and/or directories to be restored. Optional destination directory.
[#NULL*file2* [*dest_dir2*]]	Optional. Additional names of files and or directories with a different destination directory.

Inquiry Function

For the **inquiry** function, you may have the following entries.

#NULL	Lists the last backup.
[*backup_id*]	Optional BIDs will list all backups.
[#NULL *file1*]	Optional null with names of files and or directories will list all backups with the specified file/directory names.
[*backup_id file2*]	Optional BIDs and directories of files and or directories will list the specified files or directory names in the specified backups.

`backint -o` *out_file* Contents C

The contents of the output text file will change depending on the function initiated by the NetBackup for SAP on UNIX `backint` interface.

Backup Function

When a backup function is successfully completed, the output file entry will identify the BID assigned to the backup by NetBackup and will list the files and directories backed up.

`#SAVED` *backup_id file*

When a backup function fails, the output file entry will list the files that were not successfully backed up.

`#ERROR` *file*

Restore Function

When a restore function is successfully completed, the output file entry will identify the BID and list the files restored.

`#RESTORED` *backup_id file*

When a restore function fails, the output file will list the files and directories not found. It will also list the files and directories that where not successfully backed up.

`#NOTFOUND` *file*
`#ERROR` *file*

Inquiry Function

When an inquiry function is successfully completed, the output file entry will identify the BID assigned to the backup by NetBackup and/or will list the files backed up.

`#BACKUP` *backup_id*
`#BACKUP` *backup_id file*

When an inquiry function fails, the output file lists the files that where not successfully backed up.

`#ERROR` *file*

Environment Variable D

The NetBackup for SAP on UNIX `backint` interface will recognize the following environmental variables.

$*SAP_SERVER* This environmental variable sets the name of the NetBackup server. It can be used to override the current server and perform a backup to an alternative server. This environmental variable is the same as the `server` parameter in the *par_file* (`init`*SID*`.utl`) file and the SERVER option in the NetBackup `bp.conf` file.

$*SAP_CLIENT* This environmental variable sets the name of the NetBackup client. It can be used to override the current client and perform an alternate restore to a different client. This variable is the same as the `client` parameter in the *par_file* (`init`*SID*`.utl`) file and the *CLIENT_NAME* option in the NetBackup `bp.conf` file.

$*SAP_CLASS* This environmental variable sets the name of the NetBackup class. This class can be used to define different types of database backups. One class type can be used to perform offline database backups, and another class type can be used perform archive log backups. This environmental variable is the same as the `class` parameter in the *par_file* (`init`*SID*`.utl`) file and the *BPBACKUP_CLASS* option in the NetBackup `bp.conf` file.

$*SAP_SCHED* This environmental variable sets the name of the SAP *Backup Policy* schedule. This schedule provides an easy way to switch to a different schedule for each SAP database backup. This environmental variable is the same as the `schedule` parameter in the *par_file* (`init`*SID*`.utl`) file and the *BPBACKUP_SCHED* option in the NetBackup `bp.conf` file.

$*SAP_DRIVES* This environmental variable sets the number of simultaneous `bpbackup/bprestore` operations the NetBackup for SAP on UNIX `backint` interface will execute. This environmental variable is the same as the `drives` parameter in the *par_file* (`init`*SID*`.utl`) file.

bp.conf File

E

There are a number of parameters that can be specified in either the *install_path*/netbackup/bp.conf file or the *$HOME*/bp.conf file. These parameters will be used by the NetBackup for SAP on UNIX backint interface if they are not found as an environmental variable or in the *par_file* (init*SID*.utl) file. The server, client, class and schedule parameters in the *par_file* (init*SID*.utl) can all be defined in the bp.conf file. The following is a list of the variable names and definitions.

SERVER	This is the option, in the bp.conf file, which names the NetBackup client. This option is the same as the *$SAP_CLIENT* environment variable and the client parameter in the -p *par_file* file.
CLIENT_NAME	This is the option, in the bp.conf file, which names the NetBackup client. This option is the same as the *$SAP_CLIENT* environment variable and the client parameter in the -p *par_file* file.
BPBACKUP_CLASS	This is the option, in the bp.conf file, which names the NetBackup class. This option is the same as the *$SAP_CLASS* environment variable and the class parameter in the -p *par_file* file.
BPBACKUP_SCHED	This is the option, in the bp.conf file, which names the NetBackup schedule. This option is the same as the *$SAP_SCHED* environment variable and the schedule parameter in the -p *par_file* file.

See the *NetBackup System Administrator's Guide - UNIX* or the *NetBackup System Administrator's Guide - Windows NT/2000* for additional information on bp.conf.

backint -p *par_file* **or init***SID***.utl** Contents

F

server

This is an optional parameter, used to define the machine name of the NetBackup master server. The NetBackup master server is the name of the machine that provides most of the administration and control for NetBackup operations. It contains the NetBackup database. The following is an example entry:

```
server jupiter
```

If the NetBackup for SAP on UNIX `backint` interface finds a *$SAP_SERVER* environment variable, the `server` parameter value will be overridden by the *$SAP_SERVER* value. If the `server` parameter is not specified, and there is no environment variable, then the `server` parameter value will default to the SERVER option specified in NetBackup `/usr/openv/netbackup/bp.conf`.

client

This is an optional parameter, used to set a machine name that contains the NetBackup client software, an Oracle database, and an SAP environment. In some cases the server and client machine will be the same machine. The following is an example entry:

```
client saturn
```

If the NetBackup for SAP on UNIX `backint` interface finds a *$SAP_CLIENT* environment variable, the `client` parameter value will be overridden by the *$SAP_CLIENT* value. If the `client` parameter is not specified, and there is no environment variable, then the `client` parameter value will default to the *CLIENT_NAME* option specified in the NetBackup `bp.conf` file. If the value is not specified in the NetBackup `bp.conf` file, the NetBackup for SAP on UNIX `backint` interface uses the value returned by the `gethostname()` library function.

drives

This is an optional parameter, used to determine the number of bpbackup/bprestore commands that will be run. To maximize write performance to a tape, the drives value should be set to the number of tape drives multiplied by the MPX value per schedule. Based on the number of drives specified, the NetBackup for SAP on UNIX backint interface will simultaneously run the same number of bpbackup/bprestore commands.

If, for example, MPX is set to 4 and there are two available tape drives, then the drives parameter should be set to 8 (4 X 2). The NetBackup for SAP on UNIX backint interface will run eight bpbackup/bprestore jobs at the same time. As a result there will be four data streams going to each tape. The drives parameter should be set to the following rule:

drives = *Number of drives per class* X *MPX value in schedule*

The drives parameter value should not exceed the Set Maximum Jobs per Client global attribute. The following is an example entry:

```
drives 5
```

If the NetBackup for SAP on UNIX backint interface finds a *$SAP_DRIVES* environment variable, the drives parameter value will be overridden by the *$SAP_DRIVES* value. If the drive parameter is not specified and there is no environment variable, then the NetBackup for SAP on UNIX backint interface will exit with an error.

class

This is an optional parameter, used to set the name of an SAP class type defined in NetBackup. The SAP class must have a *Backup Policy* schedule defined in order for the NetBackup for SAP on UNIX backint interface to work. The following is an example entry:

```
class sap_nb
```

If the NetBackup for SAP on UNIX backint interface finds a *$SAP_CLASS* environment variable, the class parameter value will be overridden by the *$SAP_CLASS* value. If the class parameter is not specified, and there is no environment variable, then the class parameter value will default to the *BPBACKUP_CLASS* option in the NetBackup bp.conf file. By default, if *BPBACKUP_CLASS* is not in any NetBackup bp.conf file, NetBackup uses the first active SAP class type it finds for the client with a Backup Policy backup schedule.

backint_dir

This is a optional parameter. It must be set to a public directory. The NetBackup for SAP on UNIX `backint` interface uses this directory for work space. These files keep track of backup information. The directory should have enough space for about one MB of information. The following is an example entry:

```
backint_dir /oracle/sap/sapscript/backint_dir
```

schedule

This is an optional parameter, used to set the name of a *Backup Policy* schedule associated with an SAP class type. The schedule can define aspects of the backup such as how long NetBackup retains images, maximum MPX per drive, storage unit, and volume pool. The following is an example entry:

```
schedule sap_full_backup
```

If the NetBackup for SAP on UNIX `backint` interface finds a *$SAP_SCHED* environment variable, the `schedule` parameter value will be overridden by the *$SAP_SCHED* value. If the `schedule` parameter is not specified and there is no environment variable, then the schedule parameter value will default to the *BPBACKUP_SCHED* option in the NetBackup `bp.conf` file. By default, if *BPBACKUP_SCHED* is not in any NetBackup `bp.conf` file then, NetBackup uses the first *Backup Policy* schedule it finds in the first active SAP class.

schedule2

This is an optional parameter, used to set the name of a *Backup Policy* schedule to be used for the secondary SAP backup. If it is not specified, then the `schedule` parameter value is used.

For each SAP backup, there are two individual backups performed. The first backup is responsible for backing up database data. The second backup is responsible for backing up log files needed to track SAP backup information. Use this parameter to save SAP log files to a different media. This can make database restore/recovery easier. This option can be used to save the backup information to a different volume pool. The following is an example entry:

```
schedule2  sap_backup_information
```


sleep

This is an optional parameter, used to specify a sleep time to monitor the bpbackup or bprestore logs. If it is not specified, the value is set to a default of five seconds.

When the NetBackup for SAP on UNIX backint interface is called, a number of bpbackup/bprestore commands can be running at the same time. The NetBackup for SAP on UNIX backint interface monitors each command and writes to the file that is specified on the -o *out_file* parameter. In some cases, bpbackup/bprestore information is not displayed because of the monitoring cycle. Therefore, this option is used mainly for debug reasons. The following is an example entry:

```
sleep 3
```

media_notify_script

This is an optional parameter, used to call a script when a Waiting mount is entered in a bpbackup/bprestore log. It can be used to display a mount tape message to an SAP user. The value for this option must be the full path name to a script. The script should have the right file permissions (chmod 755). Test the script before implementation. The following is an example of an entry:

```
media_notify_script /oracle/sap/sapscripts/sap_media_notify
```

If the message is encountered and this option is specified, then the following commands will be executed from the NetBackup for SAP on UNIX backint interface:

```
MEDIA_ID=A001;export MEDIA_ID
NETBACKUP_SERVER=saturn;export NETBACKUP_SERVER
/oracle/sap/sapscripts/sap_media_notify
```

restore_filter_script

This is an optional parameter, used to resolve linked file paths on a restore. This parameter should be used only on rare occasions. The following cases must exist before this parameter is used:

- Oracle table spaces use file paths
- The directory paths to the Oracle table spaces are linked paths
- The linked directory paths do not exist at restore time

The value for this parameter must be a fully qualified file path name to a script with the right permissions. Test the script before implementation. The following is an example of an entry:

```
restore_filter_script /usr/openv/netbackup/ext/db_ext/sap/\
```

```
scripts/sap_restore_filter
```

The script must have an input parameter and an output parameter. It must be able to modify the contents of a text file. The script is responsible for converting linked directory paths into absolute directory paths. The following is an example of this script:

```
#!/bin/sh
# this shell is used to change some logically linked files
# during a restore
# /oracle/sap/sapdata/sapdata1 to /oracle/product/7.0.16/sapdata1
# /oracle/sap/sapdata/sapdata2 to /oracle/product/7.0.16/sapdata2
# /oracle/sap/sapdata/sapdata3 to /oracle/product/7.0.16/sapdata3
# /oracle/sap/sapdata/sapdata4 to /oracle/product/7.0.16/sapdata4
# /oracle/sap/sapdata/sapdata5 to /oracle/product/7.0.16/sapdata5
# /oracle/sap/sapdata/sapdata6 to /oracle/product/7.0.16/sapdata6
sed -e '
s/\/oracle\/sap\/sapdata\/sapdata1/\/oracle\/product\/7.0.16\/sapdata1/
s/\/oracle\/sap\/sapdata\/sapdata2/\/oracle\/product\/7.0.16\/sapdata2/
s/\/oracle\/sap\/sapdata\/sapdata3/\/oracle\/product\/7.0.16\/sapdata3/
s/\/oracle\/sap\/sapdata\/sapdata4/\/oracle\/product\/7.0.16\/sapdata4/
s/\/oracle\/sap\/sapdata\/sapdata5/\/oracle\/product\/7.0.16\/sapdata5/
s/\/oracle\/sap\/sapdata\/sapdata6/\/oracle\/product\7.0.16\/sapdata6\/'
$1 > $2
```

bplist_filter

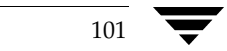
This is an optional parameter, used to resolve linked file paths on an `inquire`. This parameter should be used only on rare occasions. As in `restore_filter_script` all of the following cases must exist before this parameter is used:

- Oracle table spaces use file paths
- The directory paths to the Oracle table spaces are linked paths
- The linked directory paths do not exist at restore time

The value for this option must be a fully qualified path name to a script with the right file permission. Test the script before implementing. The following is an example of an entry:

```
bplist_filter_script /usr/openv/netbackup/ext/db_ext/sap/scripts\
/bplist_restore_filter
```

The script must have an input parameter and output parameter and be able to modify the contents of a text file. The script is responsible for converting absolute directory paths into linked directory paths. This is just the opposite of `restore_filter_script`. The following is an example of this script:



```
#!/bin/sh
# this shell is used to change some logically linked files
# during a restore
# /oracle/sap/sapdata/sapdata1 to /oracle/product/7.0.16/sapdata1
# /oracle/sap/sapdata/sapdata2 to /oracle/product/7.0.16/sapdata2
# /oracle/sap/sapdata/sapdata3 to /oracle/product/7.0.16/sapdata3
# /oracle/sap/sapdata/sapdata4 to /oracle/product/7.0.16/sapdata4
# /oracle/sap/sapdata/sapdata5 to /oracle/product/7.0.16/sapdata5
# /oracle/sap/sapdata/sapdata6 to /oracle/product/7.0.16/sapdata6
sed -e
s/\/oracle\/sap\/sapdata\/sapdata1/\/oracle\/product\/7.0.16\/sapdata1/
s/\/oracle\/sap\/sapdata\/sapdata2/\/oracle\/product\/7.0.16\/sapdata2/
s/\/oracle\/sap\/sapdata\/sapdata3/\/oracle\/product\/7.0.16\/sapdata3/
s/\/oracle\/sap\/sapdata\/sapdata4/\/oracle\/product\/7.0.16\/sapdata4/
s/\/oracle\/sap\/sapdata\/sapdata5/\/oracle\/product\/7.0.16\/sapdata5/
s/\/oracle\/sap\/sapdata\/sapdata6/\/oracle\/product\/7.0.16\/sapdata6\/'
$1 > $2
```

check_directory_flag

This is an optional parameter, used to allow directory backup.

If this parameter is set to `0 (false)`, and an attempt is made to back up a directory or subdirectory, the NetBackup for SAP on UNIX `backint` interface will report an error. When this parameter is set to `1 (true)`, SAP Tools will be able to back up directories and subdirectories. The following example allows directory backup:

```
check_directory_flag 1
```

print_log_flag

This is an optional parameter, used to turn off the log information from `bpbackup` and `bprestore` operations to the `-o` *out_file* parameter on `backint`. The parameter values can be set to `1` for true or `0` for false. The following entry will turn off logging:

```
print_log_flag 1
```

switch_list

This is a required parameter. It is used as a control file to communicate with the NetBackup for SAP on UNIX `backint` interface and `brbackup` for on-line backups. A switch list file is created every time `brbackup` wants to back up a file, or when it wants to indicate that a backup is finished. The `switch_list` parameter must be set to a file path located in:

%ORACLE_HOME%/sapbackup/.switch.lis.

The following is an example of a valid entry:

```
switch_list /$ORACLE_HOME/sapbackup/switch.lis
```

switch_sem

This is a required parameter. It is used as a control file between the NetBackup for SAP on UNIX backint interface and brbackup. After the switch list file has been created and closed, the NetBackup for SAP on UNIX backint interface creates the switch semaphore file and waits until it is deleted by brbackup. The switch_sem parameter must be set to a file path located in: %ORACLE_HOME%/sapbackup/.switch.sem. The following is an example of a valid entry:

```
switch_sem /$ORACLE_HOME/sapbackup/switch.sem
```

switch_log

This is a required parameter. It is used as a control file between the NetBackup for SAP on UNIX backint interface and brbackup. After the switch semaphore file has been deleted, the NetBackup for SAP on UNIX backint interface opens and reads the switch log file, created by brbackup, to determine if the process is successful. The switch_log parameter must be set to a file path located in: %ORACLE_HOME%/sapbackup/.switch_log. The following is an example of a valid entry:

```
switch_log /$ORACLE_HOME/sapbackup/switch.log
```

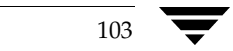
sort_backup_type

This is optional parameter, used to specify one of four different backup sort parameter values [*size* | *custom* | *device* | *drive*]. If it is not specified, it will default to the *size* option.

The following is detailed information on each parameter value.

size

This is the default parameter value for the *sort_backup_type* parameter. The size feature will create bpbackup jobs based upon the number of drives specified in the *par_file* (drives 3). Each file being backed up will be associated with a backup job based on size. For example, if three tape drives are specified, the files will be divided evenly into three



bpbackup jobs based on size. So, if there are 25 input files from SAP and three tape drives, then three bpbackup jobs would be running at the same time with the following files in each job.

Input file list from SAP (brbackup, sapdba)

```
/oracle/sap/sapdata1/btabd_1/btabd.data1
/oracle/sap/sapdata2/btabi_1/btabi.data1
/oracle/sap/sapdata2/clud_1/clud.data1
/oracle/sap/sapdata1/ddicd_1/ddicd.data1
/oracle/sap/sapdata5/ddici_1/ddici.data1
/oracle/sap/sapdata4/el30cd_1/EL30cd.data1
/oracle/sap/sapdata1/el30ci_1/el30ci.data1
/oracle/sap/sapdata6/es30cd_1/es30cd.data1
/oracle/sap/sapdata2/poold_1/poold.data1
/oracle/sap/sapdata1/pooli_1/pooli.data1
/oracle/sap/sapdata4/protd_1/protd.data1
/dev/rdsk/c0t4d0s6  11812864
/oracle/sap/sapdata1/roll_1/roll.data1
/oracle/sap/sapdata2/sourced_1/sourced.data1
/oracle/sap/sapdata3/stabd_1/stabd.data1
/oracle/sap/sapdata2/stabi_2/stabi.data2
/oracle/sap/sapdata1/temp_1/temp.data1
/oracle/sap/sapdata4/user1d_1/user1d.data1
/oracle/sap/sapdata2/user1i_1/user1i.data1
/oracle/sap/sapdata1/system_1/system.data1
/oracle/sap/saplog1/log_g1_m1/log1_m1.dbf
/oracle/sap/saplog1/log_g2_m1/log2_m1.dbf
/oracle/sap/saplog1/log_g3_m1/log3_m1.dbf
/oracle/sap/saplog1/log_g4_m1/log4_m1.dbf
/oracle/sap/dbs/cntrlSAP.dbf
```

Backup Job 1

```
size= 36708352: file /name=/oracle/sap/sapdata1/roll_1/roll.data1
size= 10493952: file name=/oracle/sap/sapdata1/temp_1/temp.data1
size=  5251072: file name=/oracle/sap/sapdata1/ddicd_1/ddicd.data1
size=  5251072: file name=/oracle/sap/sapdata1/el30ci_1/el30ci.data1
size=  5243392: file name=/oracle/sap/saplog1/log_g4_m1/log4_m1.dbf
Total=62947840
```

Backup Job 2

```
size= 15736832: file name=/oracle/sap/sapdata1/system_1/system.data1
size=  5251072: file name=/oracle/sap/sapdata2/btabi_1/btabi.data1
size=  5251072: file name=/oracle/sap/sapdata5/ddici_1/ddici.data1
size=  5251072: file name=/oracle/sap/sapdata6/es30cd_1/es30cd.data1
```

```
size=  5251072: file name=/oracle/sap/sapdata2/poold_1/poold.data1
size=  5251072: file name=/oracle/sap/sapdata3/stabd_1/stabd.data1
size=  5251072: file name=/oracle/sap/sapdata1/pooli_1/pooli.data1
size=  5251072: file name=/oracle/sap/sapdata2/user1i_1/user1i.data1
size=  5243392: file name=/oracle/sap/saplog1/log_g1_m1/log1_m1.dbf
size=   231936: file name=/oracle/sap/dbs/cntrlSAP.dbf
Total=57969664
```

Backup Job 3

```
size= 11812864: file name=/dev/rdsk/c0t4d0s6
size=  5251072: file name=/oracle/sap/sapdata2/clud_1/clud.data
size=  5251072: file name=/oracle/sap/sapdata4/el30cd_1/EL30cd.data1
size=  5251072: file name=/oracle/sap/sapdata4/protd_1/protd.data1
size=  5251072: file name=/oracle/sap/sapdata2/sourced_1/sourced.data1
size=  5251072: file name=/oracle/sap/sapdata2/stabi_2/stabi.data2
size=  5251072: file name=/oracle/sap/sapdata4/user1d_1/user1d.data1
size=  5251072: file name=/oracle/sap/sapdata1/btabd_1/btabd.data1
size=  5243392: file name=/oracle/sap/saplog1/log_g2_m1/log2_m1.dbf
size=  5243392: file name=/oracle/sap/saplog1/log_g3_m1/log3_m1.dbf
Total=59057152
```

Note The number of drives specified does not have to equal the number of physical tape drives. The number of drives correlates to the number of simultaneous `bpbackup` jobs run by the NetBackup for SAP on UNIX `backint` interface. For example, if you had 10 SAP files and three tape drives, you can specify 10 drives in the *par_file* (`init`*SID*`.utl`). This would cause 10 `bpbackup` jobs with one file for each `bpbackup` job. `bpsched` will handle all of the job scheduling. Initially, three `bpbackup` jobs would be active and the other seven jobs would be queued. You can increase the number of active jobs and data throughput, by increasing the multiplex value for the class.

custom

This is a parameter value for ***sort_backup_type*** parameter. If `custom` is specified, the ***custom_sort_file*** parameter needs to be set to a valid file path. An SAP Tools end-user must create the ***custom_sort_file*** file (see "sort_restore_type" on page 108).

device

This is a parameter value for ***sort_backup_type*** parameter. This parameter value will create `bpbackup` jobs based on a file's device id. The number of tape drives specified in the `init`***SID***`.utl` file will not be used. For example, if there are 12 files requested for

backup, and they reside on two different devices (X and Y), then two `bpbackup` jobs will be forked. The first job will contain all the files associated with device X and the next job will contain all the files on device Y. The following is an example of the sort by device option:

Input file list from SAP (`brbackup, sapdba`)

```
/oracle/sap/sapdata1/btabd_1/btabd.data1
/oracle/sap/sapdata2/btabi_1/btabi.data1
/oracle/sap/sapdata2/clud_1/clud.data1
/oracle/sap/sapdata1/ddicd_1/ddicd.data1
/oracle/sap/sapdata5/ddici_1/ddici.data1
/oracle/sap/sapdata4/el30cd_1/EL30cd.data1
/oracle/sap/sapdata1/el30ci_1/el30ci.data1
/oracle/sap/sapdata6/es30cd_1/es30cd.data1
/oracle/sap/sapdata2/poold_1/poold.data1
/oracle/sap/sapdata1/pooli_1/pooli.data1
/oracle/sap/sapdata4/protd_1/protd.data1
/dev/rdsk/c0t4d0s6  11812864
```

Backup Job 1 (all have the device id X)

```
/oracle/sap/sapdata1/btabd_1/btabd.data1
/oracle/sap/sapdata2/btabi_1/btabi.data1
/oracle/sap/sapdata2/clud_1/clud.data1
/oracle/sap/sapdata1/ddicd_1/ddicd.data1
/oracle/sap/sapdata5/ddici_1/ddici.data1
/oracle/sap/sapdata4/el30cd_1/EL30cd.data1
/oracle/sap/sapdata1/el30ci_1/el30ci.data1
/oracle/sap/sapdata6/es30cd_1/es30cd.data1
/oracle/sap/sapdata2/poold_1/poold.data1
/oracle/sap/sapdata1/pooli_1/pooli.data1
/oracle/sap/sapdata4/protd_1/protd.data1
```

Backup Job 2 (all have the same device id Y)

```
/dev/rdsk/c0t4d0s6  11812864
```

Note The implementation is based on the *st_dev* value from `stat()function`. This identifies a file partition.

drive

This is a parameter value for the ***sort_backup_type*** parameter. It will create `bpbackup/bprestore` jobs based off of the number of tape drives specified by the ***drives*** parameter in the ***par_file*** (`init`***SID***`.utl`) file.

For example, if there are three tape drives and 10 SAP files, the following distribution will occur:

Input file list from SAP

```
/oracle/sap/sapdata1/roll_1/roll.data1
/oracle/sap/sapdata2/sourced_1/sourced.data1
/oracle/sap/sapdata3/stabd_1/stabd.data1
/oracle/sap/sapdata2/stabi_2/stabi.data2
/oracle/sap/sapdata1/temp_1/temp.data1
/oracle/sap/sapdata4/user1d_1/user1d.data1
/oracle/sap/sapdata2/user1i_1/user1i.data1
/oracle/sap/sapdata1/system_1/system.data1
/oracle/sap/saplog1/log_g1_m1/log1_m1.dbf
```

Backup/Restore Job 1

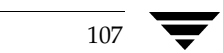
```
/oracle/sap/sapdata1/roll_1/roll.data1
/oracle/sap/sapdata2/stabi_2/stabi.data2
/oracle/sap/sapdata2/user1i_1/user1i.data1
```

Backup/Restore Job 2

```
/oracle/sap/sapdata2/sourced_1/sourced.data1
/oracle/sap/sapdata1/temp_1/temp.data1
/oracle/sap/sapdata1/system_1/system.data1
```

Backup/Restore Job 3

```
/oracle/sap/sapdata3/stabd_1/stabd.data1
/oracle/sap/sapdata4/user1d_1/user1d.data1
/oracle/sap/saplog1/log_g1_m1/log1_m1.dbf
```

sort_restore_type

This is an optional parameter, used to specify one of three different restore sort options [*custom* | *drive* | *image*]. If *sort_restore_type* is not specified it will default to the *image* option.

The following is detailed information on each parameter value.

custom

If `custom` is specified then the *custom_sort_file* parameter needs to have a valid parameter value specified. A valid *custom_sort_file* must be created (see page 108).

drive

This is an option for *sort_restore_type* parameter. It will create `bpbackup/bprestore` jobs based off of the number of tape drives specified by the *drives* variable in the *par_file* (`init`*SID*`.utl`) file.

For example, if there are three tape drives and 10 SAP files, the following distribution will occur:

Input file list from SAP

```
/oracle/sap/sapdata1/roll_1/roll.data1
/oracle/sap/sapdata2/sourced_1/sourced.data1
/oracle/sap/sapdata3/stabd_1/stabd.data1
/oracle/sap/sapdata2/stabi_2/stabi.data2
/oracle/sap/sapdata1/temp_1/temp.data1
/oracle/sap/sapdata4/user1d_1/user1d.data1
/oracle/sap/sapdata2/user1i_1/user1i.data1
/oracle/sap/sapdata1/system_1/system.data1
/oracle/sap/saplog1/log_g1_m1/log1_m1.dbf
```

Backup/Restore Job 1

```
/oracle/sap/sapdata1/roll_1/roll.data1
/oracle/sap/sapdata2/stabi_2/stabi.data2
/oracle/sap/sapdata2/user1i_1/user1i.data1
```

Backup/Restore Job 2

```
/oracle/sap/sapdata2/sourced_1/sourced.data1
/oracle/sap/sapdata1/temp_1/temp.data1
/oracle/sap/sapdata1/system_1/system.data1
```

Backup/Restore Job 3

```
/oracle/sap/sapdata3/stabd_1/stabd.data1
/oracle/sap/sapdata4/user1d_1/user1d.data1
/oracle/sap/saplog1/log_g1_m1/log1_m1.dbf
```

image

This parameter value is only for restores and is the default option if ***sort_restore_type*** is not set in the ***par_file*** (`int`***SID***`.utl`) file. To set this option, specify image (lower case) after the ***sort_restore_type*** variable. Sort by image will group files based on their backup image numbers and fork a `bprestore` for each group. For example, if nine files were backed up by two `bpbackup` jobs, each file would be associated with one of two backup image ids. If all nine files were restored, then there would be two `bprestore` jobs forked by the NetBackup for SAP on UNIX `backint` interface. One job for each image. The files will be grouped the way they were backed up. The following is an example of a restore.

Input file list from SAP (`brrestore`, `sapdba`):

image 1

```
/oracle/sap/sapdata1/roll_1/roll.data1
/oracle/sap/sapdata2/sourced_1/sourced.data1
/oracle/sap/sapdata3/stabd_1/stabd.data1
/oracle/sap/sapdata2/stabi_2/stabi.data2
/oracle/sap/sapdata1/temp_1/temp.data1
```

image 2

```
/oracle/sap/sapdata4/user1d_1/user1d.data1
/oracle/sap/sapdata2/user1i_1/user1i.data1
/oracle/sap/sapdata1/system_1/system.data1
/oracle/sap/saplog1/log_g1_m1/log1_m1.dbf
```

Restore Job 1

```
/oracle/sap/sapdata1/roll_1/roll.data1
/oracle/sap/sapdata2/sourced_1/sourced.data1
/oracle/sap/sapdata3/stabd_1/stabd.data1
/oracle/sap/sapdata2/stabi_2/stabi.data2
/oracle/sap/sapdata1/temp_1/temp.data1
```


Restore Job 2

```
/oracle/sap/sapdata4/user1d_1/user1d.data1
/oracle/sap/sapdata2/user1i_1/user1i.data1
/oracle/sap/sapdata1/system_1/system.data1
/oracle/sap/saplog1/log_g1_m1/log1_m1.dbf
```

Note Restore will fork another job for raw partition files if they are grouped with regular files.

custom_sort_file

This is optional parameter, used only when the custom option is specified on either the *sort_backup_type* parameter or the *sort_restore_type* parameter. When `custom` is specified, the `custom_sort_file` parameter must be set to a valid file. The value must be a full path name to a custom sort file and must have public permissions. The following is an example of an entry:

install_path`/dbext/ext/db_ext/sap/scripts/sap_custom_sort_file`

The `custom_sort_file` must include two fields. The first field groups a set of files to a particular `bpbackup` job. Use the second field, file path name, to map the SAP backup file list to a group ID.

Note Restore will fork another job for raw partition files, if they are grouped with regular files.

Note If `custom` sort is not being used then the `custom_sort_file` parameter does not have to be specified in the *par_file* `init`*SID*`.utl` file (or it does not have to equal a valid file path).

Example of a Custom Sort File

```
1 /oracle/sap/sapdata1/btabd_1/btabd.data1
1 /oracle/sap/sapdata2/btabi_1/btabi.data1
1 /oracle/sap/sapdata2/clud_1/clud.data1
1 /oracle/sap/sapdata1/ddicd_1/ddicd.data1
1 /oracle/sap/sapdata5/ddici_1/ddici.data1
1 /oracle/sap/sapdata4/el30cd_1/EL30cd.data1
1 /oracle/sap/sapdata1/el30ci_1/el30ci.data1
1 /oracle/sap/sapdata6/es30cd_1/es30cd.data1
1 /oracle/sap/sapdata2/poold_1/poold.data1
1 /oracle/sap/sapdata1/pooli_1/pooli.data1
1 /oracle/sap/sapdata4/protd_1/protd.data1
```

```
1 /dev/rdsk/c0t4d0s6
2 /oracle/sap/sapdata1/roll_1/roll.data1
2 /oracle/sap/sapdata2/sourced_1/sourced.data1
2 /oracle/sap/sapdata3/stabd_1/stabd.data1
2 /oracle/sap/sapdata2/stabi_2/stabi.data2
2 /oracle/sap/sapdata1/temp_1/temp.data1
2 /oracle/sap/sapdata4/user1d_1/user1d.data1
2 /oracle/sap/sapdata2/user1i_1/user1i.data1
2 /oracle/sap/sapdata1/system_1/system.data1
2 /oracle/sap/saplog1/log_g1_m1/log1_m1.dbf
2 /oracle/sap/saplog1/log_g2_m1/log2_m1.dbf
2 /oracle/sap/saplog1/log_g3_m1/log3_m1.dbf
2 /oracle/sap/saplog1/log_g4_m1/log4_m1.dbf
2 /oracle/sap/dbs/cntrlSAP.dbf
```

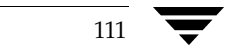
Based on the above custom sort file, if SAP submits the entire file list to be backed up, there would be two `bpbackup` jobs running at the same time. One job would have all the files that have a 1 in the first field. The second job would have all of the files that have a 2 in the first field. The following is a list of jobs and associated files:

Backup/Restore Job 1

```
/oracle/sap/sapdata1/btabd_1/btabd.data1
/oracle/sap/sapdata2/btabi_1/btabi.data1
/oracle/sap/sapdata2/clud_1/clud.data1
/oracle/sap/sapdata1/ddicd_1/ddicd.data1
/oracle/sap/sapdata5/ddici_1/ddici.data1
/oracle/sap/sapdata4/el30cd_1/EL30cd.data1
/oracle/sap/sapdata1/el30ci_1/el30ci.data1
/oracle/sap/sapdata6/es30cd_1/es30cd.data1
/oracle/sap/sapdata2/poold_1/poold.data1
/oracle/sap/sapdata1/pooli_1/pooli.data1
/oracle/sap/sapdata4/protd_1/protd.data1
/dev/rdsk/c0t4d0s6
```

Backup/Restore Job 2

```
/oracle/sap/sapdata1/roll_1/roll.data1
/oracle/sap/sapdata2/sourced_1/sourced.data1
/oracle/sap/sapdata3/stabd_1/stabd.data1
/oracle/sap/sapdata2/stabi_2/stabi.data2
/oracle/sap/sapdata1/temp_1/temp.data1
/oracle/sap/sapdata4/user1d_1/user1d.data1
/oracle/sap/sapdata2/user1i_1/user1i.data1
/oracle/sap/sapdata1/system_1/system.data1
/oracle/sap/saplog1/log_g1_m1/log1_m1.dbf
```

```
/oracle/sap/saplog1/log_g2_m1/log2_m1.dbf
/oracle/sap/saplog1/log_g3_m1/log3_m1.dbf
/oracle/sap/saplog1/log_g4_m1/log4_m1.dbf
/oracle/sap/dbs/cntrlSAP.dbf
```

master_time_offset

This is optional parameter, used to restore old backups if there was a time difference between the master and client machines. This option should only be used:

- for restoring files backed up with NetBackup release 3.0 or older software
- when the date/times are out of sync between the server and client machines

The parameter value, specified in minutes, will be subtracted from the start time and added to the end time for a restore or inquire. The following is an example of an entry:

```
master_time_offset 3
```

standard_class_flag

This is optional parameter, used to perform operations with a Standard class type instead of an SAP class type. At NetBackup release 3.0, all SAP backups used a standard class type. For NetBackup release 3.1 and above, the NetBackup for SAP on UNIX `backint` interface has its own class. The flag gives the NetBackup for SAP on UNIX `backint` interface the ability to use a Standard class. The parameter value is either a `1` for true or `0` for false. The following entry will set the class type to standard:

```
standard_class_flag 1
```

class_log

`class_log` is optional and is the name of a class to be used for backing up a second copy of an archive log. If this option is specified then two backups will be performed on the same archive log. The first backup will go to the `class` name option and the second backup will go to the `class_log` name option.

```
class_log sap_archive_logs
```

sched_log

`sched_log` is optional and is the name of a schedule to create a second backing up of an archive log. If this option is specified, then two backups will be performed on the same archive log. The first backup will go to the `schedule` option and the second backup will

be go to the sched_log and option. The sched_log name must be a valid schedule name under the class_log name option, otherwise it must be a valid schedule name under the class name option.

```
sched_log Default-Policy
```

retry_backup

retry_backup is an optional parameter and should be set to the number of retries for a failed backup. If this option is specified BACKINT will retry a failed bpbackup job. The number of retries is determine by the value on the retry_backup parameter.

```
retry_backup 2
```

fail_backup

fail_backup is optional and is used to stop the backup process immediately when an error occurs. The standard behavior of BACKINT is to continue processing even in the event of an error and then report what files failed and what files were successful. If this parameter is specified, then BACKINT will stop process on the first error and report failures for all the files that were not backed up.

```
fail_backup
```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