VERITAS™

VERITAS NetBackup™ 5.1 for SAP

System Administrator's Guide

for UNIX

N12342B

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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 for UNIX*, if you have a UNIX server,

  or

- *NetBackup System Administrator's Guide for Windows* 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 for UNIX, Volumes I and II*, or *NetBackup System Administrator's Guide for Windows, Volumes I and II*
  - *NetBackup Troubleshooting Guide for UNIX and Windows*
- A thorough understanding of the SAP environment.

What Is In This Guide?

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 this chapter.
- Using NetBackup for SAP on UNIX 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`.
- Appendix G describes the method for using NetBackup for SAP to back up SAPDB.

Getting Help

VERITAS offers you a variety of support options.

Accessing the VERITAS Technical Support Web Site

The VERITAS Support Web site allows you to:

- obtain updated information about NetBackup for SAP, including system requirements, supported platforms, and supported peripherals
- contact the VERITAS Technical Support staff and post questions to them
- get the latest patches, upgrades, and utilities
- view the NetBackup for SAP Frequently Asked Questions (FAQ) page
- search the knowledge base for answers to technical support questions
- receive automatic notice of product updates
- find out about NetBackup for SAP training
- read current white papers related to NetBackup for SAP

The address for the VERITAS Technical Support Web site follows:

- http://support.veritas.com

Subscribing to VERITAS Email Notification Service

Subscribe to the VERITAS Email notification service to be informed of software alerts, newly published documentation, Beta programs, and other services.

Go to http://support.veritas.com. Select a product and click “E-mail Notifications” on the right side of the page. Your customer profile ensures you receive the latest VERITAS technical information pertaining to your specific interests.

Accessing VERITAS Telephone Support

Telephone support for NetBackup for SAP is only available with a valid support contract. To contact VERITAS for technical support, dial the appropriate phone number listed on the Technical Support Guide included in the product box and have your product license information ready for quick navigation to the proper support group.

▼ **To locate the telephone support directory on the VERITAS web site**

1. Open http://support.veritas.com in your web browser.
2. Click the **Phone Support** icon. A page that contains VERITAS support numbers from around the world appears.

Accessing VERITAS E-mail Support

▼ **To contact support using E-mail on the VERITAS web site**

1. Open http://support.veritas.com in your web browser.
2. Click the **E-mail Support** icon. A brief electronic form will appear and prompt you to:
   - Select a language of your preference
   - Select a product and a platform
   - Associate your message to an existing technical support case
   - Provide additional contact and product information, and your message
3. Click **Send Message**.

Contacting VERITAS Licensing

For license information call 1-800-634-4747 option 3, fax 1-650-527-0952, or e-mail amercustomercare@veritas.com.

NetBackup for SAP Manuals

The following manuals, along with the online help, are included in the NetBackup for SAP documentation set. For a more detailed listing of NetBackup documents, refer to *NetBackup Release Notes for UNIX and Windows.*

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

- *VERITAS NetBackup System Administrator's Guide for UNIX, Volume I*

NetBackup_AdminGuideI_UNIXServer.pdf

Explains how to configure and manage NetBackup on a UNIX server, including managing storage units, backup policies, catalogs and host properties.

- *VERITAS NetBackup System Administrator's Guide for UNIX, Volume II*

  NetBackup_AdminGuideII_UNIXServer.pdf

  Explains additional NetBackup features such as notify scripts, enhanced authorization and authentication, and role-based security. The guide also discusses using NetBackup with AFS, Intelligent Disaster Recovery (IDR), and the BE Tape Reader.

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

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

- *VERITAS NetBackup Troubleshooting Guide for UNIX and Windows*

  Provides troubleshooting information for UNIX- and Windows-based NetBackup products, including Media Manager.

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

- *VERITAS NetBackup System Administrator's Guide for Windows, Volume I*

  NetBackup_AdminGuideI_WinServer.pdf

  Explains how to configure and manage NetBackup on a Windows server, including managing storage units, backup policies, catalogs and host properties.

- *VERITAS NetBackup System Administrator's Guide for Windows, Volume II*

  NetBackup_AdminGuideII_WinServer.pdf

  Explains additional NetBackup features such as notify scripts, enhanced authorization and authentication, and role-based security. The guide also discusses using NetBackup with AFS, Intelligent Disaster Recovery (IDR), and the BE Tape Reader.

- *NetBackup Media Manager System Administrator's Guide for Windows*

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

- *VERITAS NetBackup Troubleshooting Guide for UNIX and Windows*

  Provides troubleshooting information for UNIX- and Windows-based NetBackup products, including Media Manager.

Other Documentation

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

Glossary

If you encounter unfamiliar terminology, consult the NetBackup online glossary. The glossary contains terms and definitions for NetBackup and all additional NetBackup options and agents.

The NetBackup online glossary is included in the NetBackup help file.

▼ **To access the NetBackup online glossary**

1. In the NetBackup Administration Console, click **Help** > **Help Topics**.
2. Click the **Contents** tab.
3. Click **Glossary of NetBackup Terms**.

Use the scroll function to navigate through the glossary.

Accessibility Features

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

- Support for assistive technologies such as screen readers and voice input (Windows servers only)
- Support for keyboard (mouseless) navigation using accelerator keys and mnemonic keys

For more information, see the *NetBackup System Administrator's Guide for Windows, Volume I* or the *NetBackup System Administrator's Guide for UNIX, Volume I*.

Conventions

The following conventions apply throughout the documentation set.

Product-Specific Conventions

The following term is used in the NetBackup for SAP 5.1 documentation to increase readability while maintaining technical accuracy.

- Microsoft Windows, Windows

  Terms used to describe a specific product or operating system developed by Microsoft, Inc. Some examples you may encounter in NetBackup documentation are, Windows servers, Windows 2000, Windows Server 2003, Windows clients, Windows platforms, or Windows GUI.

  When Windows or Windows servers is used in the documentation, it refers to all of the currently supported Windows operating systems. When a specific Windows product is identified in the documentation, only that particular product is valid in that instance.

  For a complete list of Windows operating systems and platforms that NetBackup supports, refer to the *NetBackup Release Notes for UNIX and Windows* or go to the VERITAS support web site at `http://www.support.veritas.com`.

Typographical Conventions

Here are the typographical conventions used throughout the manuals:

Conventions

Convention	Description
GUI Font	Used to depict graphical user interface (GUI) objects, such as fields, listboxes, menu commands, and so on. For example: Enter your password in the **Password** field.
Italics	Used for placeholder text, book titles, new terms, or emphasis. Replace placeholder text with your specific text. For example: Replace *filename* with the name of your file. Do *not* use file names that contain spaces. This font is also used to highlight NetBackup server-specific or operating system-specific differences. For example: *This step is only applicable for NetBackup Enterprise Server.*

Conventions (continued)

Convention	Description
`Code`	Used to show what commands you need to type, to identify pathnames where files are located, and to distinguish system or application text that is displayed to you or that is part of a code example.
Key+Key	Used to show that you must hold down the first key while pressing the second key. For example: Ctrl+S means hold down the Ctrl key while you press S.

You should use the appropriate conventions for your platform. For example, when specifying a path, use backslashes on Microsoft Windows and slashes on UNIX. Significant differences between the platforms are noted in the text.

Tips, notes, and cautions are used to emphasize information. The following samples describe when each is used.

Tip Used for nice-to-know information, like a shortcut.

Note Used for important information that you should know, but that shouldn't cause any damage to your data or your system if you choose to ignore it.

Caution Used for information that will prevent a problem. Ignore a caution at your own risk.

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`

In this example, the user can use either the *arg1* or *arg2* variable.

Navigating Multiple Menu Levels

When navigating multiple menu levels, a greater-than sign (>) is used to indicate a continued action.

The following example shows how the > is used to condense a series of menu selections into one step:

- Select **Start** > **Programs** > **VERITAS NetBackup** > **NetBackup Administration Console**.

The corresponding actions could be described in more steps as follows:

1. Click **Start** in the task bar.
2. Move your cursor to **Programs**.
3. Move your cursor to the right and highlight **VERITAS NetBackup**.
4. Move your cursor to the right. First highlight and then click **NetBackup Administration Console**.

Introduction 1

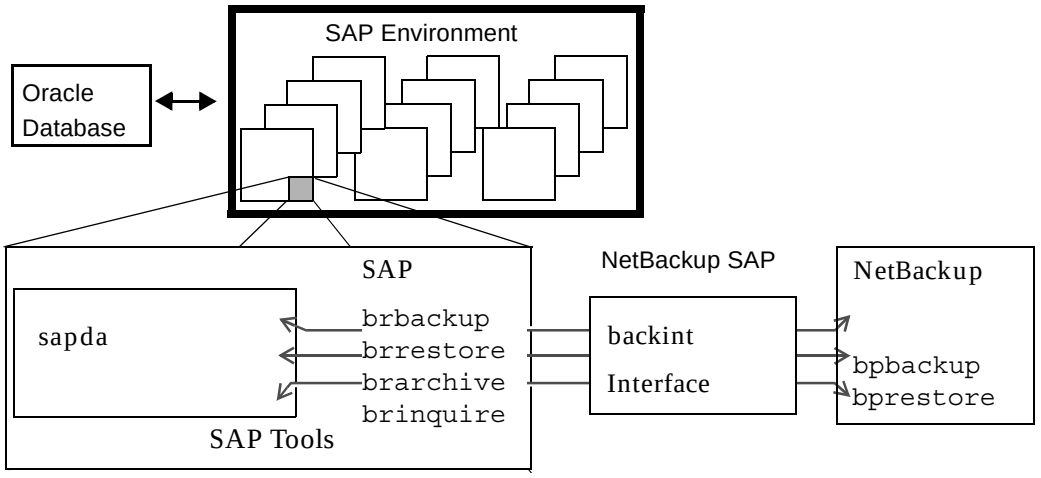
NetBackup for SAP on UNIX integrates the database backup and recovery capabilities of SAP Tools with the backup and recovery management capabilities of NetBackup and its Media Manager.

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

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 policy	NetBackup policies define criteria for backups and restores. These criteria include storage unit and media to use, backup schedules, clients, files to back up, or backup templates or scripts to execute.
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 via NetBackup interfaces.
User-directed backups and restores	NetBackup 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.

For explanations of other NetBackup terms, consult the NetBackup online glossary. For instructions, see the "Glossary" section in the Preface.

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 "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 91.

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.

NetBackup for SAP on UNIX main features

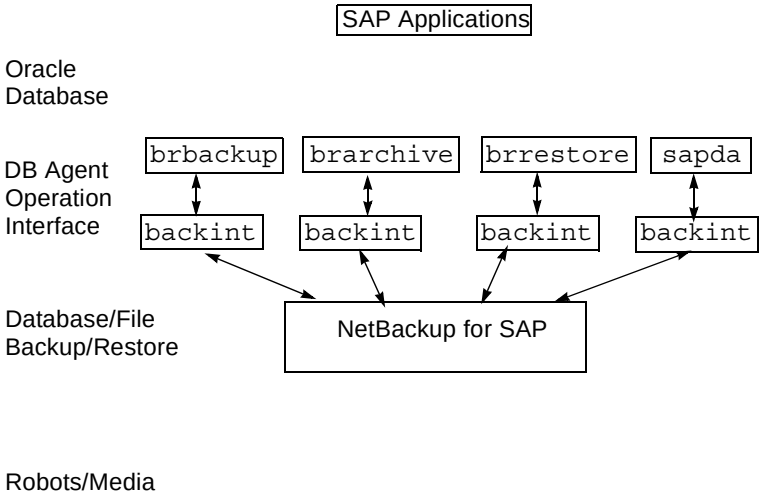
Feature	Description
Media and device management	All devices supported by Media Manager are available to NetBackup for SAP on UNIX.
Scheduling facilities	NetBackup scheduling facilities on the master server can be used to schedule automatic and unattended SAP backups. This also lets you choose the times 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.

NetBackup for SAP on UNIX main features

Feature	Description
Transparent execution of both SAP and regular file system backup and restore operations	All backups and restores are run simultaneously and transparently without any action from the NetBackup administrator. A database administrator can run 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 run 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.
Graphical user interfaces	NetBackup provides the following graphical user interfaces for client users and administrators: ◆ Backup, Archive, and Restore user interface ◆ Client user motif interface, `xbp` ◆ NetBackup Administration Console for Java ◆ NetBackup Administration Console for Windows 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.

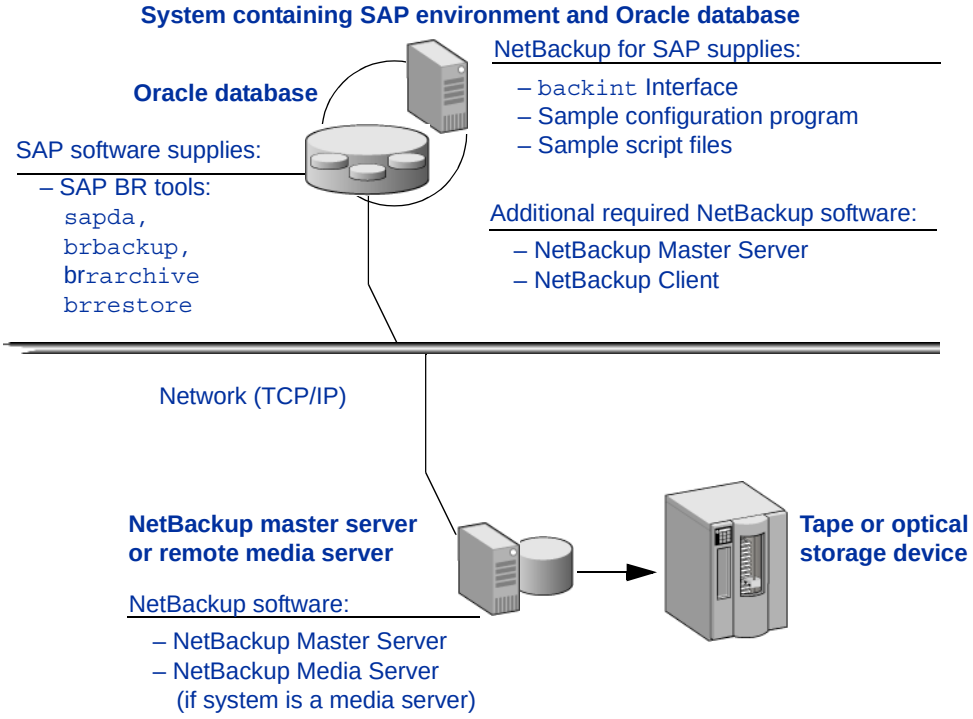
Technical Overview of NetBackup for SAP on UNIX

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 (`brbackup`, `brarchive`, and `brrestore`) 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.



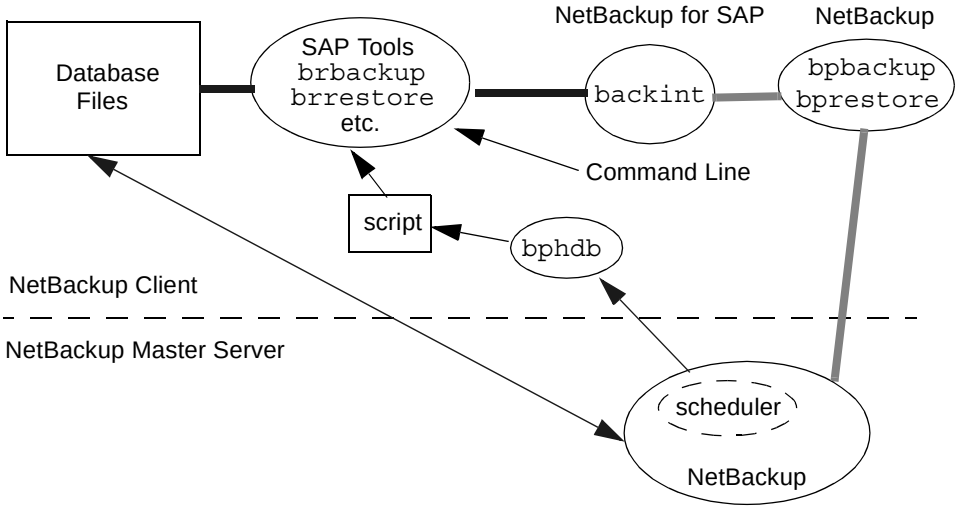
The host with the database must be a NetBackup client and have NetBackup for SAP on UNIX, SAP software, and Oracle software installed.

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 "Creating Scripts" on page 49 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.

Installation 2

This chapter describes the NetBackup for SAP on UNIX installation and setup procedures. It includes a section on installation prerequisites.

▼ To locate the latest Database Agent information on the VERITAS support web site

1. Go to the VERITAS support web page: http://www.support.veritas.com.
2. From the Select Product Family list, choose **NetBackup Products**. The Select Product window refreshes showing a list of NetBackup products.
3. Select one of the NetBackup products. The page refreshes and displays a search window with four tabs.
4. Select **5.1** in the **Product Version** drop-down field.
5. Select a Product Platform.
6. Click the **Compatibility** tab. The page refreshes showing documents that contain compatibility information.
7. Click on the title of the document link for NetBackup Database Agent Compatibility List. A document appears that contains a downloadable file that enables you to view the supported database spreadsheet for this release.

Installation Prerequisites

Before installing NetBackup for SAP on UNIX, be sure you have completed the following procedures:

- Install the NetBackup server software on the server.

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

  Refer to the *NetBackup Installation Guide for UNIX* or the *NetBackup Installation Guide for Windows*.

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

  Refer to the *NetBackup Installation Guide for UNIX* for installation instructions.

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.

Guidelines for Installing NetBackup for SAP on UNIX in a Cluster

- Prior to installing NetBackup for SAP on UNIX, the NetBackup server must be installed and configured to work in a cluster. (This is accomplished by following the instructions in the *NetBackup Installation Guide for UNIX*, including running the `cluster_config` script after the NetBackup server software has been installed.)
- Commands such as `bpplclients` and `update_dbclients` must be run from the active NetBackup node. If you are pushing the database agent software to clients located in a cluster, specify the individual node names (not virtual names) in the list of clients.
- If installing NetBackup for SAP on UNIX on a clustered NetBackup server, freeze the active NetBackup node before beginning the installation. Install on all the inactive nodes, then install on the active node. After you successfully install on the active node, unfreeze this node.
- The `cluster_config` script only needs to be run after the NetBackup server software has been installed. You do not need to run this script after installing NetBackup for SAP on UNIX on a NetBackup server or if you wish to install NetBackup for SAP on UNIX on a machine on which only the NetBackup client is installed.

Installing NetBackup for SAP on UNIX

There are two ways to install database agent software.

- Remote installation: Loads the software on a master server. The user then pushes 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 UNIX master server. The software is then distributed to the clients and installed.

Note In a clustered environment, the capability to push client software is only available from the active node.

Installation Requirements

- The version of the NetBackup client and the version of NetBackup for SAP on UNIX must be the same (for example, 5.1).
- There must be 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 5.1 software is installed and operational on each SAP client.
- In a clustered environment, NetBackup server software has been installed and configured to work in a cluster. (This is accomplished by following the instructions in the *NetBackup Installation Guide for UNIX*, including running the `cluster_config` script after the NetBackup server software is installed.)

Remote Installation Instructions

▼ To perform a remote installation

1. If installing NetBackup for SAP on UNIX on a clustered NetBackup server, first refer to the "Guidelines for Installing NetBackup for SAP on UNIX in a Cluster" earlier in this chapter.

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

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

   ```
   su - root
   ```

3. Make sure a valid license key for NetBackup for SAP on UNIX has been registered. To view or add license keys, perform one of the following:

   - Run the following command:

     install_path/netbackup/bin/admincmd/get_license_key.

   - Open the NetBackup Administration Console and choose **Help** > **License Keys**.

4. Insert the CD-ROM into the drive.

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

   ```
   cd /CD_mount_point
   ```

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

   ```
   ./install
   ```

   a. Select the NetBackup Database Agent Software option.

      The following prompt appears:

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

   b. Answer **n**.

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

   c. Select the NetBackup for SAP option.

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

      A prompt appears asking if the list is correct.

   e. 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 is automatically 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 agent version files, compressed tar files and the `install_dbext` script are copied to directory *`install_path`*`/netbackup/dbext`.

7. Distribute and install the NetBackup for SAP on UNIX software on each client as described in the next sections.

Note In a clustered environment, the capability to distribute client software is only available from the active node.

There are two types of installation processes.

- *initial install*: Use an initial install if the clients you intend to update have not been added to policies of type SAP.
- *upgrade install*: Use an upgrade install if all the clients you intend to update already have been added to policies of type SAP.

Note The NetBackup version level (for example, 5.1) running on the clients you wish to update must be the same as the version level of the NetBackup for SAP on UNIX being installed.

Initial Installation on Clients

▼ To perform an initial install on the clients

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

   `cd` *`install_path`*`/netbackup/bin`
   `./admincmd/bpplclients -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 `bpplclients`.

   `bpplclients` generates output in following format:

   hardware operating_system client_name

where:

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

operating_system is the operating system name. For example, 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 Solaris8 curry
RS6000 AIX4.3.3 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* in the `update_dbclients` command.

   For example:

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

   Only clients listed in *filename* are updated.

Upgrade Installation on Clients

▼ To perform an upgrade installation on the clients

1. Execute the following command.

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

   This command looks at all possible clients and updates only the clients currently in the SAP policy type.

   Instead of `ALL ALL`, you may use `-ClientList` *filename* as explained in “Initial Installation on Clients” 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 6 of the "Remote Installation Instructions" on page 14
- (if using the `ALL ALL` method) the client does not belong to the SAP policy type

All skipped clients are available in a file whose name is displayed by `update_dbclients`.

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*

(must be in the range of 1 to *max*; default: *dflt*).

where:

max is the maximum number of simultaneous updates that is allowed. The value displayed ranges from 1 to 30.

dflt is the default number the program uses if you press Enter. The value displayed ranges from 1 to 15.

For example, if three client updates will be performed, the *max* and *dflt* values shown would be 3. If 50 client updates will be performed, the *max* value shown would be 30 and the *dflt* value shown would be 15.

`update_dbclients` starts the number of updates that you specify. If this number is less than the total number of client updates to be performed, new updates 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]`

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

   If you answer **`n`**, `update_dbclients` quits and leaves 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 automatically runs the `install_dbext` script on the client. If `install_dbext` has successfully completed, there will be a version file in directory *`install_path`*`/share` that contains the version of NetBackup for SAP on UNIX that

was installed. 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.

Installation Requirements

- The version of the NetBackup client and the version of NetBackup for SAP on UNIX are the same (for example, 5.1).
- The local machine must have 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 5.1 client software is installed and operational.

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

Local Install Instructions

▼ To install NetBackup for SAP on UNIX to the local machine

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

   If you are already logged in, but are not the root user, run 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. In a NetBackup server clustered environment, the license key must be registered on each node. To view or add license keys, perform one of the following:

   - Run the command *`install_path`*`/netbackup/bin/admincmd/get_license_key`.

- Open the NetBackup Administration Console and choose **Help** > **License 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, 5.1) running on the local machine matches the version level of the database agent being installed.

```
./install
```

   a. Select the NetBackup Database Agent Software option.

      The following prompt appears:

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

   b. Answer **y**.

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

   c. Select the NetBackup for SAP option.

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

      A prompt appears asking if the list is correct.

   e. Answer **y**.

      The following actions occur:

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

   f. Enter **q** to quit from the script.

Linking NetBackup for SAP with 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

To follow SAP convention, you must 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 must be executed:

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

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. Configuring Media Using Media and Device Management
2. Setting the Maximum Jobs Per Client Property
3. Configuring a NetBackup Policy
4. Creating Scripts
5. Configuring the initSID.utl File
6. Configuring the initSID.sap File
7. Testing NetBackup for SAP on UNIX Configuration Settings
8. Testing Multiple Drives and Files

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

To configure NetBackup for SAP on UNIX from a Windows NetBackup server, see "Configuration Using the NetBackup Administration Console for Windows" on page 22.

To configure NetBackup for SAP on UNIX from a UNIX NetBackup server, see "Configuration Using the NetBackup Administration Console for UNIX" on page 35.

Configuration Using the NetBackup Administration Console for Windows

Although the database agent is installed on the NetBackup client, some configuration procedures are performed using the NetBackup Administration Console on the server.

These procedures include:

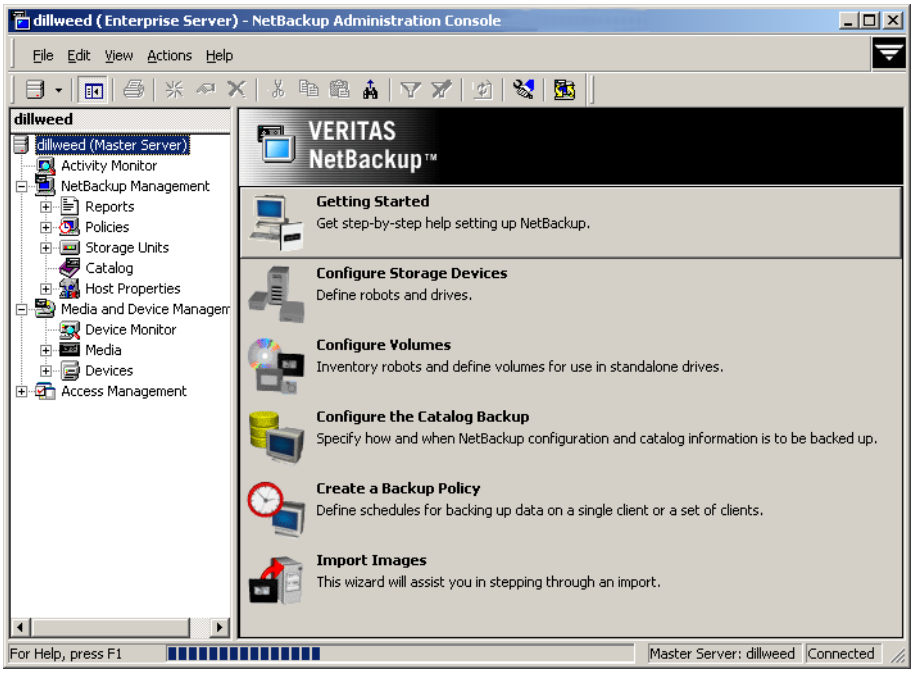
- Configuring media using Media and Device Management
- Setting the **Maximum Jobs per Client** property
- Configuring a NetBackup policy
- Testing NetBackup for SAP on UNIX configuration settings

See the next section for instructions on starting the NetBackup Administration Console.

▼ To launch the NetBackup Administration Console for Windows

1. Log on to the server as administrator.
2. Choose **Start** > **Programs > VERITAS NetBackup** > **NetBackup Administration Console**.

The NetBackup Administration Console is displayed.



Configuring Media Using Media and Device Management

Use the Media and Device Management (Media Manager) to configure media for a NetBackup for SAP on UNIX configuration. Refer to the *NetBackup Media Manager System Administrator's Guide* for more information.

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.

Setting the Maximum Jobs Per Client Property

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

Maximum Jobs per Client = *Number of Drives* x *Number of Policies*

Where:

- *Number of Drives* is the number of concurrent `bpbackup` jobs. These jobs are defined by the drive parameter in the `initSID.utl` file.

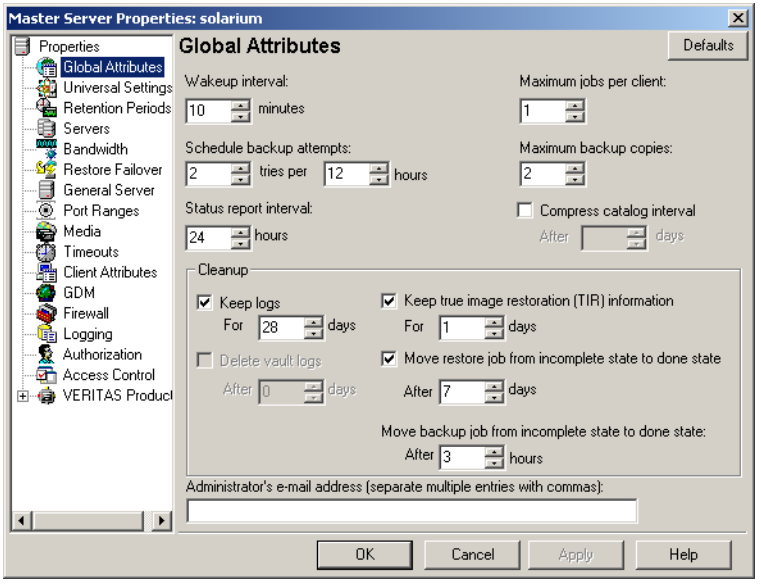
- *Number of Policies* is the number of policies that may back up this client at the same time. This number can be greater than one. For example, a client may be in two policies in order to back up two different databases. These backup windows may overlap.

Tip To avoid any problems, we recommend that you enter a high enough value for the **Maximum jobs per client** property to meet the number of jobs executed by SAP.

▼ To set the Maximum jobs per client property using the Windows console

1. In the left pane of the NetBackup Administration Console, expand **Host Properties**.
2. Select **Master Server**.
3. In the right pane, double-click on the server icon.

   The Master Server Properties dialog is displayed.
4. In the Master Server Properties dialog, click **Global Attributes**.



   The default value is 1 for **Maximum jobs per client**.
5. Change the **Maximum jobs per client** value to 99.

If you prefer to enter a lower value, calculate the value equal to the maximum number of backups allowed per client using the formula provided above.

Configuring a NetBackup Policy

A NetBackup policy defines the backup criteria for a specific group of one or more clients. These criteria include:

- storage unit and media to use
- backup schedules
- clients to be backed up
- script files to be executed on the clients

To use NetBackup for SAP on UNIX, at least one SAP policy with the appropriate schedules needs to be defined. A configuration can have a single policy that includes all clients or there can be many policies, some of which include only one client.

Most requirements for SAP policies are the same as for file system backups. In addition to the attributes described here, there are other attributes for a policy to consider. Refer to the *NetBackup System Administrator's Guide for Windows, Volume I* or *NetBackup System Administrator's Guide for UNIX, Volume I* for detailed configuration instructions and information on all the attributes available.

Adding New Policies

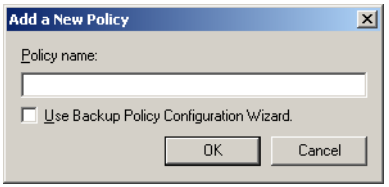
Use this procedure when configuring a policy from a Windows server or from a NetBackup Remote Administration Console host.

▼ **To add a new policy**

Note This policy name can be specified in the `initSID.utl` file on the client.

1. Log on to the server as administrator.
2. Start the NetBackup Administration Console.
3. If your site has more than one master server, choose the one where you want to add the policy.
4. In the left pane, right-click **Policies** and choose **New Policy**.

The Add a New Policy dialog is displayed.



a. In the **Policy name** box, type a unique name for the new policy.

b. Choose whether to use the wizard for configuring the policy. The wizard guides you through most of the setup process and simplifies it by automatically choosing default values that are good for most configurations. If necessary, you can change the defaults later by editing the policy. You will need to manually add entries to the Backup Selections list after completing the wizard.

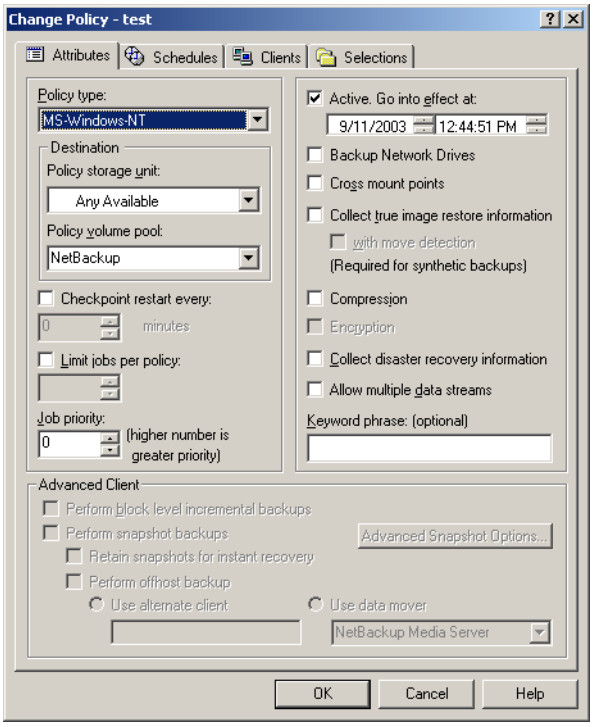
- To use the wizard, select the **Use Backup Policy Configuration Wizard** box and click **OK**. The wizard starts and you create the policy by following the prompts. When prompted, select the SAP policy type.

Note The SAP policy type will not appear in the drop-down list unless your server has a license key for NetBackup for SAP on UNIX.

- If you require more control over the settings than the wizard provides, then do not select the **Use Backup Policy Configuration Wizard** box and proceed to step 5.

5. Click **OK**.

A dialog is displayed in which you can specify the general attributes for the policy.



6. From the **Policy Type** box, select the SAP policy type.

7. Complete the entries on the **Attributes** tab as explained in "Description of Attributes."

8. Add other policy information:
   - To add schedules, see "Adding New Schedules."
   - To add clients, see "Adding Clients to a Policy."
   - To add scripts to the Backup Selections list, see "Specifying the List of Backup Selections."

9. Click **OK**. The new policy is created.

Description of Attributes

With a few exceptions, NetBackup manages a database backup like a file system backup. Policy attributes that are different for SAP backups are explained below.

Your other policy attributes will vary according to your specific backup strategy and system configuration. Consult the *NetBackup System Administrator's Guide for Windows, Volume I* or *NetBackup System Administrator's Guide for UNIX, Volume I* for detailed explanations of the policy attributes.

Description of Policy Attributes

Attribute	Description
Policy type	Determines the type of clients that can be in the policy and in some cases the types of backups that can be performed on those clients. To use NetBackup for SAP on UNIX, you must have defined at least one SAP policy.
Keyword phrase to associate with the backup	For NetBackup for SAP on UNIX, the keyword phrase entry is ignored.

Adding New Schedules

Each policy has its own set of schedules. These schedules control initiation of automatic backups and also specify when user operations can be initiated.

A server-directed, scheduled SAP backup requires an Application Backup schedule, which is created automatically when you create a SAP policy. The Application Backup schedule is used to initiate and manage the backup operation. You also need one or more Automatic Backup schedules, if you plan to have NetBackup perform automatic, scheduled backups.

The following procedures explain how to configure the required schedule types, and how to add new schedules. The procedures start on the Policy dialog. To see the Policy dialog, double-click the policy name in the Policies list of the NetBackup Administration Console.

▼ To configure an Application Backup schedule

1. On the Policy dialog, click the **Schedules** tab.
2. Double-click on the schedule named **Default-Application-Backup**.

   A dialog is displayed.

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

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

3. Specify the other properties for the schedule as explained in "Schedule Properties."

   The backup window for an Application Backup schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the Application Backup 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 Application Backup schedule must have a start time of 0800 and a duration of 14 hours.

Example Settings for an Application Backup schedule

Type of Backup	Schedule settings	Description	Settings
Application Backup	Retention	The length of time backup images are stored.	2 weeks
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday through Saturday 00:00:01 - 23:59:59

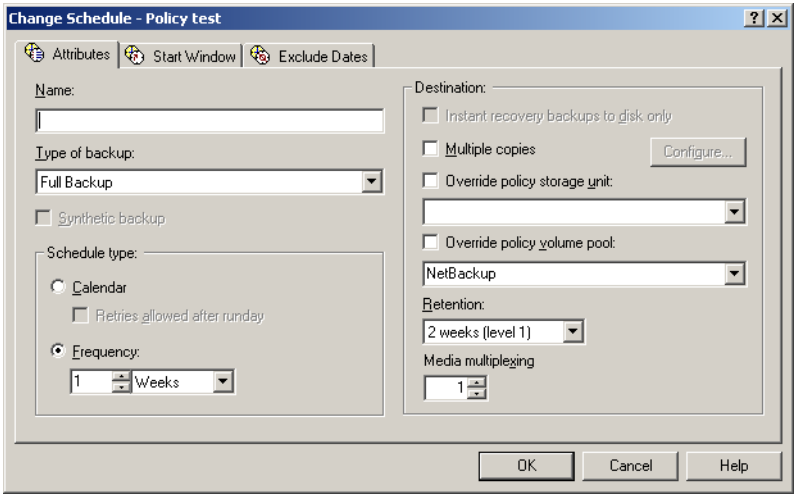
Note The Application Backup schedule name can be specified in the `initSID.utl` file on the client.

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

▼ To configure an automatic backup schedule

1. On the Policy dialog, click the **Schedules** tab.
2. Click **New**.

   A dialog is displayed. The title bar shows the name of the policy to which you are adding the schedules.



3. Specify a unique name for the schedule.
4. Select the **Type of backup**.

   For information on the types of backups available for this policy, see "Types of Backups."

   Refer to the following table for example settings for an Automatic Backup schedule.

Example Settings for an Automatic Backup Schedule

Type of Backup	Schedule settings	Description	Settings
Automatic Backup	Retention	The length of time to store the record of a backup.	2 weeks
	Frequency	Frequency determines how often a backup should be performed	every week
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday, 18:00:00 - 22:00:00

5. Specify the other properties for the schedule as explained in "Schedule Properties."

6. Click **OK**.

Types of Backups

Description of Backup Types for SAP

Application Backup	The Application Backup schedule enables user-controlled NetBackup operations performed on the client. At least one Application Backup schedule type must be configured for each SAP policy. The Default-Application-Backup schedule is automatically configured as an Application Backup schedule.
Automatic 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 policy, the SAP scripts are executed on each client.

Schedule Properties

Some of the schedule properties have a different meaning for database backups than for a regular file system backup. These properties are explained in the following table.

Other schedule properties vary according to your specific backup strategy and system configuration. Consult the *NetBackup System Administrator's Guide for Windows, Volume I* or *NetBackup System Administrator's Guide for UNIX, Volume I* for detailed explanations of the schedule properties.

Description of Schedule Properties

Property	Description
Type of backup	Specifies the type of backup that this schedule will control. The selection list shows only the backup types that apply to the policy you are configuring. For more information see the following section "Types of Backups."

Description of Schedule Properties (continued)

Property	Description
Frequency	This setting is used only for scheduled backups, and not for user-directed backups. **Frequency** specifies the period of time that will elapse until the next backup operation can begin on this schedule. For example, if the frequency is seven days and a successful backup occurs on Wednesday, the next full backup will not occur until the following Wednesday. Normally, incremental backups will have a shorter frequency than full backups.
Calendar	This setting is used only for scheduled backups, and not for user-directed backups. The **Calendar** option allows you to schedule backup operations based on specific dates, recurring week days, or recurring days of the month.
Retention	**Frequency based scheduling** The retention period for an Application Backup schedule refers to the length of time that NetBackup keeps backup images. The retention period for an Automatic Backup schedule controls how long NetBackup keeps records of when scheduled backups have occurred. 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. **Calendar based scheduling** The retention period for an Application Backup schedule refers to the length of time that NetBackup keeps backup images. The retention period for an Automatic Backup schedule controls how long NetBackup keeps records of when scheduled backups have occurred. However, this setting is not significant for calendar based scheduling.
Multiple copies	If you are licensed for the Inline Tape Copy feature and wish to specify multiple copies for your SAP policy, configure **Multiple copies** on the Application Backup schedule.

Adding Clients to a Policy

The client list is the list of clients on which your SAP scripts are run during an automatic backup. A NetBackup client must be in at least one policy but can be in more than one.

This procedure starts in the Policy dialog. To see the Policy dialog, double-click the policy name in the Policies list in the NetBackup Administration Console.

Requirements for clients

The following software must be installed on the client:

- SAP
- NetBackup client or server
- NetBackup for SAP on UNIX
- the backup or restore script(s)

▼ To add clients to a policy

1. In the Policy dialog, click the **Clients** tab.
2. Click **New**.
3. Enter the name of the client you want to add.
   - Type the name into the client list and click **OK**.

     If NetBackup cannot detect the hardware and operating system, a dialog will be displayed so you can specify this information.

     OR

   - Click the **Browse for Computer** button to choose the client from the network:
4. To add another client, repeat step 2 and step 3. If this is the last client, click **OK** to close the dialog.

Specifying the List of Backup Selections

The Backup Selections list in a database policy has a different meaning than for non-database policies. For example, in a Standard policy, the list contains files and directories to be backed up. In a database policy, you specify scripts to be run.

Add scripts only if you are setting up a policy for automatic scheduling. All scripts listed in the Backup Selections list will be executed for the Automatic Backup schedules, as specified under the **Schedules** tab, and manual backups. NetBackup will start backups according to the order that scripts appear in the Backup Selections list.

The following procedure starts in the Policy dialog. To see the Policy dialog, double-click the policy name in the Policies list in the NetBackup Administration Console.

▼ To add scripts to the Backup Selections list

1. In the Policy dialog, click the **Backup Selections** tab.
2. Click **New**.
3. Enter the name of the selection.
   - Type the name of the script.

     Be sure to specify the full pathname when listing SAP scripts. For example:

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

     OR

   - Click the **Remote Folder** button.

     The Browse window is displayed. Navigate to the script file and select the file. Click **OK**.

   Refer to "Instructions for Modifying Scripts" on page 49 for details.

   Be sure that the SAP scripts listed here are installed on each client in the Client list.
4. Click **OK**.

Configuration Using the NetBackup Administration Console for UNIX

Although the database agent is installed on the NetBackup client, some configuration procedures are performed using the NetBackup Administration Console on the server.

These procedures include:

- Configuring media using Media and Device Management
- Setting the **Maximum Jobs per Client** property
- Configuring a NetBackup policy
- Testing NetBackup for SAP on UNIX configuration settings

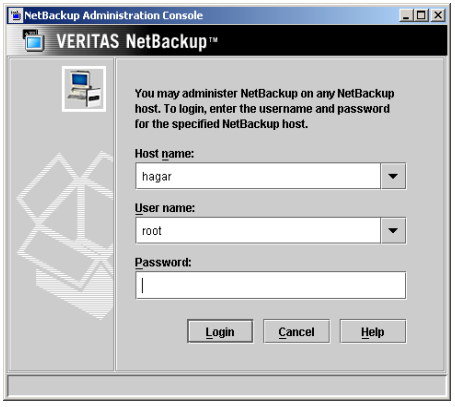
See the next section for instructions on starting the NetBackup Administration Console.

▼ To launch the NetBackup Administration Console for UNIX

1. Log onto the UNIX server as root.
2. Start the NetBackup Administration Console by executing:

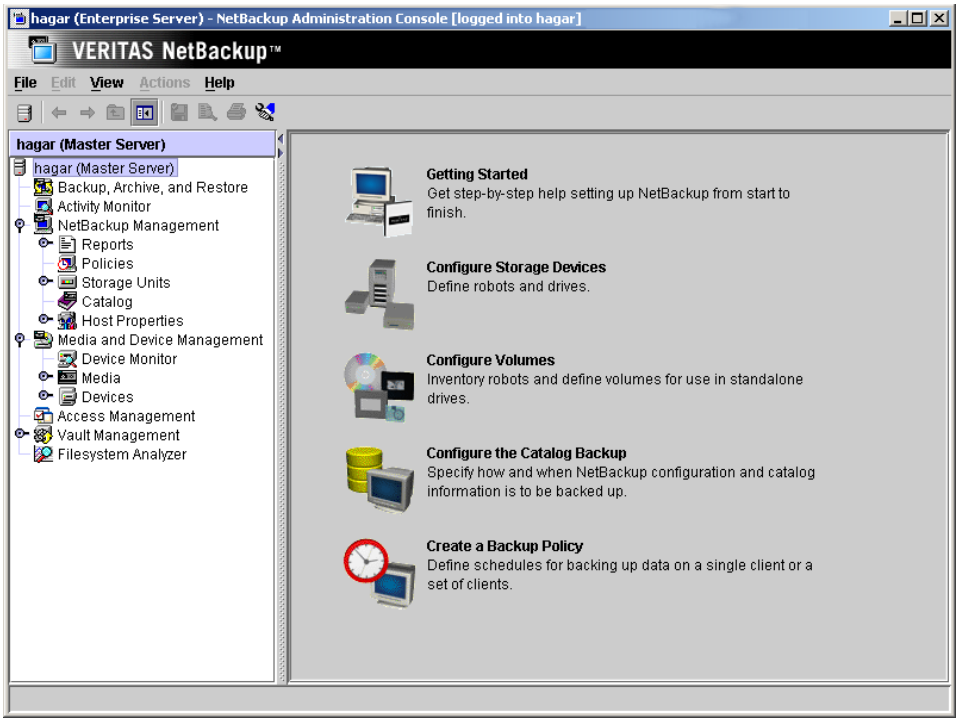
   install_path`/netbackup/bin/jnbSA &`

   The login dialog is displayed.



3. Type the name of the master server where you initially want to manage NetBackup. You can specify any NetBackup master server. Indicate the User and Password.

4. Click **Login**. The NetBackup Administration Console is displayed.



Configuring Media Using Media and Device Management

Use the Media and Device Management (Media Manager) to configure media for a NetBackup for SAP on UNIX configuration. Refer to the *NetBackup Media Manager System Administrator's Guide* for more information.

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.

Setting the Maximum Jobs Per Client Property

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

Maximum Jobs per Client = *Number of Drives* x *Number of Policies*

Where:

- *Number of Drives* is the number of concurrent `bpbackup` jobs. These jobs are defined by the drive parameter in the `initSID.utl` file.

- *Number of Policies* is the number of policies 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 policies in order to back up two different databases. These backup windows may overlap.

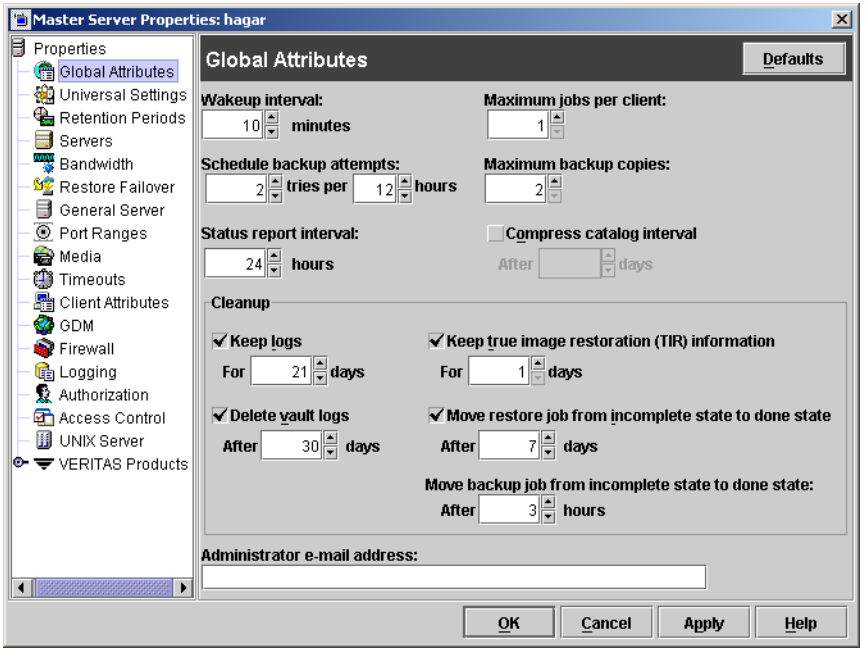
Tip To avoid any problems, we recommend that you enter a high enough value for the **Maximum jobs per client** property to meet the number of jobs executed by SAP.

▼ To set the Maximum jobs per client property using the NetBackup Administration Console for UNIX

1. In the left pane of the NetBackup Administration Console, expand **Host Properties**. Select **Master Servers**.

2. In the right pane, double-click on the server icon. Click **Global Attributes**.

   The Master Server Properties dialog is displayed.



   The default value is 1 for **Maximum jobs per client**.

3. Change the **Maximum jobs per client** value to 99.

If you prefer to enter a lower value, calculate the value equal to the maximum number of backups allowed per client using the formula provided above.

Configuring a NetBackup Policy

A NetBackup policy defines the backup criteria for a specific group of one or more clients. These criteria include:

- storage unit and media to use
- backup schedules
- clients to be backed up
- script files to be executed on the clients

To use NetBackup for SAP on UNIX, at least one SAP policy with the appropriate schedules needs to be defined. A configuration can have a single policy that includes all clients or there can be many policies, some of which include only one client.

Most requirements for SAP policies are the same as for file system backups. In addition to the attributes described here, there are other attributes for a policy to consider. Refer to the *NetBackup System Administrator's Guide for Windows, Volume I* or *NetBackup System Administrator's Guide for UNIX, Volume I* for detailed configuration instructions and information on all the attributes available.

Adding New Policies

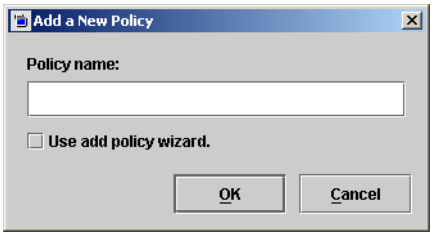
Use this procedure when configuring a policy from a UNIX server.

▼ **To add a new policy**

Note This policy name can be specified in the `initSID.utl` file on the client.

1. Log onto the server as root.
2. Start the NetBackup Administration Console.
3. If your site has more than one master server, choose the one to which you want to add the policy.
4. In the left pane, click on **Policies**. The right pane splits into an All Policies pane and a details pane.
5. In the All Policies pane, right-click on the Master Server, and click **New**.

The Add a New Policy dialog is displayed.



a. In the **Policy name** box, type a unique name for the new policy.

b. Choose whether to use the wizard for configuring the policy. The wizard guides you through most of the setup process and simplifies it by automatically choosing default values that are good for most configurations. If necessary, you can change the defaults later by editing the policy. You will need to manually add entries to the Backup Selections list after completing the wizard.

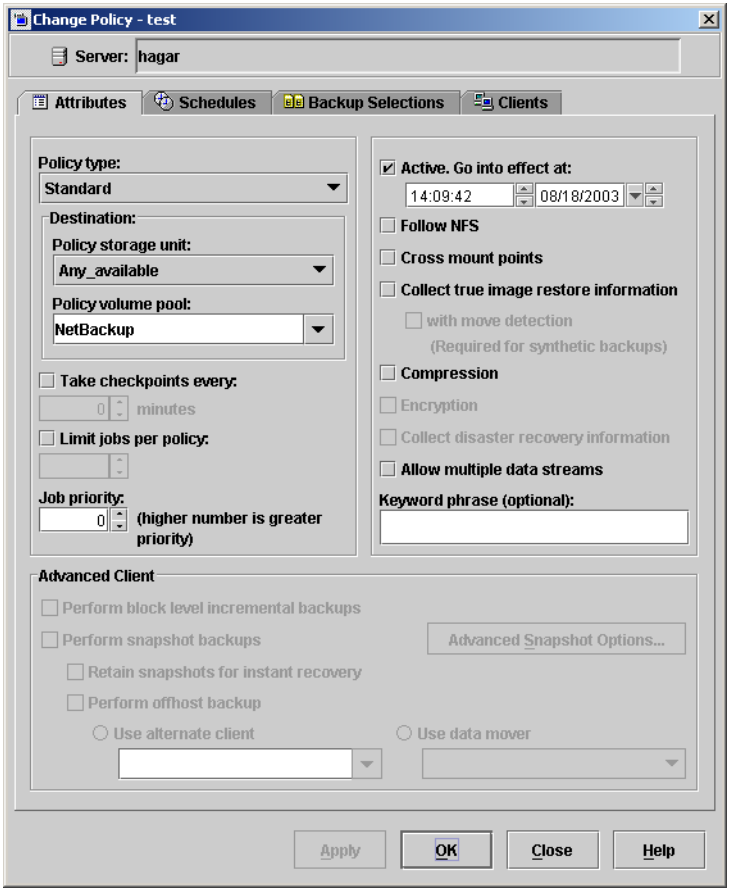
- To use the wizard, select the **Use add policy wizard** box and click **OK**. The wizard starts and you create the policy by following the prompts. When prompted, select the SAP policy type.

Note The SAP policy type will not appear in the drop-down list unless your server has a license key for NetBackup for SAP on UNIX.

- If you require more control over the settings than the wizard provides, do not select the **Use add policy wizard** box and proceed to step 6.

6. Click **OK**.

A dialog is displayed in which you can specify the general attributes for the policy.



7. From the **Policy type** box, select the SAP policy type.

8. Complete the entries on the **Attributes** tab as explained in "Description of Attributes" and click **Apply** to save the attribute entries.

9. Add other policy information:

   - To add schedules, see "Adding New Schedules."
   - To add clients, see "Adding Clients to a Policy."
   - To add scripts, see "Specifying the List of Backup Selections."

10. Click **Apply**. The new policy is created.

Description of Attributes

With a few exceptions, NetBackup manages a database backup like a file system backup. Policy attributes that are different for SAP backups are explained below.

Your other policy attributes will vary according to your specific backup strategy and system configuration. Consult the *NetBackup System Administrator's Guide for Windows, Volume I* or *NetBackup System Administrator's Guide for UNIX, Volume I* for detailed explanations of the policy attributes.

Description of Policy Attributes

Attribute	Description
Policy type	Determines the type of clients that can be in the policy and in some cases the types of backups that can be performed on those clients. To use NetBackup for SAP on UNIX, you must have defined at least one SAP policy.
Keyword phrase to associate with the backup	For NetBackup for SAP on UNIX, the keyword phrase entry is ignored.

Adding New Schedules

Each policy has its own set of schedules. These schedules control initiation of automatic backups and also specify when user operations can be initiated.

A server-directed, scheduled SAP backup requires at least two specific schedule types: an Application Backup schedule and an Automatic Backup schedule. You can also create additional schedules.

The following procedures explain how to configure the required schedule types, and how to add other new schedules. The procedures start from the Policy dialog. To see the Policy dialog, double click the policy in the policy list in the left pane of the NetBackup Administration Console.

▼ To configure an Application Backup schedule

1. In the Policy dialog, click the **Schedules** tab.

2. In the Schedule list, double-click on the schedule named **Default-Application-Backup**.

   A dialog is displayed. The title bar shows the name of the policy to which you are adding the schedule.

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

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

3. Specify the other properties for the schedule as explained in "Schedule Properties."

   The backup window for an Application Backup schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the Application Backup 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 Application Backup schedule must have a start time of 0800 and a duration of 14 hours.

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

Example Settings for an Application Backup schedule

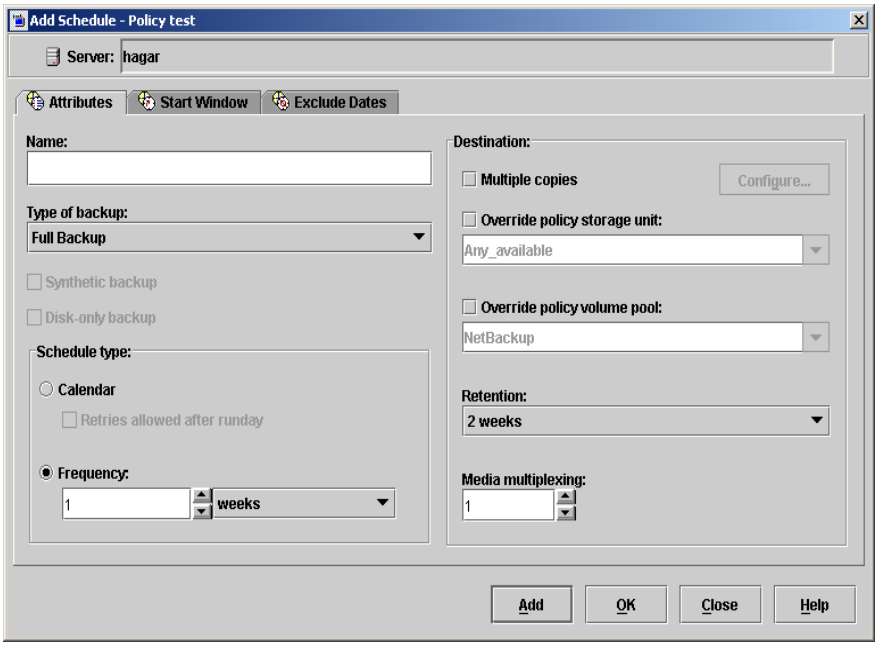
Type of Backup	Schedule settings	Description	Settings
Application Backup	Retention	The length of time backup images are stored.	2 weeks
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday through Saturday 00:00:01 - 23:59:59

Note The Application Backup schedule name can be specified in the `initSID.utl` file on the client.

▼ To configure an automatic backup schedule

1. In the Policy dialog, click the **Schedules** tab.
2. Click **New**.

   A dialog is displayed. The title bar shows the name of the policy to which you are adding the schedules.



3. Specify a unique name for the schedule.
4. Select the **Type of Backup**.

   For information on the types of backups available for this policy, see "Types of Backups."

Refer to the following tables for example settings for an Automatic Backup schedule.

Example Settings for a Automatic Backup Schedule

Type of Backup	Schedule settings	Description	Settings
Automatic Backup	Retention	The length of time to store the record of a backup.	2 weeks
	Frequency	Frequency determines how often a backup should be performed	every week
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday, 18:00:00 - 22:00:00

5. Specify the other properties for the schedule as explained in "Schedule Properties."

6. If this is the last schedule, click **OK**.

Types of Backups

Description of Backup Types for SAP

Application Backup	The Application Backup schedule enables user-controlled NetBackup operations performed on the client. At least one Application Backup schedule type must be configured for each SAP policy. The Default-Application-Backup schedule is automatically configured as an Application Backup schedule.
Automatic 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 policy, the SAP scripts are executed on each client.

Schedule Properties

Some of the schedule properties have a different meaning for database backups than for a regular file system backup. These properties are explained in the following table.

Other schedule properties vary according to your specific backup strategy and system configuration. Consult the *NetBackup System Administrator's Guide for Windows, Volume I* or *NetBackup System Administrator's Guide for UNIX, Volume I* for detailed explanations of the schedule properties.

Description of Schedule Properties

Property	Description
Type of backup	Specifies the type of backup that this schedule will control. The selection list shows only the backup types that apply to the policy you are configuring. For more information see the following section "Types of Backups."
Frequency	This setting is used only for scheduled backups, and not for user-directed backups. **Frequency** specifies the period of time that will elapse until the next backup operation can begin on this schedule. For example, if the frequency is seven days and a successful backup occurs on Wednesday, the next full backup will not occur until the following Wednesday. Normally, incremental backups will have a shorter frequency than full backups.
Calendar	This setting is used only for scheduled backups, and not for user-directed backups. The **Calendar** option allows you to schedule backup operations based on specific dates, recurring week days, or recurring days of the month.
Retention	**Frequency based scheduling** The retention period for an Application Backup schedule refers to the length of time that NetBackup keeps backup images. The retention period for an Automatic Backup schedule controls how long NetBackup keeps records of when scheduled backups have occurred. 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. **Calendar based scheduling** The retention period for an Application Backup schedule refers to the length of time that NetBackup keeps backup images. The retention period for an Automatic Backup schedule controls how long NetBackup keeps records of when scheduled backups have occurred. However, this setting is not significant for calendar based scheduling.

Description of Schedule Properties (continued)

Property	Description
Multiple copies	If you are licensed for the Inline Tape Copy feature and wish to specify multiple copies for your SAP policy, configure **Multiple copies** on the Application Backup schedule.

Adding Clients to a Policy

The client list is the list of clients on which your NetBackup for SAP on UNIX backups will be performed. A NetBackup client must be in at least one policy but can be in more than one.

This procedure starts from the Policy dialog. To see the Policy dialog, double-click the policy in the policy list in the left pane of the NetBackup Administration Console.

Requirements for clients

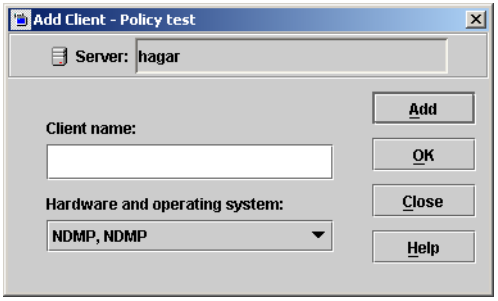
The following software must be installed on the client:

- SAP
- NetBackup client or server
- NetBackup for SAP on UNIX
- the backup or restore script(s)

▼ To add clients to a policy

1. In the Policy dialog, click the **Clients** tab.
2. On the **Clients** tab, click **New**.

The Add Client dialog is displayed. The title bar shows the name of the policy where you are adding clients.



3. In the **Client name** text box, type the name of the client that you are adding.
4. Choose the **Hardware and operating system** type and click **Add**.
5. If this is the last client, click **OK**. If you are going to add more clients, repeat step 3 and step 4.

Specifying the List of Backup Selections

The Backup Selections list in a database policy has a different meaning than for non-database policies. For example, in a Standard policy, the list contains files and directories to be backed up. In a database policy, the list contains script.

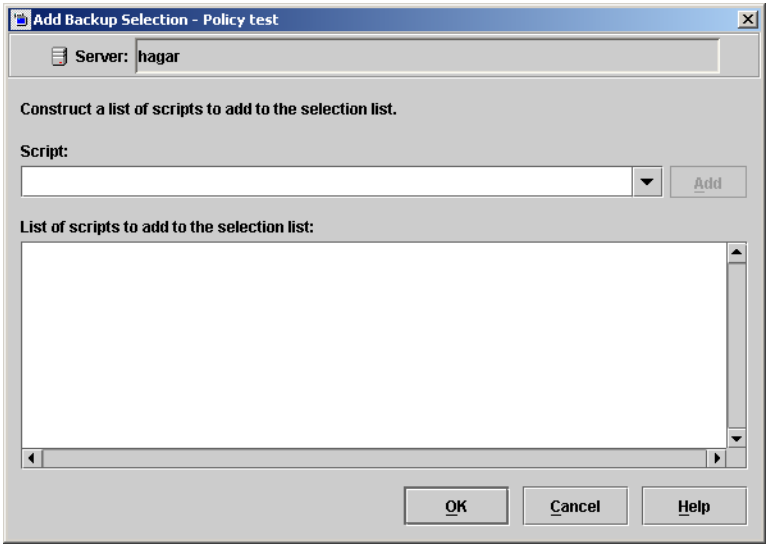
Add scripts only if you are setting up a policy for automatic scheduling. All scripts listed in the Backup Selections list will be executed for the Automatic Backup schedules as specified under the **Schedules** tab. NetBackup will start backups by running the scripts in the order that they appear in the Backup Selections list.

The following procedure starts from the Policy dialog. To see the Policy dialog, double-click the policy in the **Policies** list in the NetBackup Administration Console.

▼ To add scripts to the Backup Selections List

1. In the Policy dialog, click the **Backup Selections** tab.
2. Click **New**.

A dialog is displayed. The title bar shows the name of the policy to which you are adding the scripts.



3. Type the name of the SAP script.

   Be sure to specify the full pathname when listing SAP scripts. For example:

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

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

   Refer to "Creating Scripts" on page 49 for details on creating scripts.

4. Click **Add**.

5. To add more scripts, repeat step 3 and step 4.

6. When you are finished adding backup selections, click **OK**.

Creating 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

#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_POLICY = $SAP_POLICY"

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_POLICY exists then export it to make it available to backint
#
if [ -n "$SAP_POLICY" ]
then
        CMD_LINE="$CMD_LINE export SAP_POLICY=$SAP_POLICY;"
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 "Testing NetBackup for SAP on UNIX Configuration Settings" on page 59.

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_POLICY* 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_POLICY	Name of the NetBackup SAP policy.
$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_POLICY* 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_POLICY*, 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_POLICY = $SAP_POLICY"
RETURN_STATUS=0
CMD_LINE=""
if [ -n "$SAP_SERVER" ]
then
        CMD_LINE="$CMD_LINE export SAP_SERVER=$SAP_SERVER;"
fi
if [ -n "$SAP_POLICY" ]
then
        CMD_LINE="$CMD_LINE export SAP_POLICY=$SAP_POLICY;"
fi
CMD_LINE="$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_POLICY = $SAP_POLICY"
RETURN_STATUS=0
EX_CMD_LINE=""
if [ -n "$SAP_SERVER" ]
then
        EX_CMD_LINE="$CMD_LINE export SAP_SERVER=$SAP_SERVER;"
fi
if [ -n "$SAP_POLICY" ]
then
        EX_CMD_LINE="$CMD_LINE export SAP_POLICY=$SAP_POLICY;"
fi
CMD_LINE="$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_POLICY = $SAP_POLICY"
RETURN_STATUS=0
CMD_LINE=""
if [ -n "$SAP_SERVER" ]
then
        CMD_LINE="$CMD_LINE export SAP_SERVER=$SAP_SERVER;"
fi
if [ -n "$SAP_POLICY" ]
then
        CMD_LINE="$CMD_LINE export SAP_POLICY=$SAP_POLICY;"
fi
CMD_LINE="$CMD_LINE brarchive -c -d util_file -sd"
echo "Execute $CMD_LINE"
su - orasap -c "$CMD_LINE"
RETURN_STATUS=$?
exit $RETURN_STATUS
```

Configuring the initSID.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 "Configuring the initSID.sap File" on page 57). 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 *policy*, *schedule*, *client*, *server*, and *drives* to valid values. The following steps set the *policy* parameter.

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

   b. Find the following line.

   ```
   policy std
   ```

   c. Copy and paste this line under the original

   ```
   policy std
   policy std
   ```

   d. Comment out the original line.

   ```
   #policy std
   policy std
   ```

   e. Change `std` to `SAP_Backup`.

   ```
   #policy std
   policy SAP_Backup
   ```

   Repeat Step 2 for each parameter you would like to change. For example, the following are parameters that will need to be adjusted for your configuration:

   ```
   policy SAP_backup
   ```

```
schedule Default-Application-Backup
client puffin
server puffin
drives
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.

Configuring the initSID.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/dbs/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.

Testing NetBackup for SAP on UNIX Configuration Settings

After configuring the master server for NetBackup for SAP on UNIX, test the configuration settings. For a description of status codes, refer to the *NetBackup Troubleshooting Guide for UNIX and Windows*.

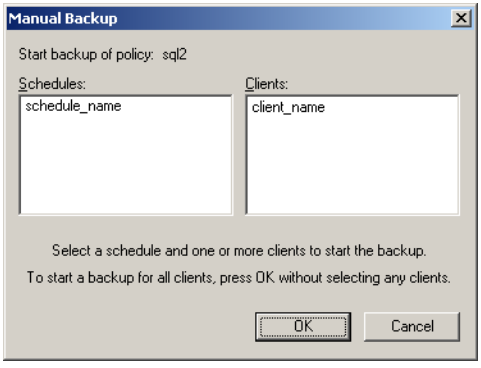
NetBackup Administration Console for Windows

Use this procedure to test a policy configuration from a Windows server or from the Remote Administration Console.

▼ To test the configuration settings on a Windows server

1. Log onto the server as administrator.
2. Start the NetBackup Administration Console.
3. In the left pane, click **Policies**. The policy list appears in the right pane.
4. Click on the policy you wish to test.
5. Choose **Actions** > **Manual Backup**.

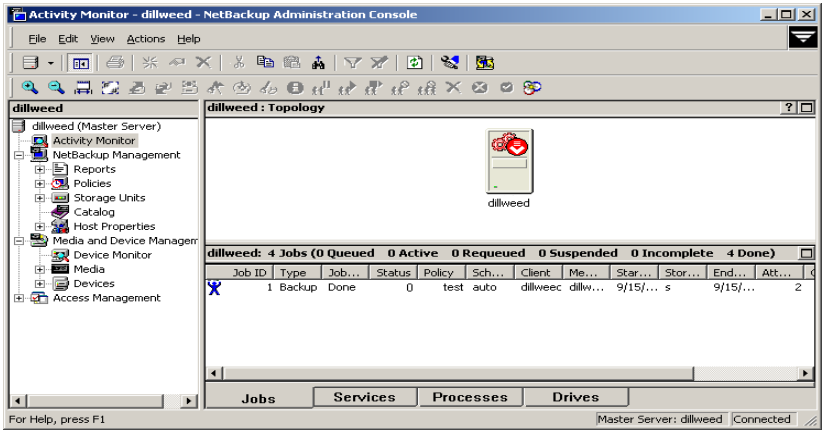
   The Manual Backup dialog is displayed.



   The Schedules pane contains the name of a schedule (or schedules) configured for the policy you are going to test. The Clients pane contains the name of the client(s) listed in the policy you are going to test.

6. Follow the instructions on the dialog.

7. Click **Activity Monitor** on the NetBackup Administration Console.



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

NetBackup Administration Console for UNIX

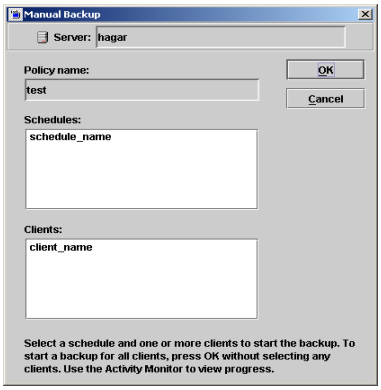
Use this procedure to test a policy configuration on the NetBackup Administration Console for UNIX.

▼ To test the configuration settings on a UNIX server

1. Log onto the server as root.
2. Start the NetBackup Administration Console.
3. In the left pane, click **Policies**.

   The right pane splits into an All Policies pane and a details pane.
4. In the All Policies pane, click the policy you wish to test.
5. Choose **Actions** > **Manual Backup**.

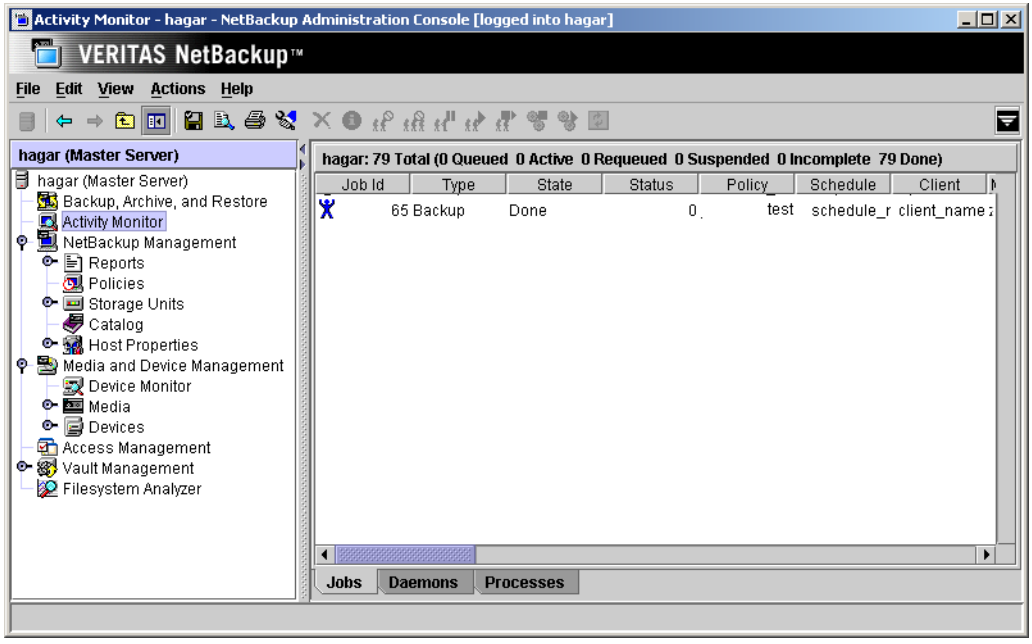
The Manual Backup dialog is displayed.



The Schedules pane contains the name of a schedule (or schedules) configured for the policy you are going to test. The Clients pane contains the name of the client(s) listed in the policy you are going to test.

6. Follow the instructions on the dialog.

7. Click **Activity Monitor** on the NetBackup Administration Console.



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

Testing 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 92 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 “Creating Scripts” on page 49). 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 Policy
- Using xbp
- Using SAP to Perform a Backup

Backup of an SAP Policy

Automatic Backup

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.

The instructions in the previous chapter, Configuration, explain how to create and configure a policy that will use the SAP scripts you create to automatically back up your database according to the schedules you specify. To add a new schedule or change an existing schedule for automatic backups, follow the guidelines in "Adding New Schedules" on page 28.

Manual Backup

The administrator can use the NetBackup server software to manually execute an automatic backup schedule for the SAP policy. Refer to "Testing NetBackup for SAP on UNIX Configuration Settings" on page 59 for instructions on initiating a manual backup of an Oracle policy.

Using xbp to Perform a Backup

Note xbp is not supported on AIX platforms.

The following describes how to use xbp to back up your database. Refer to the xbp man page and the online help in the interface for detailed instructions on using xbp to back up the database.

▼ To perform a backup using xbp

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

   If you are already logged in under a different user account, use the su - command to change 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. Choose **File** > **Browse File System for Backup Scripts**.

5. Select the backup script from the Files pane.

6. Choose **Backup** > **Backup Database Using Selected Scripts**. The xbp_confirm dialog displays.

7. Click **OK**.

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

8. View the status of the script execution.

   a. Choose **Backup** > **Report Progress Of Backup...**.

      The xbp_progress dialog displays.

   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. For additional information, check the output of the script.

9. View the log file for the NetBackup operation.

a. Change directories to the bphdb log directory.

```
cd install_path/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 Perform a Backup

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 “Configuration Using the NetBackup Administration Console for Windows” on page 22 or “Configuration Using the NetBackup Administration Console for UNIX” on page 35.

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.

Creating Backup Copies of Archive Logs

It is possible to create two backup copies of an archive log. You can store each copy on separate media, and retrieve them fairly easily. The `policy_log`, `sched_log`, and `second_secondary_archive` parameters were created to help facilitate this task.

In addition, there are two alternative methods to accomplish this task. We present all three methods here, along with the advantages and disadvantages of each methods. Depending on how you use NetBackup for SAP, choose the method of creating archive log backup copies that is easiest for you.

Solution 1: Using policy_log, sched_log, and second_secondary_archive Parameters

NetBackup For SAP has an ability to create a second backup copy of an archive log. This feature is regulated through optional parameters, `policy_log` and `schedule_log`, both located in `init<SID>.utl` file.

This feature, however, is not integrated with SAP Tools. SAP Tools are not "aware" of the second backup copy. Should first backup copy become unavailable, the user would have to know NetBackup (NB) backup id (BID) of the second backup copy in order to restore it.

Example

The user performs a backup of the archive log:

```
brarchive -d util_file -s
```

This will automatically find an archive log that is ready to be backed up, for example, `archive log 77`. Assuming that `policy_log` and `schedule_log` parameters were properly set, NetBackup for SAP will create two backup copies. These backup copies can be stored to disk or tape, two different tapes, or any desired backup media combination.

To restore `archive log 77`, issue the following command:

```
brrestore -d util_file -a 77
```

This will automatically determine the NB backup ID (BID) needed to restore the desired archive log. This backup ID is always for the first backup copy.

Unfortunately, brrestore is not aware of second copy. If the first backup copy is lost, brrestore will not be able to automatically find the second backup image that can be used for restore. The user will have to explicitly provide the alternative backup ID to brrestore. For example:

```
brrestore -d util_file -b2 NS0123456789 -m /ora/SAP/saparch/SAParch1_77.dbf
```

Advantages:

- Easy administration through init<SID>.utl file.
- Any combination of backup media can be used.

Disadvantages:

- In practice this presents administrator with an additional task of keeping track of NB backup IDs that can be used for restore in case first backup image is lost.

Solution 2: Using Two brarchive Commands in Sequence

The user can also create a backup copy of the archive log by issuing two brarchive commands in sequence. For the first copy, the user must call brarchive with the -s option. For the second copy, the user calls brarchive with the -sc option.

Example

Assume that there is only one archive log to be backed up, archive log 77. Both commands will automatically determine that it needs to be backed up and perform the backup.

To create the first backup copy, issue the following command:

```
brarchive -d util_file -s
```

To create the second backup copy, issue the following command:

```
brarchive -d util_file -sc
```

Following these backups, the user can restore the archived log files by issuing the brrestore command.

To restore the first backup copy:

```
brrestore -a 77
```

To restore the second backup copy:

```
brrestore -a2 77
```

Advantages:

- Both backup copies can be stored different media, two tapes, disk and tape or any desired combination.
- Restore is easy.

Disadvantages:

- `brarchive` has to be called two times.
- User must ensure that the first and second schedules specify different NetBackup schedules, because that is how NetBackup regulates which storage unit will be used.

Solution 3: Using Inline Tape Copy

Inline Tape Copy is a separately licensed feature of NetBackup. NetBackup for SAP users that also have the inline tape copy feature can use the feature to automatically create backup copies of the archive log file.

Example

To create two backup copies using inline tape copy, issue the following command:

```
brarchive -d util_file -s
```

This will create two backup copies that will be stored on two different tapes.

To restore the first available copy of the archive log file, issue the following command:

```
brrestore -d util_file -a <log_number>
```

Advantages:

- Inline tape copy results in a transparent restore. If first copy became unavailable, second copy will be picked up automatically.
- More than two copies can be created during backup.

Disadvantages:

- The only backup media currently supported is tape.
- Inline tape copy requires an additional license.

Performing a Restore

Using xbp to Perform a Restore

The following describes how to use xbp to restore your database. Refer to the xbp man page and the online help in the interface for detailed instructions on using xbp to restore database backups.

▼ To use xbp to perform a restore

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**

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. Choose **File** > **Browse File System for Restore Scripts**. The xbp dialog is displayed.

5. Select the restore script from the Files pane.

6. Choose **Restore** > **Restore Database Using Selected Scripts**. The xbp_confirm dialog is displayed.

7. Click **OK**.

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

8. View the status of the script execution.

   a. Choose **Restore** > **Report Progress Of Restore...**.

      The xbp_progress dialog is displayed.

   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 Perform a 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.

Redirecting a Restore to a Different Client

You have the option to restore an SAP Database to a client other than the one that originally supplied the backup. This process of restoring data to a different client is called a redirected restore.

In order to perform a redirected restore, the following conditions must be true:

- The source and destination clients must have identical computer system architecture and OS versions and bit-levels.
- The source and destination clients must have identical Oracle RDBMS levels.

Note In some situations it is possible to restore from lower to higher release levels of Oracle. Refer to the Oracle documentation or support for details.

The redirected restore is a 4 part process:

1. Configuring the NetBackup server
2. Copying files from the source client to the destination client
3. Configuring the NetBackup for SAP destination client
4. Performing the redirected restore

The following procedure explains each part of the process in detail. For more information on redirected restore, see the *NetBackup System Administrator's Guide.*

▼ To perform a NetBackup for SAP redirected restore

1. Configure the NetBackup server to allow redirected restores. You must be the NetBackup administrator to perform these tasks.

   To remove restrictions for all clients, create the following file on the Netbackup master sever:

   install_path/netbackup/db/altnames/No.Restrictions

   Or, to restrict clients to restore only from certain other clients, create the following file:

   install_path/netbackup/db/altnames/*client_name*

   (where *client_name* is the name of the client allowed to perform the redirected restore). Add the name of the NetBackup for SAP source client to that file.

2. Copy configuration and control files from the NetBackup for SAP source client to the NetBackup for SAP destination client.

Note Before overwriting the files on the destination client, back up the control files to preserve the original configuration. These files are usually in the `$ORACLE_HOME/database` directory.

The file copy can be accomplished by using ftp – File Transfer Protocol.

a. Copy the following files from the source client (normally in $ORACLE_HOME/`database`) to the same directory on the destination client:

- init<SID>.sap
- init<SID>.utl

b. Copy the following control files from `$ORACLE_HOME/sapbackup` on the source client to the same directory on the destination client.

- back<SID>.log
- SAP backup log file

  (This is an 8 letter file with extension that depends on the type of backup performed, for example, `bdhautdo.aff` for a full offline backup.)

3. Configure the NetBackup for SAP destination client as follows:

a. Change the client paramter in the init<SID>.utl file on the destination client to the name of the source client.

b. Alternately, set the SAP_CLIENT environment variable on the destination client to the name of the source client:

```
SAP_CLIENT=<source client>
export SAP_CLIENT
```

Note The SAP_CLIENT variable has higher priority than the value in the init<SID>.utl file

c. Set the restore_filter paramter in the init<SID>.utl file on the destination client.

If the source client path is set to `/home_db/oracle/sap` and the input file contains the path `/oracle/SAP`, then the value of restore_filter would be a script such as the following:

```
#!\/bin\/sh
# this shell is used to change some logically linked files
# during a restore
sed -e '
s\/oracle\/SAP\/home_db\/oracle\/sap\/' $1 > $2
```

d. Create a symbolic link on the destination client that resembles the actual path of the source client and point it to the directory that points to the SAP files.

Note Do not use the `-m<dest_dir>` option with `brrestore` to achieve the same effect. This will result in the files being restored to the directory you specify, rather than in the original directories.

4. Perform the redirected restore.

a. Log onto the NetBackup for SAP destination client.

b. Perform the

```
brrestore -d util_file -b last -m full
```

Redirected Restore Sample Environment

This sample environment shows how a redirected restore uses the restore_filter script. This example assumes the following:

- Source client
  - Actual path is `/home_db/oracle/sap`
  - Also has soft link: `/oracle/SAP` (SAP is the sytem ID), which points to `/home_db/oracle/sap`.
- Destination client
  - Actual path is `/home2/sap`
  - Also has soft link: `/oracle/SAP`, which points to `/home2/sap`.
  - Make soft link `/home_db/oracle/sap`, which points to `/home2/sap`

In the restore_filter script, we substitute the path provided in the input file list of the destination client into the actual path of the source client. The resulting script sample might look like the following:

```
#!/bin/sh
# this shell is used to change some logically linked files
# during a restore
sed -e '
s\/oracle\/SAP\/home_db\/oracle\/sap\/' $1 > $2
```

When the backup starts, the file list contains the file path with a soft link:

```
/oracle/SAP/sapdata1/btabd_1/btabd.data1
```

But the file is really backed up with the actual path:

```
/home_db/oracle/sap/sapdata1/btab_d/btabd.data
```

When the request for a restore is issued, the input file list contains file paths with soft links. These are converted to the actual path of the destination client. Since this path is different from the source client path, the restore would fail in the inquire phase. To prevent this, use the `restore_filter` script.

Troubleshooting 5

This chapter provides processes and resources to help you troubleshoot NetBackup for SAP on UNIX, including logs and reports that NetBackup, NetBackup for SAP on UNIX, and the SAP Tools provide. These reports are useful for finding errors associated with those applications.

This chapter includes the following sections:

- Setting the Debug Level
- NetBackup Reports
- `sapdba` Logs and Messages
- Preventing Timeout Failures on Large Database Restores

Setting the Debug Level

You can control the amount of information written to the debug log in the *install_path*/netbackup/logs/ by changing the Database debug level. The higher the value, the more information is logged. In everyday normal operations, the default value of 0 is sufficient. However, VERITAS Technical Support may ask you to set the value higher when a problem is being analyzed. 5 is the highest possible setting.

NetBackup Reports

The NetBackup server and client software allow you to set up detailed debug logs for troubleshooting problems that occur outside of either NetBackup for SAP on UNIX or the SAP Tools. In addition to the NetBackup for SAP-specific directories explained in the following section, you should also create directories for general NetBackup client debug logs, such as bpbackup, bprestore, bpbkar, and tar. See the *NetBackup Troubleshooting Guide for UNIX and Windows* for a complete description of debug 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. SAP may (or may not) use the NetBackup for SAP logs for errors in the application. Your best sources for SAP error information are the logs provided by SAP.

Note In general, each debug log corresponds to a NetBackup process and executable.

▼ To enable the NetBackup for SAP on UNIX logs

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
   ```

   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 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.

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 on the Client

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

mmddyy

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

install_path/netbackup/logs/

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 Windows, Volume I* or *NetBackup System Administrator's Guide for UNIX, Volume I* 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_HOME*saparch

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

Preventing Timeout Failures on Large Database Restores

Large database restores sometimes fail when multiple restore sessions compete for resources. In this situation, a restore session can be delayed waiting for media or device access. If the delay is too long, the restore session times out.

This problem can be resolved by increasing the **Client Read Timeout** property, which prevents session timeouts and allows the restores to complete successfully.

Use the NetBackup Administration Console on the server to change the properties of each client that contains a database you may need to restore. The **Client Read Timeout** property is found on the Timeouts host properties dialog of the master and media servers. The default for the **Client Read Timeout** setting is 300 seconds (5 minutes). For database agent clients, increase the value significantly to prevent timeout errors, e.g. 30 minutes.

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” on page 99 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 91 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 93 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 were not successfully restored.

`#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 Variables 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_POLICY This environmental variable sets the name of the NetBackup policy. This policy can be used to define different types of database backups. One policy type can be used to perform offline database backups, and another policy type can be used to perform archive log backups. This environmental variable is the same as the `policy` parameter in the *par_file* (`init`*`SID`*`.utl`) file and the BPBACKUP_POLICY 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

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, policy 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 server. This option is the same as the *$SAP_SERVER* environment variable and the server parameter in the -p *par_file* file.
CLIENT_NAME	This is the option, in the bp.conf file, which names the NetBackup client. This option is the same as the *$SAP_CLIENT* environment variable and the client parameter in the -p *par_file* file.
BPBACKUP_POLICY	This is the option, in the bp.conf file, which names the NetBackup policy. This option is the same as the *$SAP_POLICY* environment variable and the policy parameter in the -p *par_file* file.
BPBACKUP_SCHED	This is the option, in the bp.conf file, which names the NetBackup schedule. This option is the same as the *$SAP_SCHED* environment variable and the schedule parameter in the -p *par_file* file.

See the *NetBackup System Adminstrator's Guide Volume II for UNIX* or the *NetBackup System Administrator's Guide Volume II for Windows* for additional information on bp.conf.

backint -p par_file or initSID.utl 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 policy* 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.

policy

This is an optional parameter, used to set the name of an SAP policy type defined in NetBackup. The SAP policy 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:

```
policy sap_nb
```

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

policy2

This is an optional parameter, used to set the name of an policy to be used for the secondary SAP backup. The secondary backup is performed for each SAP database backup on files that are needed to track SAP backup information. This option would be used to save the backup information on a different media. If `policy2` is not specified and `schedule2` is specified, then the `policy` parameter value is used.

backint_dir

This is an optional parameter that should only be set if you have old backups performed with NetBackup 3.2. It must be set to a public directory. The NetBackup for SAP on UNIX `backint` interface uses this directory for work space. NetBackup for SAP will look for backint.times file, and search it for previously performed backups (using NetBackup for SAP 3.2). Note that NetBackup for SAP 4.5 will not use backint.times file to store information about new backups.

schedule

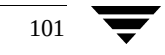
This is an optional parameter, used to set the name of a *Backup Policy* schedule associated with an SAP policy type. The schedule can define aspects of the backup such as how long NetBackup retains images, maximum MPX per drive, storage unit, and volume pool. The following is an example entry:

```
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 policy.

schedule2

This is an optional parameter, used to set the name of an Application Backup 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

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
```

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 policy.

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 “custom_sort_file” on page 112).

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 int*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
d:/ORACLE2/sap/sapdata/btabd_5/btabd.data5

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 simultaneous backup jobs 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

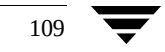
```
/oracle/sap/sapdata1/roll_1/roll.data1
/oracle/sap/sapdata2/stabi_2/stabi.data2
/oracle/sap/sapdata2/user1i_1/user1i.data1
```

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 112).

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
```

policy_log

`policy_log` is optional and is the name of a policy 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 `policy` name option and the second backup will go to the `policy_log` name option.

```
policy_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 policy_log name option, otherwise it must be a valid schedule name under the policy name option.

```
sched_log Default-Policy
```

second_secondary_archive

second_secondary_archive is an optional parameter that can have a value of 0 or 1. If value is one (1), then 2 copies of secondary backup will be made. This parameter will have an effect only if policy_log and/or sched_log are specified. The first backup will go to the policy name option and the second backup will go to the policy_log name option. Furthermore, it will support brarchive but it will have no effect on brbackup.

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
```

Note fail_backup only pertains to a specific kind of online backup. It is effective only when tablespace is set to #BEGIN/#END backup mode and when a related file backup takes place. This means that BACKINT has to be called with "-t file_online" parameter.

Using NetBackup for SAP to Back Up SAPDB

G

NetBackup for SAP (`backint` for Oracle) can be used to back up SAPDB RDBMS. SAP requires that backup applications must be able to back up any files in the file system, regardless of the existence of Oracle on that file system. External backup tools that fulfill this condition can be used to backup and restore SAPDB, and VERITAS NetBackup For SAP fulfills this condition.

SAPDB relies on an additional adapter program to communicate with NetBackup for SAP. The adapter program is part of the SAPDB distribution. This program necessitates some additional configuration for SAPDB backups.

Follow the regular NetBackup for SAP directions in the Configuration chapter to create a policy for SAPDB backups. This section provides the configuration that is additional to the configuration for a regular NetBackup for SAP backup. To use NetBackup for SAP to back up SAPDB, you must perform the following extra configuration steps:

- creating three configuration files on the SAPDB client
- defining a backup medium in SAPDB

Creating Backup Environment Configuration Files

In order to configure the backup environment to use NetBackup for SAP (`backint` for Oracle) to back up SAPDB, you must create three files on the NetBackup for SAP (SAPDB) client:

- `backint` for SAPDB configuration file
- adapter program configuration file
- NetBackup for SAP configuration file

backint for SAPDB Configuration File

The `backint` for SAPDB configuration file provides information about the adapter program to SAPDB. Set the environmental variable BSI_ENV to point to the name and location of this file. The configuration file can contain the following parameters:

Parameter	Description
BACKINT <absolute_path>/<file_name>	Absolute path and name of the `backint` program
INPUT <absolute_path>/<file_name>	Absolute path and name of the standard input file
OUTPUT <absolute_path>/<file_name>	Absolute path and name of the standard output file
ERROROUTPUT <absolute_path>/<file_name>	Absolute path and name of the standard error output file
PARAMETERFILE <absolute_path>/<file_name>	Absolute path and name of the configuration file of the `backint` for SAPDB program
TIMEOUT_SUCCESS <number>	Time in seconds that the Database Manager waits for the end of the started Backint for SAPDB if action is successful
TIMEOUT_FAILURE <number>	Time in seconds that the Database Manager waits for the end of the started `backint` for SAPDB if errors occur
ORIGINAL_RUNDIRECTORY <absolute_path>	Absolute path of the run directory of the source database

For a detailed description of these parameters, see the SAPDB documentation, available on www.sapdb.org.

The following is an example of a file with the minimum configuration specified:

```
BACKINT /export/home/sapdb/depend/bin/backint
INPUT /export/home/sapdb/logs/backint.in
OUTPUT /export/home/sapdb/logs/backint.out
ERROROUTPUT /export/home/sapdb/logs/backint.err
PARAMETERFILE /export/home/sapdb/indep_data/wrk/adapter.config
```

PARAMETERFILE specifies the name and location of the adapter program configuration file described in the following section.

Adapter Program Configuration File

The configuration file for the adapter program tells the adapter program where NetBackup for SAP (`backint` for Oracle) is and provides parameters to use in communication with NetBackup for SAP. Set the name and location of this file as the value for PARAMETERFILE in the `backint` for SAPDB configuration file. The adapter program file can contain the following parameters:

Parameter	Description
STAGING AREA: <absolute_path> / <file_name> <size> [KB | MB | GB]	Absolute path and size of a temporary file
FILES PER BACKINT CALL: <number>	Maximum number of temporary files that are to be processed by `backint` for Oracle concurrently.
BACKINT: <absolute_path> / <file_name>	Absolute path and name of the `backint` for Oracle program
PARAMETERFILE OF BACKINT: <absolute_path> / <file_name>h>	Absolute path and name of the configuration file for the `backint` for Oracle program
HISTORY FILE: <absolute_path> / <file_name>	Absolute path and name of the backup history
INPUTFILE FOR BACKINT: <absolute_path> / <file_name>	Absolute path and name of the standard input file
OUTPUT FILE FOR BACKINT: <absolute_path> / <file_name>	Absolute path and name of the standard output file
ERRORFILE FOR BACKINT: <absolute_path> / <file_name>	Absolute path and name of the standard error output file
MAXIMAL DELAY OF BACKINT CALL: <number>	Maximum waiting time in seconds between creating a temporary file and starting to save it by using `backint` for Oracle

Parameter	Description
OMIT LAST DIRECTORY DELIMITER ON RESTORE:<YES | NO>	Specifies whether the SAPDB adapter program ignores the closing slash (/) of an absolute directory name for `backint` for Oracle.
BI_CALLER_VALUE: <value>	Value of the environment variable BI_CALLER

For a detailed description of these parameters, see the SAPDB documentation, available at www.sapdb.org.

The following is an example of a file with the minimum configuration specified:

```
BACKINT: /usr/openv/netbackup/bin/backint
PARAMETERFILE OF BACKINT:
/export/home/sapdb/indep_data/wrk/initSID.utl
HISTORY FILE: /export/home/sapdb/logs/BackintHistory
INPUTFILE FOR BACKINT: /export/home/sapdb/logs/backintOracle.in
OUTPUTFILE FOR BACKINT: /export/home/sapdb/logs/backintOracle.out
ERRORFILE FOR BACKINT: /export/home/sapdb/logs/backintOracle.err
```

NetBackup for SAP Configuration File

The last file is the NetBackup For SAP configuration file, `initSID.utl`. This file is specified by PARAMETERFILE OF BACKINT in the adapter program configuration file. Use this file to set NetBackup For SAP parameters. For details, see “Configuring the initSID.utl File” on page 55.

Defining a Backup Medium in SAPDB

Prior to running a backup, create at least one backup medium per backup type (complete, incremental) in SAPDB. When using Backint for Oracle, the name of backup medium created must begin with BACK. The type of backup medium must be PIPE.

The following procedure demonstrates connecting to `dbmcli`, and then creating a backup medium (in this case, a sample medium called BACKORA).

- To create a backup medium, run:

```
dbmcli -d MYSAP -u dbm,dbm
```

```
dbmcli on MYSAP>medium_put BACKORA
/export/home/sapdb/backup_medium PIPE DATA 0 8
```

Performing a Backup

When running a backup of SAPDB, you must include the backup medium you created. In the previous section, “Defining a Backup Medium in SAPDB” on page 120, the example creates a backup medium called BACKORA. The following backup example uses that sample backup medium.

The first step of the following procedure starts the utility session. You must start the utility session before running a backup.

▼ **To run a backup:**

```
dbmcli on MYSAP>util_connect
dbmcli on MYSAP>backup_start BACKORA DATA (start backup)
```

You can also start the backup using the DBM GUI. For more information about the DBM GUI and configuring external backup tools, refer to the SAPDB documentation at www.sapdb.org.

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