VERITAS NetBackup™ 3.4 for DB2

System Administrator's Guide

UNIX

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VERITAS

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Contents

Preface

This guide describes how to install, configure and use VERITAS NetBackup DB2 extension on a UNIX platform.

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

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

  or

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

This document is the same as `NetBackup_AdminGuide_DB2_Unix.pdf` distributed with the NetBackup for DB2 on UNIX software.

Audience

This guide is intended for the:

- DB2 database system administrator responsible for configuring and using the databases.
- 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.
- A working understanding of the NetBackup client and server software.
- A familiarity with the information covered in the following NetBackup manuals:
  - *NetBackup User's Guide - UNIX*
  - *NetBackup System Administrator's Guide - UNIX* or *NetBackup System Administrator's Guide - Windows NT/2000*
  - *NetBackup Troubleshooting Guide - UNIX* or *NetBackup Troubleshooting Guide - Windows NT/2000.*
- A thorough understanding of the following DB2 database topics:
  - DB2 Administration
  - DB2 Commands
  - User Exit Program
  - `sqluv` APIs

Organization

This guide is organized as follows:

- The Introduction is for an overview of NetBackup for DB2 on UNIX terminology and a technical overview of the NetBackup for DB2 on UNIX `sqluv` APIs.
- The Installation chapter explains how to install NetBackup for DB2 on UNIX on your system.
- The Configuration chapter explains how to configure your system to use NetBackup for DB2 on UNIX. This information supplements the NetBackup for DB2 on UNIX manuals.
- Using NetBackup for DB2 on UNIX explains how to use this product to backup and restore your databases. This information supplements the NetBackup manuals.
- Troubleshooting provides troubleshooting information.
- The Configuration for an MPP DB2 Environment appendix contains special instructions for DB2 databases in an MPP environment.

Related Documents

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

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

- *NetBackup System Administrator's Guide - UNIX*

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

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

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

- *NetBackup Troubleshooting Guide - UNIX*

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

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

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

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

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

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

- *NetBackup Troubleshooting Guide - Windows NT/2000*

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

For IBM DB2 version 5.2, you may also need the following manuals from IBM:

- *IBM DB2 Universal Database for UNIX Quick Beginning* Version 5.2
- *IBM DB2 Universal Database for UNIX Extended Enterprise Edition Quick Beginning* Version 5.2
- *IBM DB2 Universal Database for NT Quick Beginning* Version 5.2
- *IBM DB2 Universal Database for for NT Extended Enterprise Edition Quick Beginning* Version 5.2
- *Cmd Ref IBM DB2 Universal Database Command Reference*

For IBM DB2 version 6.1, you may also need the following manuals from IBM:

- *IBM DB2 Universal Database for UNIX Quick Beginning* Version 6
- *IBM DB2 Universal Database for UNIX Extended Enterprise Edition Quick Beginning* Version 6
- *IBM DB2 Universal Database for NT Quick Beginning* Version 6
- *IBM DB2 Universal Database for NT Extended Enterprise Edition Quick Beginning* Version 6
- *Administration Guide:Design and Implementation* Version 6
- *Administrative API Reference* Version 6
- *Command Reference* Version 6
- *Troubleshooting Guide* Version 6
- *Quick Beginnings: Enterprise Extended Edition for UNIX* Version 6
- *Quick Beginnings: Enterprise Extended Edition for Windows NT* Version 6
- *Quick Beginnings for UNIX* Version 6
- *Quick Beginnings for Windows NT* Version 6

Conventions

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

Type Style

Table 1. Typographic Conventions

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

Notes and Cautions

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

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

Key Combinations

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

Press Ctrl+t

Command Usage

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

brackets [ ]

The enclosed command line component is optional.

Vertical bar or pipe (|)

Separates optional arguments from which the user can choose. For example, when a command has the following format:

`command` *arg1*|*arg2*

the user can use either the *arg1* or *arg2* variable.

Getting Help

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

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

For product assistance, contact VERITAS Customer Support.

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

International Customers: +1 (650) 335-8555

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

`support@veritas.com`

Introduction 1

NetBackup for DB2 on UNIX integrates the database backup and recovery capabilities of DB2 commands with the backup and recovery management capabilities of the NetBackup.

This chapter introduces NetBackup for DB2 on UNIX and how it relates to both DB2 commands and NetBackup. Read this chapter for a description of:

- Terminology for NetBackup for DB2 on UNIX
- Features of NetBackup for DB2 on UNIX
- Technical Overview of NetBackup for DB2 on UNIX

Terminology for NetBackup for DB2 on UNIX

NetBackup Terms

This section describes NetBackup terms as they apply to NetBackup for DB2 on UNIX.

NetBackup	NetBackup backs up and restores files, directories, raw partitions, and databases on client systems that have DB2 databases.
NetBackup schedule	NetBackup schedules control NetBackup operations such as: when backups can occur, the type of backup (full, incremental) to perform, and how long NetBackup retains the image (retention level).
Administrator directed backups	NetBackup administrators are able to perform remote backups of all files, directories, databases, and raw partitions contained on client systems within a client/server network.
User-directed backups and restores	NetBackup for DB2 on UNIX users are able to perform backups of all files, directories, databases, and raw partitions contained on client systems within a client system.
Graphical interfaces	Graphical user interfaces are available for both users and administrators.
Media Manager	The Media Manager provides complete management and tracking of all devices and media used during backups and restores.

DB2 Database Terms

This section describes DB2 database terms as they apply to NetBackup for DB2 on UNIX.

`BACKUP DATABASE` Command	`BACKUP DATABASE` is a DB2 UDB command which initiates the backup of a database. For details, refer to *IBM DB2 Universal Database Command Reference.*
`RESTORE DATABASE` Command	`RESTORE DATABASE` is a DB2 UDB command which initiates the restore of a DB2 database. For details, refer to *Cmd Ref IBM DB2 Universal Database Command Reference.*
`ROLLFORWARD DATABASE` Command	`ROLLFORWARD DATABASE` is a DB2 UDB command which initiates the rollforward of a database to a point in time or to the end of the database.
DB2 script	A DB2 script contains `BACKUP DATABASE` or `RESTORE DATABASE` commands.

User Exit Program	A program that manages the backup and recovery of the DB2 archive logs. The program is called `db2uext2` and is located in *$INSTHOME*`/sqllib/adm`. Refer to the User Exit for Database Recovery appendix in the Database Administration Guide.
`sqluv` APIs	The `sqluv` APIs are I/O functions provided by NetBackup for DB2 on UNIX in a shared library. The `sqluv` APIs are used by the `BACKUP DATABASE` and `RESTORE DATABASE` commands to send data buffers between a DB2 database and NetBackup. The `sqluv` APIs are described in the Backup and Restore API's for Vendor Products appendix from the DB2 Universal Database API Reference.
UDB	Universal Database.
MPP	Massively Parallel Processing environment.

Features of NetBackup for DB2 on UNIX

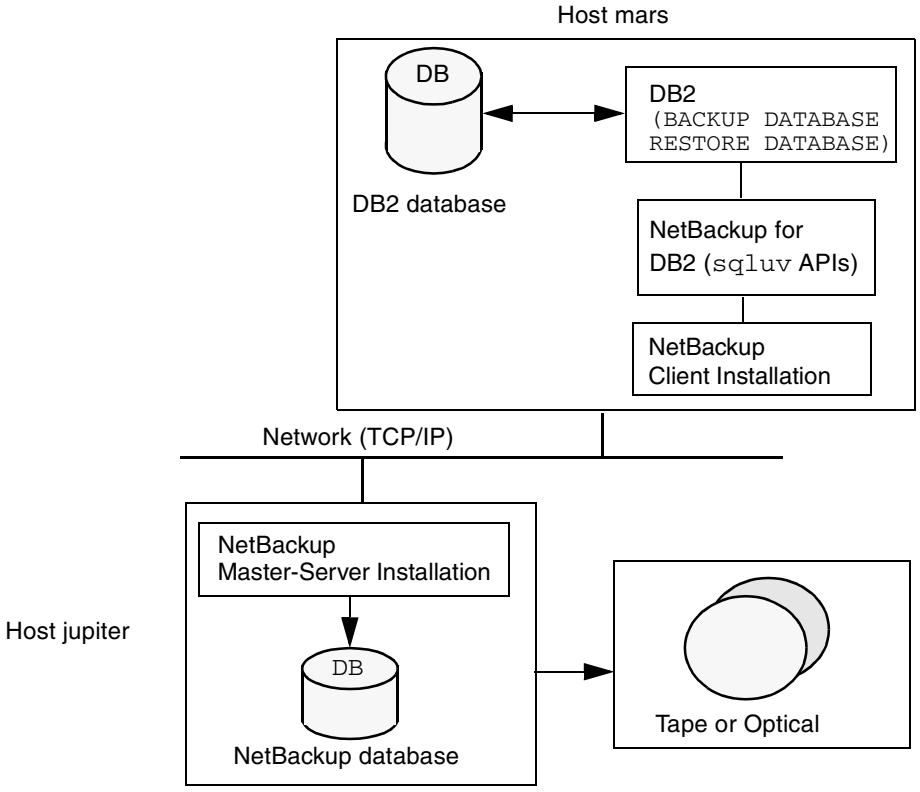
This section describes the NetBackup for DB2 on UNIX main features.

Feature	Description
Media and device management	All devices supported by Media Manager are available to NetBackup for DB2 on UNIX.
Scheduling facilities	NetBackup scheduling facilities on the master server can be used to schedule automatic and unattended DB2 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 DB2 on UNIX lets you take advantage of NetBackup's multiplexing capabilities. Multiplexing directs multiple data streams to one backup device, thereby reducing the time necessary to complete the operation.
Transparent execution of both DB2 and regular file system backup and restore operations	All backups and restores are executed simultaneously and transparently without any action from the NetBackup administrator. A database administrator can execute database backup and restore operations through NetBackup or use DB2 commands as if NetBackup were not present. An administrator or any other authorized user can use NetBackup to execute database backups and restores.
Sharing the same devices and tapes used during other file backups	It is possible to share the same devices and media used for other backups or to give DB2 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 DB2 databases can also reside on hosts that are different from the devices on which NetBackup stores the backups.

Feature	Description
Graphical user interfaces	NetBackup provides the following graphical user interfaces for client users and administrators: ◆ Client user interface on Java, `jbpSA` ◆ Client user motif interface, `xbp` ◆ Administrator user interface on Java, `jnbSA` ◆ Administrator user interface, `xbpadm` ◆ Administrator user interface on Windows NT/2000 A database administrator or NetBackup administrator can start backup or restore operations for DB2 from the NetBackup graphical user interface on the master server.
Parallel backup and restore operations	NetBackup for DB2 on UNIX supports the parallel backup and restore capabilities of the DB2 commands. This permits the user to run more than one tape device at a time for a single DB2 backup or restore, thereby reducing the time necessary to complete the operation.

Technical Overview of NetBackup for DB2 on UNIX

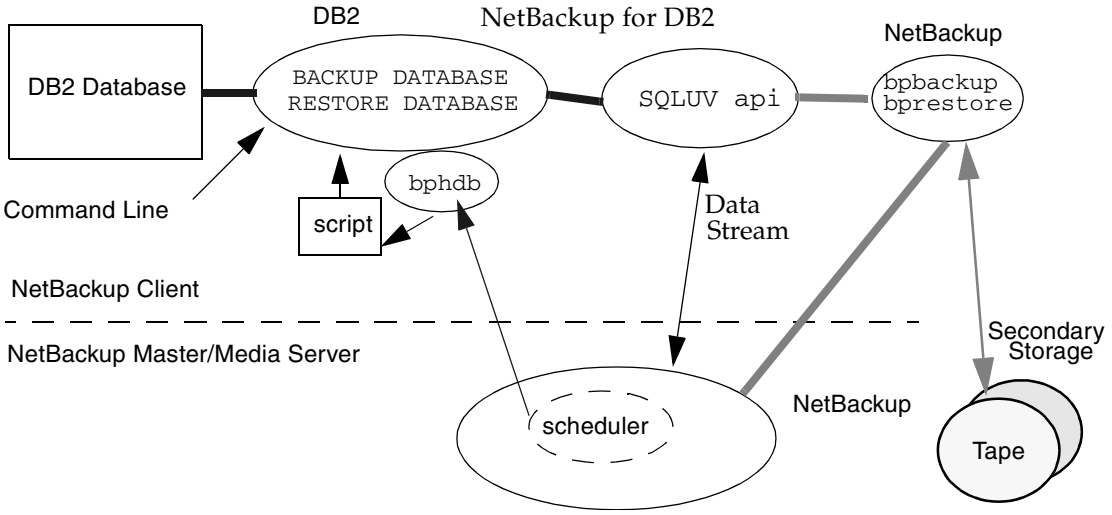
The example network in the following illustration shows the major components in a NetBackup for DB2 on UNIX configuration.



The storage devices are connected to the NetBackup master server or a remote media server. Both the master server and the remote media server must have NetBackup server software installed.

The host with the DB2 database must be a NetBackup client and have NetBackup for DB2 on UNIX software installed.

Sequence of Operation



Refer to this figure as you read the following paragraphs.

The DB2 `BACKUP DATABASE` command or the `RESTORE DATABASE` command controls the data streams going into or out of the database. Data is directed to and from the desired storage device through an `sqluv` API (NetBackup for DB2 on UNIX).

For a backup, NetBackup for DB2 on UNIX calls `bpbackup` which sends data from the client to secondary storage on the master or remote media server. From this point, the operation is similar to a user-directed backup.

A restore works in essentially the same manner except a `bprestore` command is issued. This causes NetBackup for DB2 on UNIX to retrieve the data from secondary storage and send data to the client.

Scheduler or `bpsched`

The NetBackup scheduler (`bpsched`), or DB2 commands are the starting point for a database backup or restore. The NetBackup scheduler calls a `bphdb` process on the client which in turn executes a DB2 script.

Using NetBackup for DB2 on UNIX requires that the administrator create DB2 scripts containing DB2 commands to control database backup or restore. For example, a DB2 script to archive DB2 databases would have a `BACKUP DATABASE` command. A separate DB2 script is needed for each type of operation (see "Create Scripts for DB2 Environment" on page 71 more information on these DB2 scripts).

Note The diagram above only applies when ARCFUNC SAVE. ARCFUNC COPY does a straight copy of the archive log.

BACKUP DATABASE or RESTORE DATABASE

The BACKUP DATABASE and RESTORE DATABASE commands are DB2 UDB command that tell the DB2 database manager to start a backup or restore of a database. DB2 controls the data buffers going into or out of the database and directs the data by calling the appropriate sqluv APIs.

NetBackup for DB2 on UNIX

NetBackup for DB2 on UNIX extends the capabilities of NetBackup to include the backup and restore of DB2 databases and the backup and recovery of archive logs. These operations are managed by a shared library provided in the NetBackup for DB2 on UNIX package.

The shared library contains backup and restore input and output functions used by DB2 to backup and restore databases.

The sqluv API is a part of a shared library that is packaged with NetBackup for DB2 on UNIX. The shared library communicates with NetBackup and DB2 UDB to store or retrieve the data buffer to/from the desired storage devices.

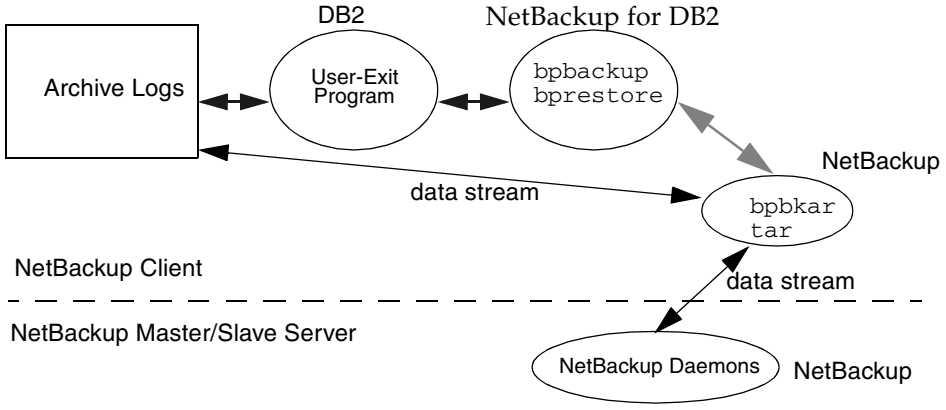
The shared library can be used by a number of IBM interfaces:

- Command Center
- Command Line Process (CLP)
- Control Center

Archive logs are managed by an enhanced version of the IBM user exit-program (db2uext2 provided with NetBackup for DB2 on UNIX. In addition to the standard options for backing up and recovering the archive logs, this program also can take advantage of NetBackup features.

Process Flow for Archive Log Files

NetBackup for DB2 on UNIX supports backup and recovery of archive logs through a user-exit program. Since archive logs are regular system files, they are treated by NetBackup as a regular file backup or restore. The following diagram illustrates the processes involved when backing up or recovering archive log files.



Refer to "Performing a Restore" on page 89 for instructions on restoring archive log files.

DB2

When the DB2 archive log is full and ready to be archived, the DB2 UDB database engine will pass the directory path and name of the log file as parameters to the user-exit program (`db2uext2`). The user-exit program in turn is responsible for archiving or retrieving the archive log file.

NetBackup for DB2 on UNIX

A user-exit program is supplied with NetBackup for DB2 on UNIX. This program calls `bpbackup` or `bprestore` to move or retrieve an archive log file.

NetBackup

Once a `bpbackup` or `bprestore` command is received by NetBackup, NetBackup communicates with secondary storage on the master server or remote media server. The `bpbkar` process manages data movement to or from secondary storage. For a restore, the data movement is done through a `tar` process.

Installation 2

This chapter describes the NetBackup for DB2 on UNIX installation procedure. It includes a section on installation prerequisites.

To determine which DB2 version levels are supported, refer to the Database Extension Matrix in the *NetBackup Release Notes*.

Installation Prerequisites

Before installing NetBackup for DB2 on UNIX, be sure to complete the following procedures:

1. Install NetBackup server software on the server.

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

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

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

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

Note In an MPP DB2 environment, the NetBackup client software must be installed on every node/client used by DB2.

3. Install the DB2 vendor software on the client where you will be backing up the databases.

   See the following for more details:

   - *IBM DB2 Universal Database for UNIX Quick Beginning* Version 5.2
   - *IBM DB2 Universal Database for UNIX Extended Enterprise Edition Quick Beginning* Version 5.2
   - *IBM DB2 Universal Database for UNIX Quick Beginning* Version 6
   - *IBM DB2 Universal Database for UNIX Extended Enterprise Edition Quick Beginning* Version 6

Now you are ready to install NetBackup for DB2 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 DB2 on UNIX.

Install NetBackup for DB2 on UNIX

There are two ways to install database extension software.

- Remote Installation

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

  Refer to the following section.

- Local Installation

  Loads and installs the software only to the local machine.

  Refer to "Local Installation of NetBackup for DB2 on UNIX" on page 19.

Note In an MPP DB2 environment, the NetBackup for DB2 on UNIX software must be installed on every node/client used by DB2.

Remote Installation of NetBackup for DB2 on UNIX

During a remote installation, NetBackup for DB2 on UNIX files are loaded onto the current machine, which must be a master server. The software will then be distributed to the clients and installed.

Before performing a remote install, make sure:

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

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

- NetBackup version 3.4 client software is installed and operational on each DB2 client.

  This also means that the directory *install_path*`/netbackup` already exists on each DB2 client.

Remote Install Procedure

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

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

   ```
   su - root
   ```

2. Make sure a valid license key for NetBackup for DB2 on UNIX has been registered.

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

3. Insert the CD-ROM into the drive.

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

   `cd /CD_mount_point`

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

   `./install`

   The following prompt will appear:

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

   a. Answer **`n`**.

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

   b. Select the NetBackup for DB2 option.

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

      A prompt will appear asking if the list is correct.

   d. Answer **`y`**.

      The `install` script identifies the types of client software loaded during the installation of the NetBackup server. By default, any matching NetBackup for DB2 on UNIX software will automatically be loaded. If there are more platforms available, the script displays a menu giving you the opportunity to add more client types to the default list. Once the list is complete, database extension version files, compressed tar files and the `install_dbext` script are copied to directory *install_path*`/netbackup/dbext`.

6. Distribute and install the NetBackup for DB2 on UNIX software on each client.

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

a. Execute the command to distribute the NetBackup for DB2 on UNIX software to the clients. This command varies, depending upon the type of install you will perform.

There are two types of installs.

- *initial install*
  Use an initial install if the clients you intend to update have not been configured into classes of type DB2.
- *upgrade install*
  Use an upgrade install if all the clients you intend to update already have been configured into classes of type DB2.

Initial Install Procedure

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

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

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

`bpclclients` generates output in following format:

hardware operating_system client_name

where

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

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

client_name is the name of the client.

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

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

2. Edit *filename*.

This is an optional step. Use it if the contents of *filename* need to be changed. Edit *filename* to contain only those clients you wish to update with NetBackup for DB2 on UNIX software.

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

   For example:

   `cd` *install_path*`/netbackup/bin`
   `./update_dbclients DB2 -ClientList` *filename*

   Only clients listed in *filename* will be updated.

Upgrade Install Procedure

Execute the following command.

`cd` *install_path*`/netbackup/bin`
`./update_dbclients DB2 ALL ALL`

This command will look at all possible clients and only update the ones currently in a DB2 class type.

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

Note With an initial or upgrade install, some clients may be skipped and not updated. Possible reasons are:
- the client is a PC client (which cannot be updated from a UNIX server),
- NetBackup for DB2 on UNIX does not support that client's platform type,
- the NetBackup for DB2 on UNIX software for that client type was not loaded onto the server in step 5,
- (if using the `ALL ALL` method) the client does not belong to a DB2 class type.
All skipped clients are available in a file whose name is displayed by `update_dbclients`.

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

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

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

where:

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

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

Example 1

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

Example 2

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

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

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

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

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

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

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

- If the configuration information for a client is unknown, you will be prompted for it. For example:

  ```
  -----> Client curry.min.ov.com

  Please specify the DB2 instance home path name:
  ```

  Type the location where the DB2 vendor software has been installed on the client shown. It will continue to ask this question until you indicate you are through specifying DB2 instances. You also will have an opportunity to validate your answer.

- If the `update_dbclients` command is able to determine a client's configuration, it will not prompt.

To change a client's DB2 instance configuration information later, you must log onto the client and execute the command *install_path*`/netbackup/bin/install_db2`.

- If more than one client is being updated, the configuration information for the previous client (whether determined by asking explicitly or by `update_dbclients` itself) establishes a default answer for the next client. This makes configuration simpler when the clients have been similarly configured. Therefore, you may see a display similar to the following:

  ```
  -----> Client guava.min.ov.com

  Please specify the DB2 instance home path name:

  The previous response to this question was:
  /db2

  Use the previous response? (y/n) [y]
  ```

  Example: Let's assume that you want to update the following three clients.

  `curry.min.ov.com`

  `guava.min.ov.com`

  `hat.min.ov.com`

  As far as the script is concerned, the configuration information for all three clients is unknown.

  Assume the instance home path on `curry.min.ov.com` is **`/db2inst1`**, so when you are prompted for configuration information for `curry.min.ov.com`, specify **`/db2inst1`** as the DB2 instance home path name.

  The next client is `guava.min.ov.com`.

  - If client `guava.min.ov.com` also has **`/db2inst1`** as its DB2 instance home path name, the answer to the `Use the previous response?` prompt will be **`y`**.
  - If client `guava.min.ov.com` has a different configuration, the answer to the `Use the previous response?` prompt will be **`n`**. The `Please specify the DB2 instance home path name:` prompt will re-display. At this point you specify a different home path name.

  The next client is `hat.min.ov.com`. The DB2 instance home path name you entered for `guava.min.ov.com` becomes the "previous response" displayed for `hat.min.ov.com`.

If the `update_dbclients` command was successful in distributing the software to the client, it will automatically run the `install_dbext` script on the client. Configuration information determined in step c on page 17 is used to complete the installation. If `install_dbext` has successfully completed, there will be a version file in directory *install_path*`/netbackup/ext` that contains the version of NetBackup

for DB2 on UNIX that was installed and an installation timestamp. The `update_dbclients` command displays a note on whether the update was successful for each client. When the `update_dbclients` command has completed, it displays a file name that contains a complete log of what happened for each client. If the update failed for any client, the log file should be examined to determine the problem.

Local Installation of NetBackup for DB2 on UNIX

During a local installation, the NetBackup for DB2 on UNIX files are extracted and installed. You also are prompted for configuration information. The local machine can be a client or a master server that also happens to be a client.

Before performing a local install, make sure:

- The local machine has adequate disk space.

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

- NetBackup version 3.4 client software is installed and operational.

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

Local Install Procedure

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

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

   ```
   su - root
   ```

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

2. Make sure a valid license key for NetBackup for DB2 on UNIX has been registered.

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

3. Insert the CD-ROM into the drive.

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

   ```
   cd /CD_mount_point
   ```


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

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

`./install`

The following prompt will appear:

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

a. Answer **`y`**.

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

b. Select the NetBackup for DB2 option.

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

A prompt will appear asking if the list is correct.

d. Answer **`y`**.

The following actions will occur:

- The version file, compressed tar file and `install_dbext` script will be loaded to directory *install_path*`/netbackup/dbext`.
- The `install` script will automatically execute the `install_dbext` script.
- After the `install_dbext` script unbundles the NetBackup for DB2 compressed tar file, you will be prompted for the following configuration information:

  ```
  Please specify the DB2 instance home path name:
  ```

  Type the location where the DB2 vendor software has been installed. It will continue to ask this question until you indicate you are through specifying DB2 instances.
- If `install_dbext` has successfully completed, there will be a version file in directory *install_path*`/netbackup/ext/` that contains the version of NetBackup for DB2 on UNIX that was installed and an installation timestamp.

Configuration 3

Before attempting to configure NetBackup for DB2 on UNIX, complete the installation procedure as described in “Installation” on page 11.

The following steps outline the configuration procedure.

1. Configure Media Manager
2. Set Maximum Jobs per Client Global Attribute
3. Add Classes to NetBackup
4. Create Scripts for DB2 Environment
5. Create a db2.conf File
6. Test NetBackup for DB2 on UNIX Configuration Settings

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

Configure Media Manager

Use the Media Manager to configure tapes or other storage units for a NetBackup for DB2 on UNIX configuration.

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

The number of volumes required will depend on the devices used, the size of the DB2

Maximum Jobs per Client Global Attribute

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

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

Where:

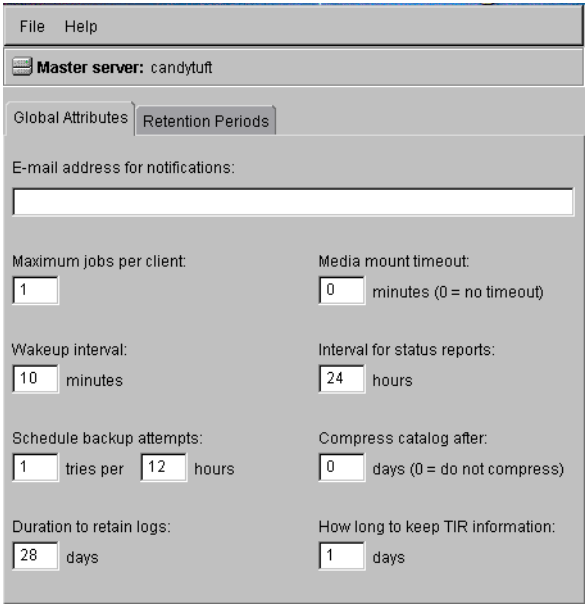
- *Number of Session* is the number of backup sessions between the backup server and NetBackup on the client. Each separate session starts a new backup job on the client.
- *Number of Classes* is the number of classes that may back up this client at the same time. This number can be greater than one. For example, a client may be in two classes in order to back up two different databases. These backup windows may overlap.

NetBackup Administration - Java Interface

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

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

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



The default value is 1 for Maximum jobs per client.

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

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

`xbpadm` Interface

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

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

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

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

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

      When you configure the DB2 class on your NetBackup installation, you will use a unique class name. For this procedure, we are going to use the word ***`practice`*** as the class name.
   c. Under Select one of, select New Class. The Class Type list box will enable.
   d. Select the DB2 class from the list box.
   e. Click OK. The Changing Class dialog box will open.
4. Check the Class Attribute settings.

   Refer to the following table to configure class attributes.

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

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

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

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

Keyword phrase:
: For NetBackup for DB2 on UNIX, the keyword phrase entry is ignored.

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

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

a. Click Schedules to change the display.

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

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

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

e. Configure a *Backup Policy* schedule.

All DB2 backup and restore operations are performed through NetBackup for DB2 on UNIX using a *Backup Policy* schedule. This includes those backups started automatically.

You must configure a *Backup Policy* schedule for each DB2 class you create. If you do not do this, you will not be able to perform a backup. To help satisfy this requirement, a *Backup Policy* schedule named Default-Policy is automatically created when you configure a new class.

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

Name:
: Each schedule requires a unique name.

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

At least one *Backup Policy* schedule must be configured in each DB2 class. The Default-Policy schedule is configured as a *Backup Policy* schedule.

Retention:

The retention period for a *Backup Policy* schedule refers to the length of time that NetBackup keeps backup images. Set the time period to retain at least two full backups of your database. In this way, if one full backup has been lost, you will have another full backup to fall back on. For example, if your database is backed up once every Sunday morning, you should select a retention period of at least 2 weeks.

Media Multiplexing

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

Start:

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

Duration:

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

The backup window for a *Backup Policy* schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the *Backup Policy* schedule starts processes that are required for all NetBackup for DB2 on UNIX backups, including those started automatically.

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

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

Tip Set the time period for the *Backup Policy* schedule for 24 hours per day, seven days per week. This will ensure that your NetBackup for DB2 on UNIX operations are never locked out due to the *Backup Policy* schedule.

f. Configure an *Automatic Backup*.

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

Name:

Each schedule requires a unique name.

Type of backup:

An *Automatic Backup* schedule specifies the dates and times when NetBackup will automatically start backups by running the DB2 scripts in the order that they appear in the file list. If there is more than one client in the DB2 class, the DB2 scripts are executed on each client.

Retention:

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

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

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

Frequency

Refers to the time period to wait between backups.

Start:

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

Duration:

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

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

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

a. Click Files.

The Files list in a database class has a different meaning than for other classes. Normally, in a Standard class, you would list files and directories to be backed up. But since you are now configuring a database class, you will list DB2 scripts.

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

b. Specify the full path name for a DB2 script in the file list. For example:

install_path`\NetBackup\dbext\sap\scripts\sap_online_backup.cmd`

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

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

   a. Click Clients to change the display.

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

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

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

      - the database installed
      - NetBackup for DB2 on UNIX installed
      - the backup or restore DB2 script(s)

Note The Install NetBackup Client Software checkbox will install NetBackup client software on a remote client. There is no option to install NetBackup for DB2 on UNIX software. Refer to the installation instructions in this guide to install NetBackup for DB2 on UNIX.

   e. Click OK.

8. Click OK.

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

NetBackup Administration - Windows NT/2000 Interface

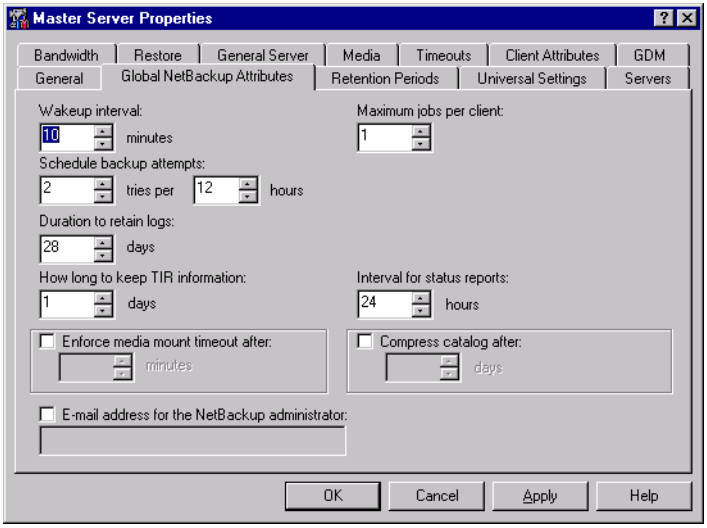
Use this procedure to set the Maximum Jobs per Client global attribute on a Windows NT/2000 server or on the NetBackup Administration Client host.

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

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

   The Master Server Properties dialog box appears.

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



   The default value is 1 for Maximum jobs per client.

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

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

Add Classes to NetBackup

NetBackup for DB2 on UNIX can be configured to run in either of two environments:

- A DB2 environment requires at least one DB2 class with an *Automatic Backup* schedule and a *Backup Policy* schedule defined. The client list for this class specifies the clients where the DB2 script is run. The file list specifies the DB2 script.

  To back up archive logs it will be necessary to add a separate Standard type class.

  To configure classes for a DB2 environment on a Windows NT/server interface see:

  - "Create a DB2 Class on the Windows NT/2000 Interface" on page 54
  - "Create a Standard on NetBackup Windows NT/2000 Interface" on page 65

  To configure classes for a DB2 environment on a Java interface see:

  - "Create a DB2 Class on the Java Interface" on page 31
  - "Create a Standard on the Java Interface for a DB2 Environment" on page 41
- MPP DB2 environment

  An MPP DB2 environment requires two separate DB2 classes: one for a *Backup Policy* schedule type of backup and another for an *Automatic Backup* schedule type of backup. To back up archive logs it will also be necessary to add a separate Standard type class. To configure classes for an MPP DB2 environment, see "Configuration for a DB2 Environment" on page 109."

Note The Media Manager must be configured and a Storage Unit defined before a class can be added.

NetBackup Administration - Java Interface

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

- clients and the NetBackup for DB2 on UNIX script files to be executed on the clients
- storage unit and media to use
- backup schedules

Procedures in this section describe how to configure a class for NetBackup for DB2 on UNIX on a NetBackup server. There are other attributes for a class to consider. Refer to the *NetBackup System Administrator's Guide - UNIX* or the *NetBackup System Administrator's Guide - Windows NT/2000* for details on how to configure all the attributes.

▼ Create a DB2 Class on the Java Interface

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

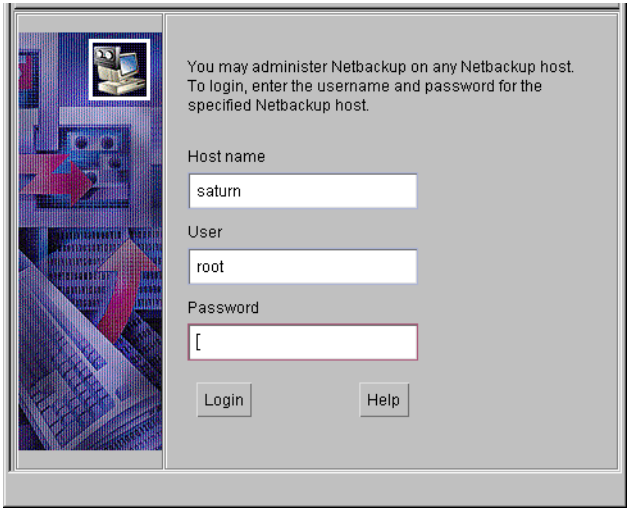
1. Log onto the server as root.
2. Start the NetBackup administrator interface by entering:

   install_path`/netbackup/bin/jnbSA &`

   For additional usage information, enter:

   ```
   jnbSA -h
   ```

   The Login dialog box appears.

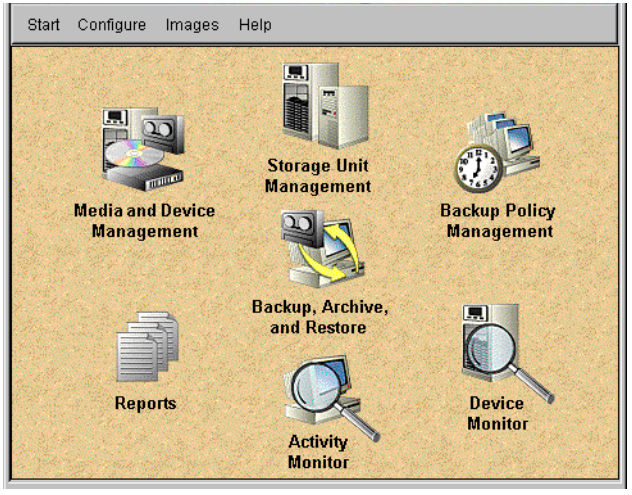


3. Type the password.

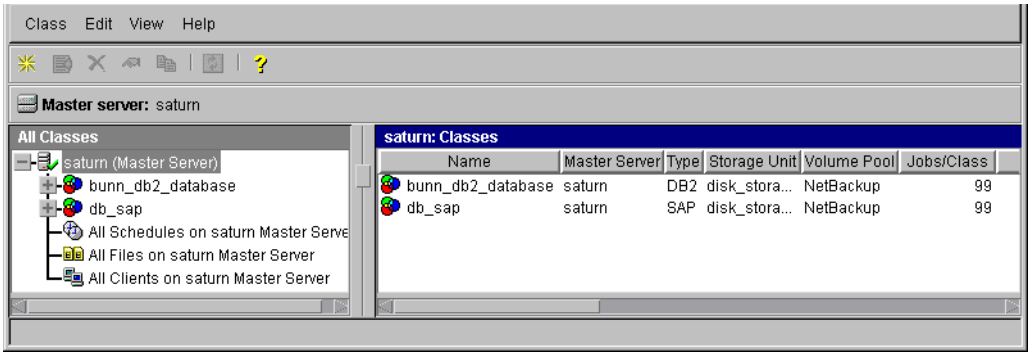
4. Press Login.

   The Login dialog closes and the NetBackup Assistant displays.

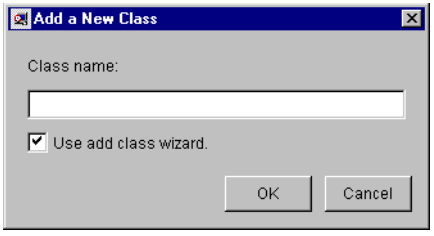
5. Click Close. The launch screen displays.



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



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



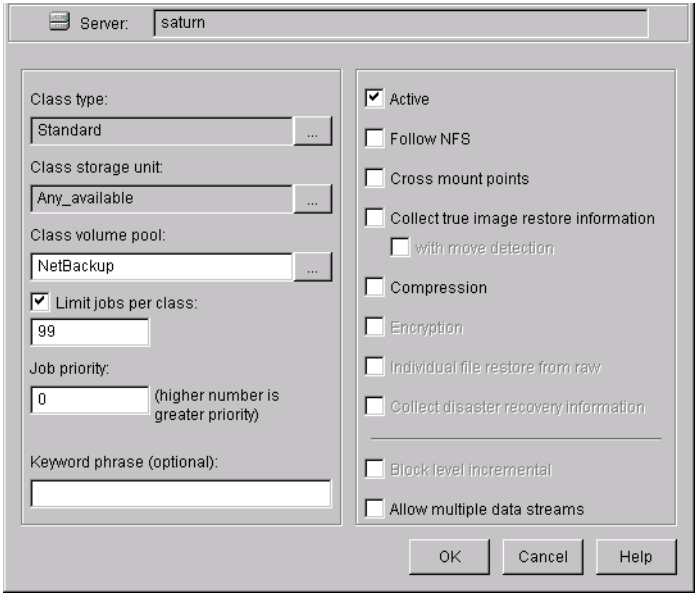
The class wizard automates the class configuration process. To configure classes without using the class wizard, use the following instructions.

8. Clear the Use add class wizard check box.

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

Note This class name must be specified in the *$DB2_Instance_Home*/db2.conf file.

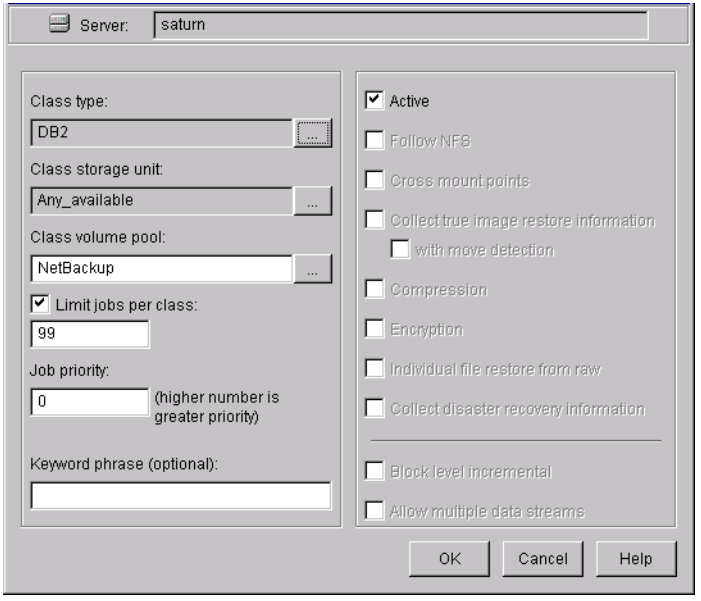
10. Click OK. The Change Attributes dialog box appears.



a. Select the DB2 class type for DB2.

b. Click OK

The Change Attributes dialog box will change as follows.



Refer to the following table to configure class attributes.

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

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

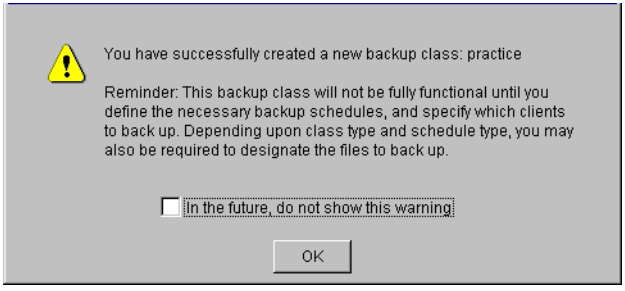
Limit jobs per class:
: Type the maximum number of concurrent jobs for this class. If the Limit jobs per class checkbox is clear, the maximum number of backup and restore jobs that NetBackup will perform concurrently for this class can be up to a limit of 999. To specify a lower limit, select the checkbox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

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

Keyword phrase:
: For NetBackup for DB2 on UNIX, the keyword phrase entry is ignored.

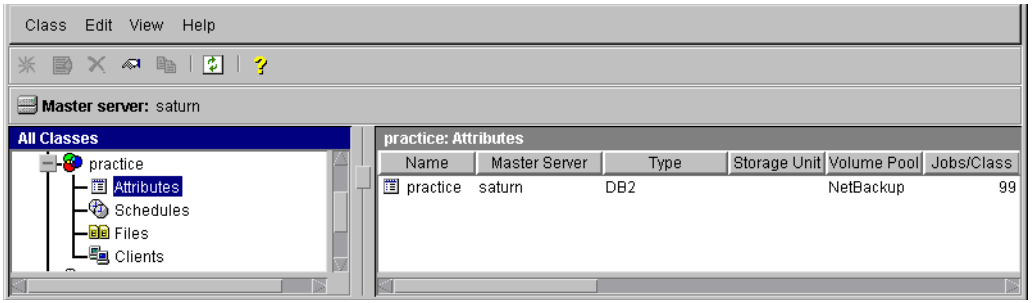
Active
: Select the checkbox to perform scheduled operations defined in this class. The class must be active for NetBackup to execute automatic backup schedules or allow user backups or archives.

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



d. Click OK to close the Warning box.

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



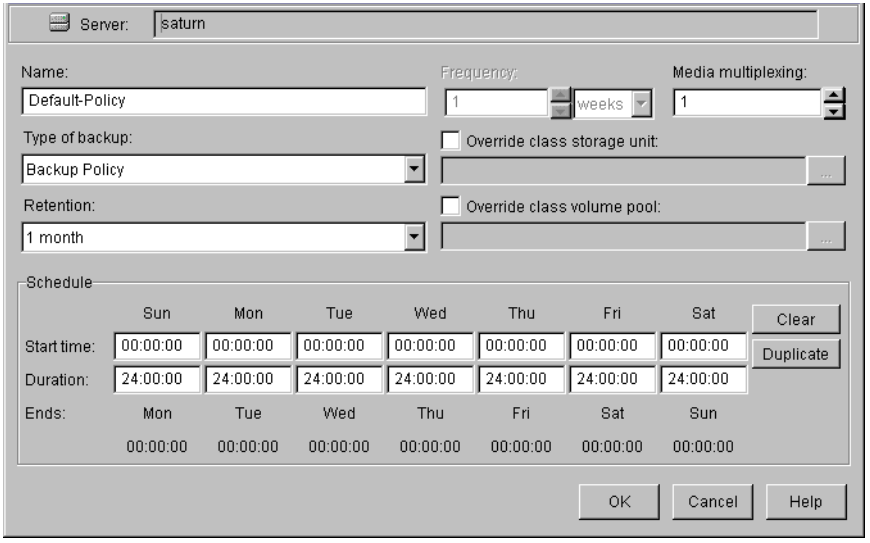
Also notice that the configuration settings you entered in the Change Attributes dialog box are displayed in the *class: Attributes* pane. Use the scroll bar at the bottom of the *class: Attributes* pane to view all settings.

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

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

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

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



c. Configure a *Backup Policy* schedule.

All DB2 backup and restore operations are performed through NetBackup for DB2 on UNIX using a *Backup Policy* schedule. This includes those backups started automatically.

You must configure a *Backup Policy* schedule for each DB2 class you create. If you do not do this, you will not be able to perform a backup. To help satisfy this requirement, a *Backup Policy* schedule named Default-Policy is automatically created when you configure a new class.

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

Name:
: Each schedule requires a unique name.

Note The *Backup Policy* schedule name must be specified in the *$DB2_Instance_Home*`/db2.conf` file on the client.

Type of backup:
: A *Backup Policy* schedule enables user-controlled NetBackup operations performed on the client.
At least one *Backup Policy* schedule must be configured in each DB2 class. The Default-Policy schedule is configured as a *Backup Policy* schedule.

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

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

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

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

  The backup window for a *Backup Policy* schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the *Backup Policy* schedule starts processes that are required for all NetBackup for DB2 on UNIX backups, including those started automatically.

  For example, assume that you:

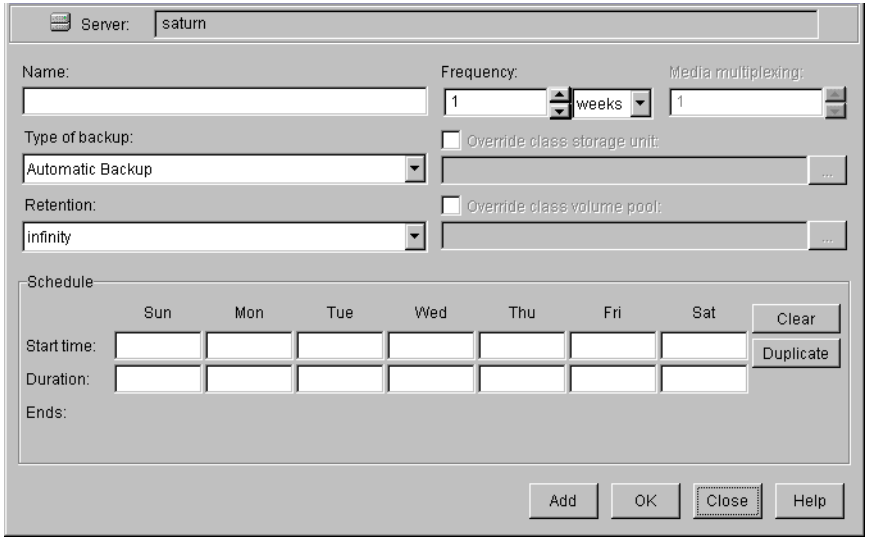
- expect users to perform NetBackup operations during business hours, 0800 to 1300.
- configured automatic backups to start between 1800 and 2200.

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

Tip Set the time period for the *Backup Policy* schedule for 24 hours per day, seven days per week. This will ensure that your NetBackup for DB2 on UNIX operations are never locked out due to the *Backup Policy* schedule.

d. Configure an *Automatic Backup*.

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



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

Name:

Each schedule requires a unique name.

Note Do not specify the schedule name in *$DB2_Instance_Home*/`db2.conf` file.

Type of backup:

An *Automatic Backup* schedule specifies the dates and times when NetBackup will automatically start backups by running the DB2 scripts in the order that they appear in the file list. If there is more than one client in the DB2 class, the DB2 scripts are executed on each client.

Retention:

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

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

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

Frequency

Refers to the time period to wait between backups.

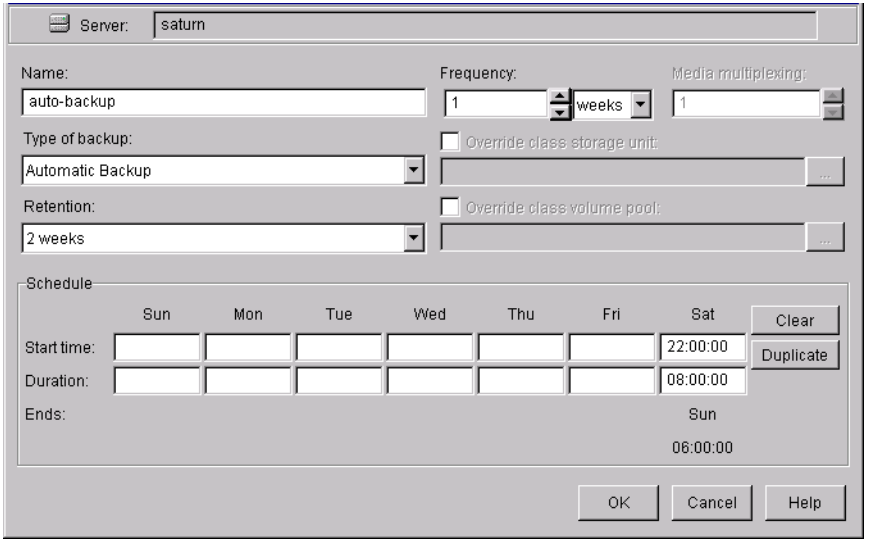
Start:

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

Duration:

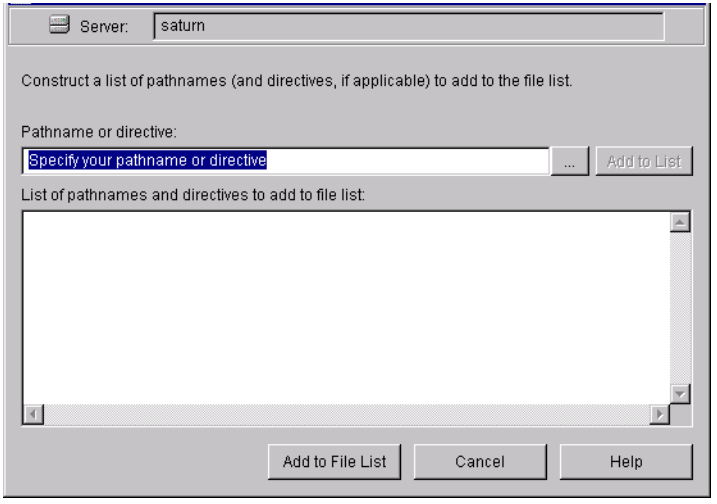
Specifies the period of time (backup window) during which the backup job can take place.

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



12. Refer to the following instructions to configure the list of DB2 scripts.

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



The File list in a database class has a different meaning than for other classes. Normally, in a Standard class, you would list files and directories to be backed up. But since you are now configuring a database class, you will list DB2 scripts.

Refer to “Create Scripts for DB2 Environment” on page 71 for details.

b. Type the DB2 script. Specify the full pathname.

For example:

install_path`/netbackup/ext/db_ext/db2/scripts/db2_offline_backup.sh`

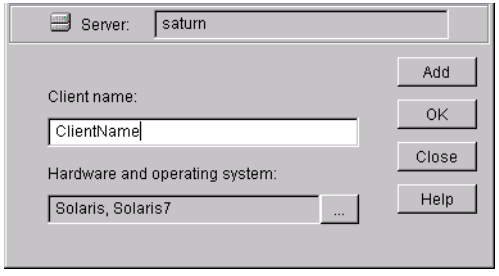
Note Be sure that the scripts listed here are installed on each client in the Client list.

c. Click Add.

Since all DB2 scripts specified in the file list execute during automatic backups, you must make sure that only one type of backup is executed on the same database.

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

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



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

- the database installed
- NetBackup for DB2 on UNIX installed
- the backup or restore DB2 script(s)

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

d. Click OK.

The Add Client Class dialog box will close. The Backup Policy Management (Classes) - NetBackup dialog box will remain open.

▼ Create a Standard on the Java Interface for a DB2 Environment

An Standard type class must be added when:

- `logretain` and `userexit` parameters are enabled in DB2 UDB.
- Client is a UNIX machine.

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

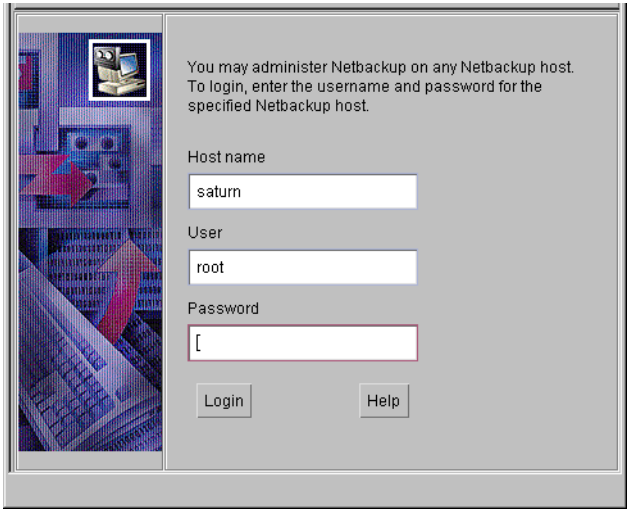
1. Log onto the server as root.
2. Start the NetBackup administrator interface by entering:

   install_path`/netbackup/bin/jnbSA &`

   For additional usage information, enter:

   `jnbSA -h`

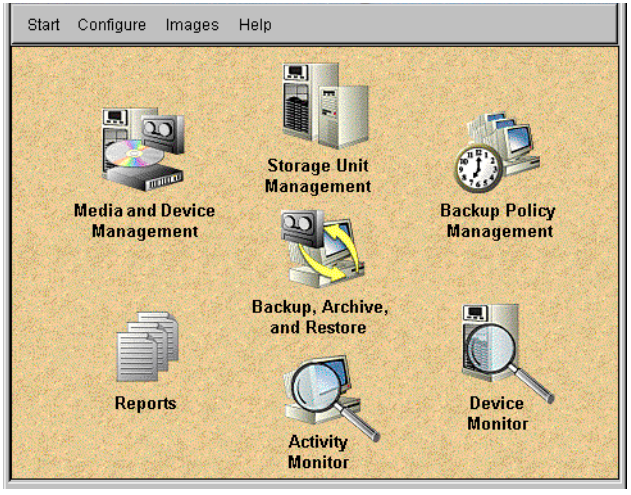
   The Login dialog box appears.



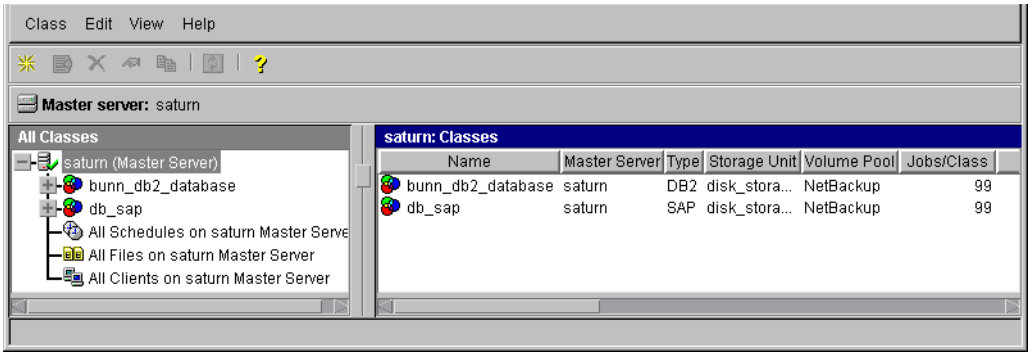
3. Type the password.
4. Press Login.

The Login dialog closes and the NetBackup Assistant displays.

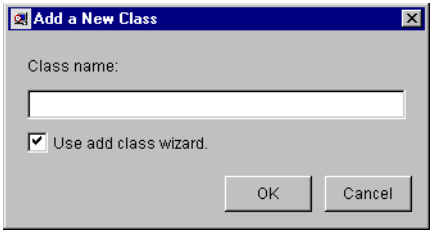
5. Click Close. The launch screen displays.



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



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



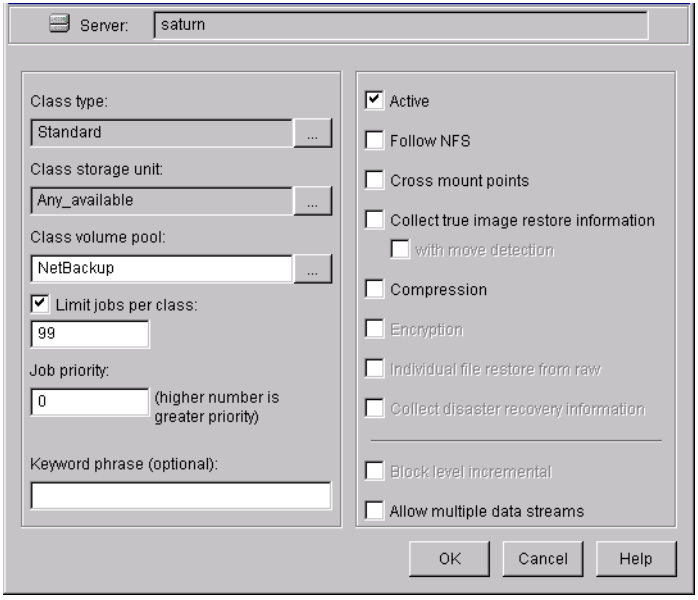
The class wizard automates the class configuration process. To configure classes without using the class wizard, use the following instructions.

8. Clear the Use add class wizard check box.

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

Note This class name must be specified in the *$DB2_Instance_Home*/db2.conf file.

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



a. Be sure to select the Standard class type.

b. Click OK.

Refer to the following table to configure class attributes.

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

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

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

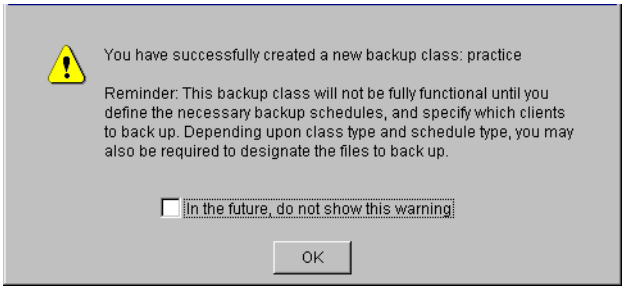
Job priority
: Select a value for the job priority NetBackup will assign to automatic backup jobs for this class. When a drive becomes available, NetBackup assigns it to the first client in the highest priority class.

Keyword phrase:
: For NetBackup for DB2 on UNIX, the keyword phrase entry is ignored.

Active

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

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

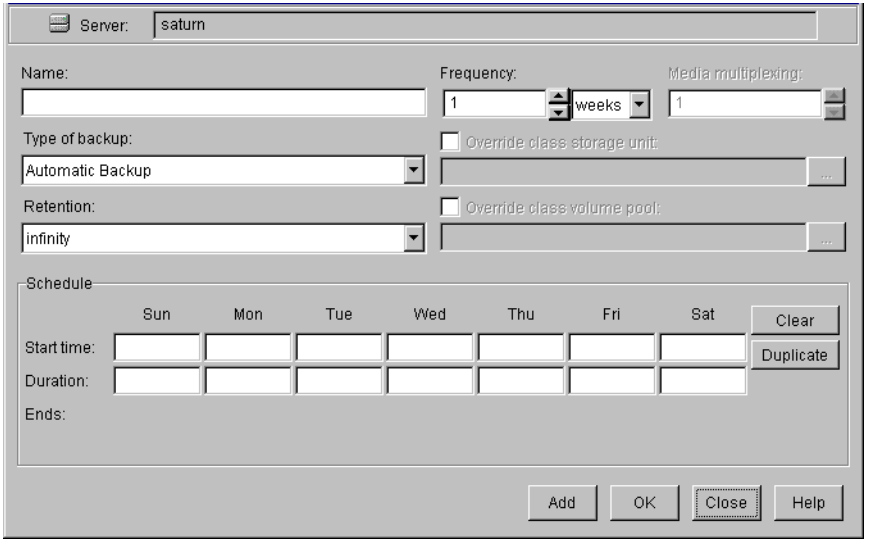


d. Click OK to close the Warning box.

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

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

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



c. Configure a *User Backup* schedule.

Refer to the following table when configuring User Backup schedules.

Name:
: Each schedule requires a unique name.

Note The *User Backup* schedule name must be specified in the *$DB2_Instance_Home*/db2.conf file on the client.

Type of backup:
: This is a user backup that is started by the NetBackup for DB2 on UNIX user-exit program on the client. This schedule specifies the criteria for DB2 archive log file backups.
A *User Backup* schedule enables user controlled NetBackup operations performed on the client.

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

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

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

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

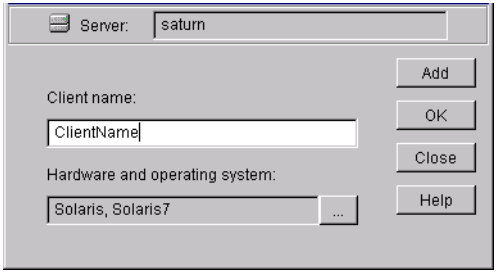
Note This schedule must encompass all of the time periods during which DB2 UDB can call the user-exit program.

Note No DB2 script is needed for a *User Backup* type schedule type.

Since all DB2 scripts specified in the file list execute during automatic backups, you must make sure that only one type of backup is executed on the same database.

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

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



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

- the database installed
- NetBackup for DB2 on UNIX installed

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

d. Click OK.

The Add Client Class dialog box will close. The Backup Policy Management (Classes) - NetBackup dialog box will remain open.

`xbpadm` Interface

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

1. Log onto the server as root.

2. Start the NetBackup `xbpadm` administrator interface.

   - If the `DISPLAY` variable is set, type:

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

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

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

   The NetBackup Administration dialog box will open.

3. Create a new class.

   a. On the Actions menu, select New, then Classes. The Creating a Class dialog box will open.

   b. In the Class Name box, type the new class name.

   When you configure the DB2 class on your NetBackup installation, you will use a unique class name. For this procedure, we are going to use the word ***`practice`*** as the class name.

Note This class name must be specified in the *$DB2_Instance_Home*`/db2.conf` file.

   c. Under Select one of, select New Class. The Class Type list box will enable.

   d. Select the DB2 class from the list box.

   e. Click OK. The Changing Class dialog box will open.

4. Check the Class Attribute settings.

   Refer to the following table to configure class attributes.

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

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

Limit jobs per class:

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

Job priority

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

Keyword phrase:

For NetBackup for DB2 on UNIX, the keyword phrase entry is ignored.

Active

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

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

a. Click Schedules to change the display.

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

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

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

e. Configure a *Backup Policy* schedule.

All DB2 backup and restore operations are performed through NetBackup for DB2 on UNIX using a *Backup Policy* schedule. This includes those backups started automatically.

You must configure a *Backup Policy* schedule for each DB2 class you create. If you do not do this, you will not be able to perform a backup. To help satisfy this requirement, a *Backup Policy* schedule named Default-Policy is automatically created when you configure a new class.

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

Name:

Each schedule requires a unique name.

Note The *Backup Policy* schedule name must be specified in the *$DB2_Instance_Home*`/db2.conf` file on the client.

Type of backup:

A *Backup Policy* schedule enables user-controlled NetBackup operations performed on the client.
At least one *Backup Policy* schedule must be configured in each DB2 class. The Default-Policy schedule is configured as a *Backup Policy* schedule.

Retention:

The retention period for a *Backup Policy* schedule refers to the length of time that NetBackup keeps backup images. Set the time period to retain at least two full backups of your database. In this way, if one full backup has been lost, you will have another full backup to fall back on. For example, if your database is backed up once every Sunday morning, you should select a retention period of at least 2 weeks.

Media Multiplexing

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

Start:

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

Duration:

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

The backup window for a *Backup Policy* schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the *Backup Policy* schedule starts processes that are required for all NetBackup for DB2 on UNIX backups, including those started automatically.

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

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

Tip Set the time period for the *Backup Policy* schedule for 24 hours per day, seven days per week. This will ensure that your NetBackup for DB2 on UNIX operations are never locked out due to the *Backup Policy* schedule.

f. Configure an *Automatic Backup*.

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

Name:

Each schedule requires a unique name.

Note Do not specify the schedule name in *$DB2_Instance_Home*/db2.conf file.

Type of backup:
: An *Automatic Backup* schedule specifies the dates and times when NetBackup will automatically start backups by running the DB2 scripts in the order that they appear in the file list. If there is more than one client in the DB2 class, the DB2 scripts are executed on each client.

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

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

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

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

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

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

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

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

a. Click Files.

The Files list in a database class has a different meaning than for other classes. Normally, in a Standard class, you would list files and directories to be backed up. But since you are now configuring a database class, you will list DB2 scripts.

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

b. Specify the full path name for a DB2 script in the file list. For example:

install_path`/netbackup/ext/db_ext/db2/scripts/db2_offline_backup.sh`

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

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

   a. Click Clients to change the display.

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

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

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

      - the database installed
      - NetBackup for DB2 on UNIX installed
      - the backup or restore DB2 script(s)

Note The Install NetBackup Client Software checkbox will install NetBackup client software on a remote client. There is no option to install NetBackup for DB2 on UNIX software. Refer to the installation instructions in this guide to install NetBackup for DB2 on UNIX.

   e. Click OK.

8. Click OK.

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

Windows Administration NT/2000 Interface

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

- clients and the NetBackup for DB2 on UNIX script files to be executed on the clients
- storage unit and media to use
- backup schedules

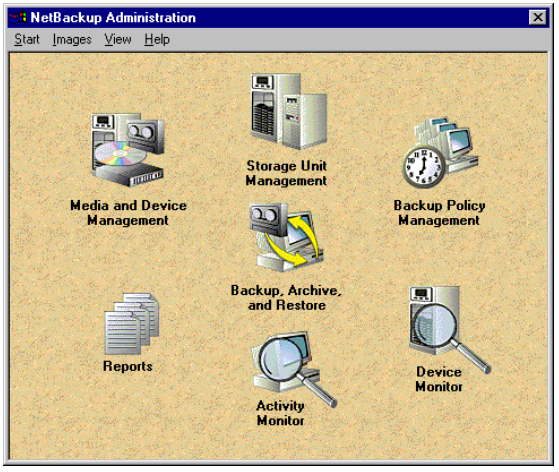
Procedures in this section describe how to configure a class for NetBackup for DB2 on UNIX on a NetBackup server. There are other attributes for a class to consider. Refer to the *NetBackup System Administrator's Guide - UNIX* or the *NetBackup System Administrator's Guide - Windows NT/2000* for details on how to configure all the attributes.

▼ Create a DB2 Class on the Windows NT/2000 Interface

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

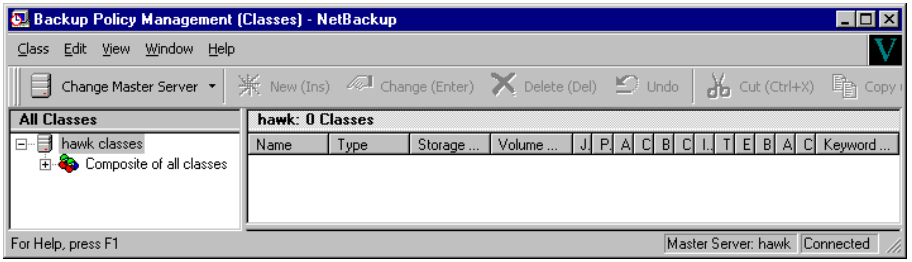
1. Log onto the server as Administrator.

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



3. Click the Backup Policy Management icon.

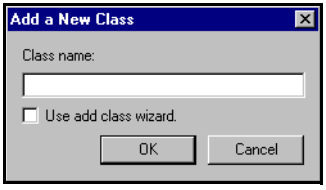
The Backup Policy Management (Classes) - NetBackup dialog appears.



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

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

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

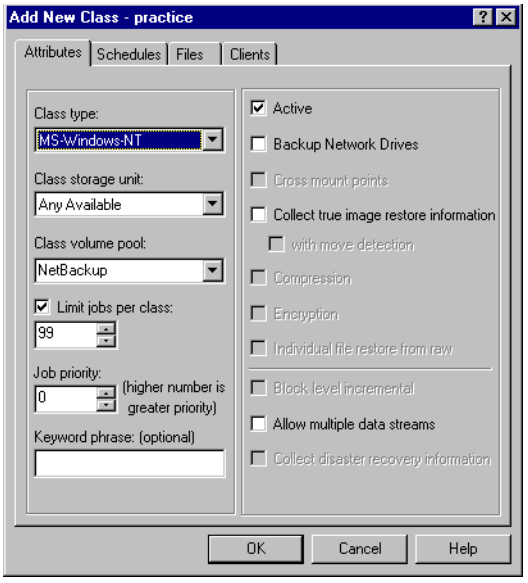


b. Confirm that the Use add class wizard check box is not checked.

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

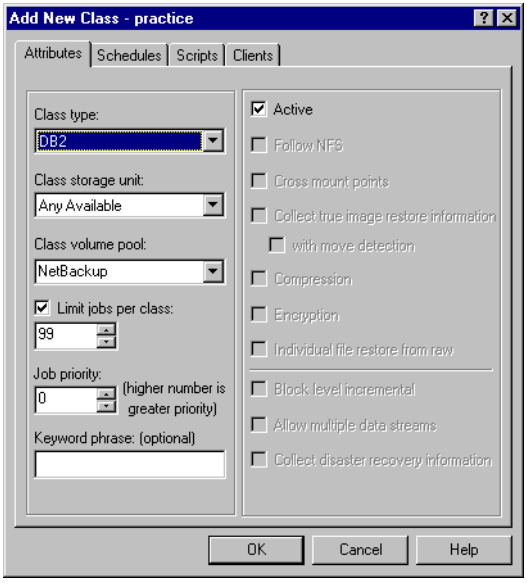
Note This class name must be specified in the *$DB2_Instance_Home*/db2.conf file.

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



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

a. Select the DB2 class type.



Refer to the following table to configure class attributes.

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

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

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

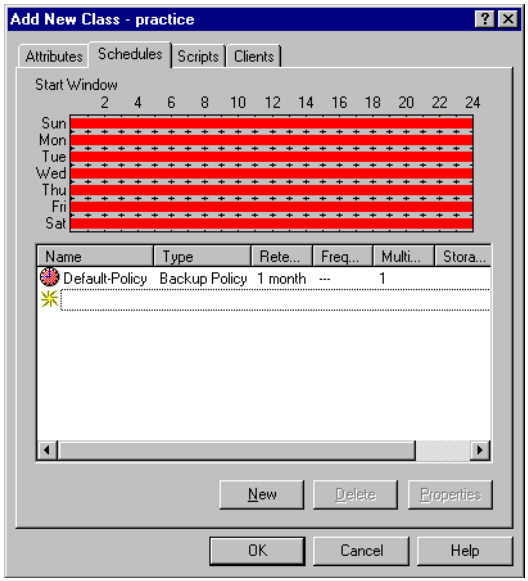
Job priority
: Select a value for the job priority NetBackup will assign to automatic backup jobs for this class. When a drive becomes available, NetBackup assigns it to the first client in the highest priority class.

Keyword phrase:
: For NetBackup for DB2 on UNIX, the keyword phrase entry is ignored.

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

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

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



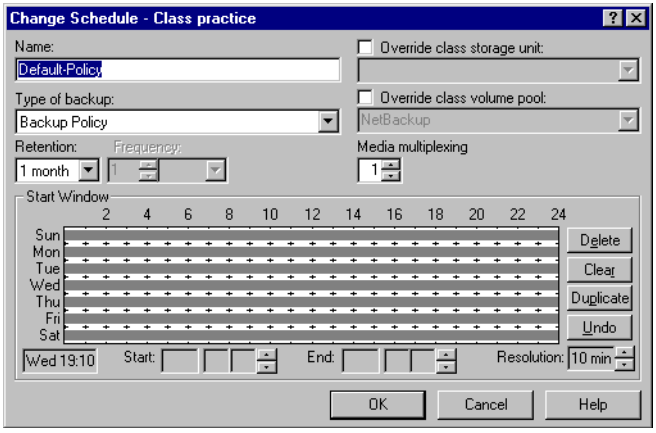
b. Configure a *Backup Policy* schedule.

All DB2 backup and restore operations are performed through NetBackup for DB2 on UNIX using a *Backup Policy* schedule. This includes those backups started automatically.

You must configure a *Backup Policy* schedule for each DB2 class you create. If you do not do this, you will not be able to perform a backup. To help satisfy this requirement, a *Backup Policy* schedule named Default-Policy is automatically created when you configure a new class.

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

The Change Schedules dialog box appears.



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

Name:
: Each schedule requires a unique name.

Note The *Backup Policy* schedule name must be specified in the *$DB2_Instance_Home*/`db2.conf` file on the client.

Type of backup:
: A *Backup Policy* schedule enables user-controlled NetBackup operations performed on the client.
At least one *Backup Policy* schedule must be configured in each DB2 class. The Default-Policy schedule is configured as a *Backup Policy* schedule.

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

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

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

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

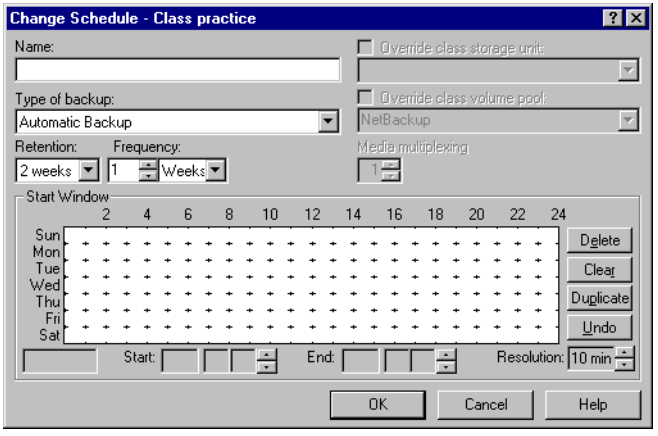
The backup window for a *Backup Policy* schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the *Backup Policy* schedule starts processes that are required for all NetBackup for DB2 on UNIX backups, including those started automatically.

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

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

Tip Set the time period for the *Backup Policy* schedule for 24 hours per day, seven days per week. This will ensure that your NetBackup for DB2 on UNIX operations are never locked out due to the *Backup Policy* schedule.

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



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

Name:

Each schedule requires a unique name.

Note Do not specify the schedule name in the *$DB2_Instance_Home*/db2.conf file.

Type of backup:

An *Automatic Backup* schedule specifies the dates and times when NetBackup will automatically start backups by running the DB2 scripts in the order that they appear in the file list. If there is more than one client in the DB2 class, the DB2 scripts are executed on each client.

Retention:

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

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

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

Frequency

Refers to the time period to wait between backups.

Start:

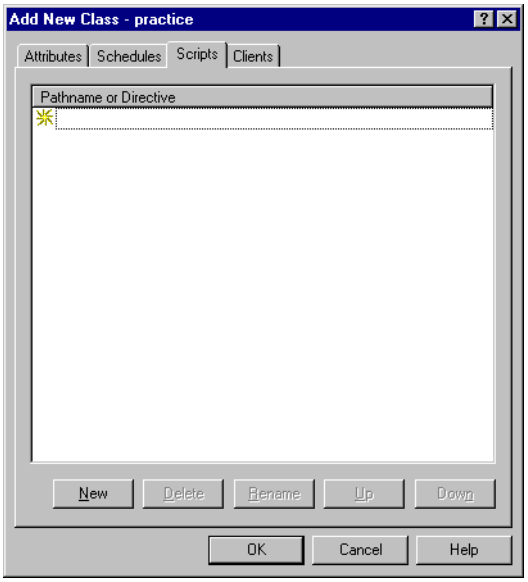
Specifies the day and time when the backup windows will open.

End:

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

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

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



The File list in a database class has a different meaning than for other classes. Normally, in a Standard class, you would list files and directories to be backed up. But since you are now configuring a database class, you will list DB2 scripts.

Refer to "Create Scripts for DB2 Environment" for more details on scripts.

b. Click New.

c. Type the DB2 script. Specify the full pathname for the DB2 script in the file list.

For example:

install_path`/netbackup/ext/db_ext/db2/scripts/db2_offline_backup.sh`

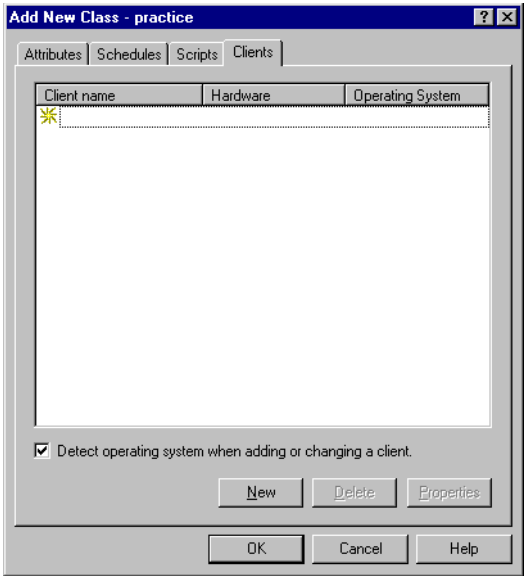
Note Be sure that the scripts listed here are installed on each client in the Client list.

d. Click Enter.

Since all DB2 scripts specified in the file list execute during automatic backups, you must make sure that only one type of backup is executed on the same database. NetBackup will automatically start backups by running the DB2 scripts in the order that they appear in the file list.

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

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



   b. Click New.

   c. Type the name of the client that has:

      - the database installed
      - NetBackup for DB2 on UNIX installed
      - the backup or restore DB2 script

   d. Click OK.

      The Client Hardware and Operating system dialog box appears.

   e. Select the hardware and operating system for the client.

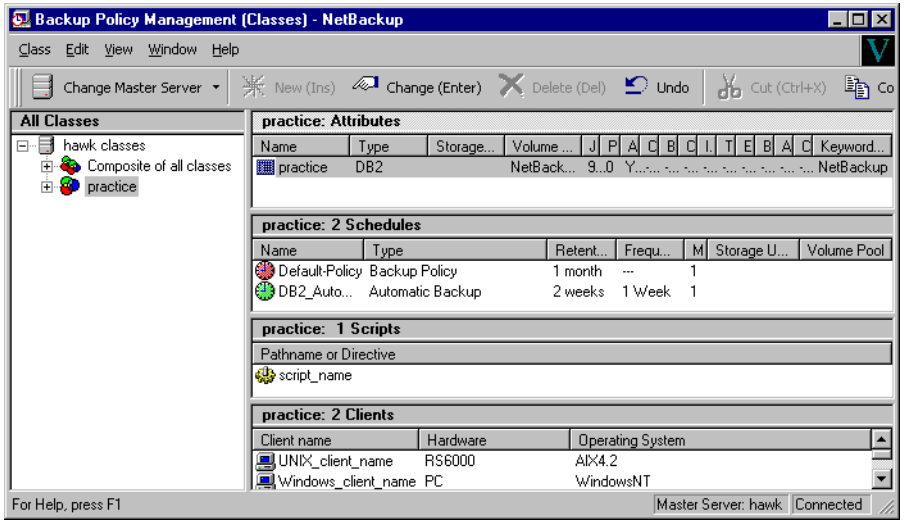
   f. Click OK.

      The Client Hardware and Operating system dialog box closes.

9. Click OK.

   The Changing Class dialog box will close. The Backup Policy Management (Classes) - NetBackup dialog box remains open.

Example DB2 Class on a NetBackup Windows NT/2000 Interface for DB2 Environment



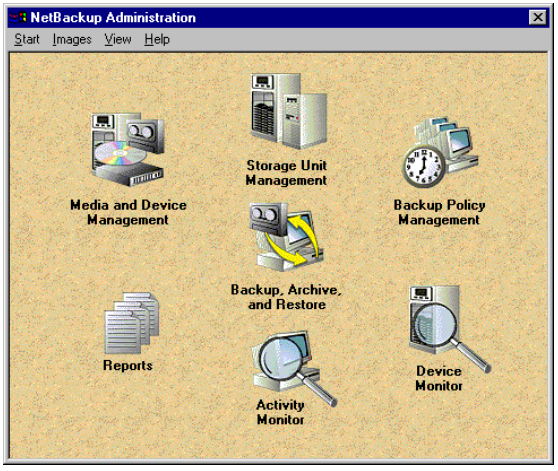
▼ Create a Standard on NetBackup Windows NT/2000 Interface

An Standard type class must be added when:

- `logretain` and `userexit` parameters are enabled in DB2 UDB.
- Client is a UNIX machine.

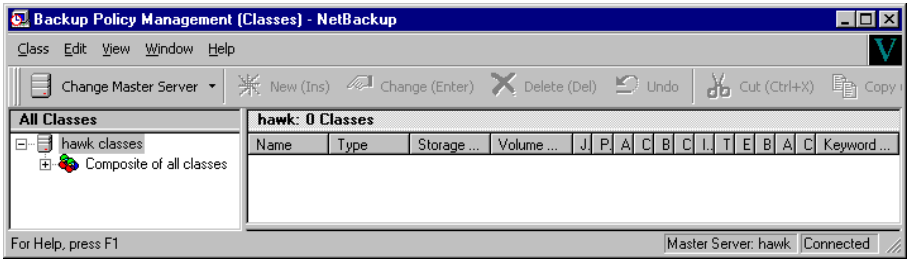
Use this procedure when configuring a class from a Windows NT/2000 server or from the NetBackup Administration Client host.

1. Log onto the server as Administrator.
2. From the Start menu, select Programs, VERITAS NetBackup, NetBackup Administration. The NetBackup Administration interface appears.



3. Click the Backup Policy Management icon.

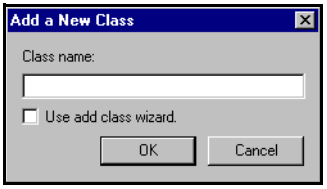
   The Backup Policy Management (Classes) - NetBackup dialog appears.



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

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

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

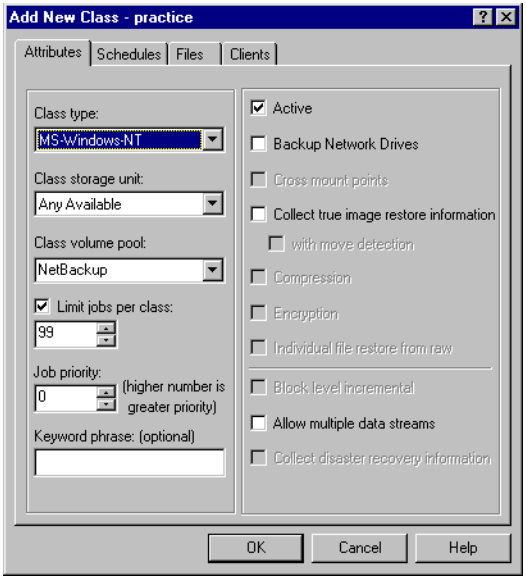


b. Confirm that the Use add class wizard check box is not checked.

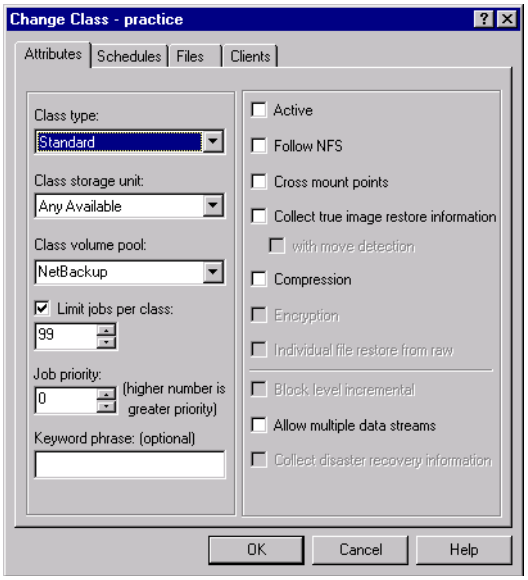
c. Type the new class name in the Class name box.

Note This class name must be specified in the *$DB2_Instance_Home*/db2.conf file.

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



e. Select the Standard class type.



Refer to the following table to configure class attributes.

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

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

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

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

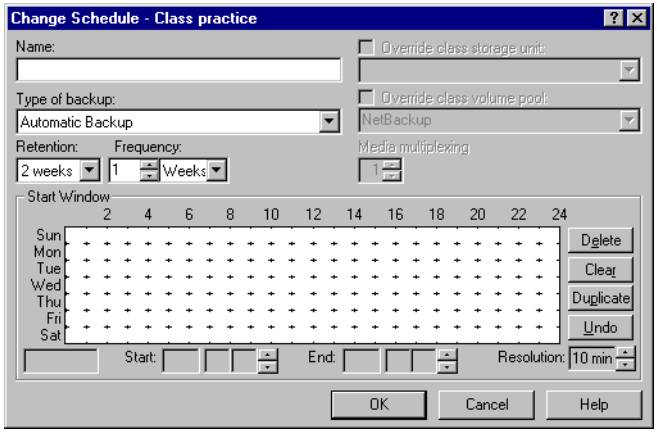
Keyword phrase:
: For NetBackup for DB2 on UNIX, the keyword phrase entry is ignored.

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

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

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

b. Click New. The Change Schedules dialog box appears.



Refer to the following table when configuring User Backup schedules.

Name:
: Each schedule requires a unique name.

Note The *User Backup* schedule name must be specified in the *$DB2_Instance_Home*/`db2.conf` file on the client.

Type of backup:
: This is a user backup that is started by the NetBackup for DB2 on UNIX user-exit program on the client. This schedule specifies the criteria for DB2 archive log file backups.
A *User Backup* schedule enables user controlled NetBackup operations performed on the client.

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

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

Start:

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

End:

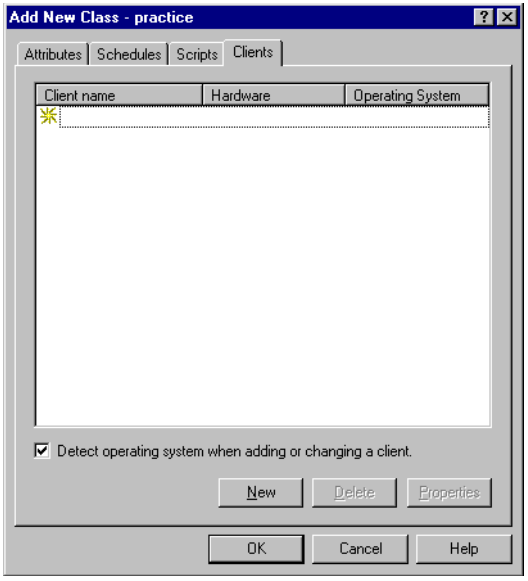
Specifies the day and time when the backup windows will close.

Note This schedule must encompass all of the time periods during which DB2 UDB can call the user-exit program.

Note No DB2 script is needed for a *User Backup* type schedule type.

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

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



b. Click New. The Client Names box appears.

c. Type the name of the client that has:

- the database installed
- NetBackup for DB2 on UNIX installed

d. Click OK.

The Client Hardware and Operating System dialog box appears.

e. Select the hardware and operating system for the client.

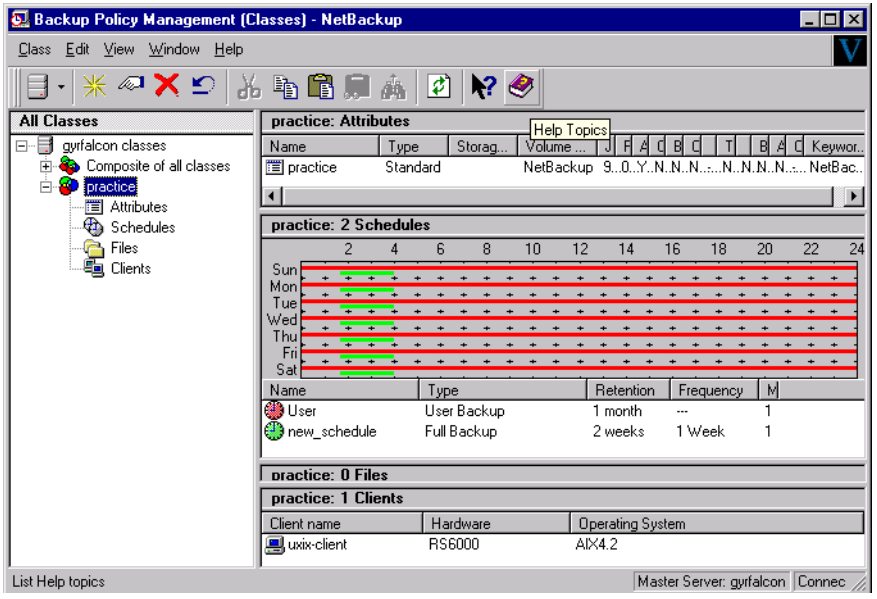
f. Click OK.

The Client Hardware and Operating System dialog box closes.

7. Click OK.

The Changing Class dialog box will close. The Backup Policy Management (Classes) - NetBackup dialog box will remain open.

Example Standard Class on the NetBackup Windows NT/2000 Interface



Create Scripts for DB2 Environment

Note For more information on scripts, see the *DB2 Commands User's Guide*.

The following example scripts were included with the NetBackup for DB2 on UNIX installation:

```
db2_all_restore_mpp.sh
db2_offline_backup.sh
db2_all_backup_mpp.sh
db2_backup_mpp.sh
db2_restore.sh
```

These scripts were provided as examples. They are installed in the following directory:

install_path`/netbackup/ext/db_ext/db2/scripts`

where *install_path* `is /usr/openv by default.`

Note Be sure to modify these scripts for your environment.

Although each script can have multiple DB2 commands 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 DB2 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 DB2 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.

Note If you are using MPP DB2, see "Create DB2 Scripts for MPP DB2 Environment" on page 116.

1. If necessary, copy the example scripts to a different directory on your client. DB2 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 script

   a. Use a text editor such as vi to open the script.

   b. Follow the instructions in the script.

Note Test the scripts you just created by starting a manual backup of this class as explained in "Test NetBackup for DB2 on UNIX Configuration Settings" on page 78.

The following example shows the sample script:

install_path`/ext/db_ext/db2/scripts/db2_offline_backup.sh`

```
#!/bin/sh

#bcpyrght
#***************************************************************************
#* $VRTScprght:  Copyright 1993 - 2000 VERITAS Software Corporation,       *
#* All Rights Reserved  $                                                  *
#***************************************************************************
#ecpyrght

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

echo "DB2_SCHEDULED = $DB2_SCHEDULED"
echo "DB2_USER_INITIATED = $DB2_USER_INITIATED"
echo "DB2_SERVER = $DB2_SERVER"
echo "DB2_CLASS = $DB2_CLASS"

RETURN_STATUS=0

CMD_LINE=""

#
# Full offline backup
#

SYSTEM=`uname`
```

```
case ${SYSTEM} in
        "AIX") CMD_LINE="db2 BACKUP DATABASE sample LOAD
/usr/openv/netbackup/bin/nbdb2.sl OPEN 4 SESSIONS BUFFER 1024";;
        "SunOS") CMD_LINE="db2 BACKUP DATABASE sample LOAD
/usr/openv/netbackup/bin/nbdb2.so OPEN 4 SESSIONS BUFFER 1024";;
esac


#
# The username on the "su" command needs to be replaced with the correct
# user name.
#
echo "Execute $CMD_LINE"
su - db2inst1 -c "$CMD_LINE"

RETURN_STATUS=$?

exit $RETURN_STATUS
```

This DB2 script uses an `su` command to log into a DB2 administrator user account from root. The `su` command then executes a DB2 `BACKUP DATABASE` command to perform an off-line database backup.

c. Follow the instructions in the `db2_backup` script.

Note Test the scripts you just created. Refer to "Test NetBackup for DB2 on UNIX Configuration Settings" on page 78.

When a schedule executes, NetBackup sets environment variables for the local shell scripts to use when performing the backup. The `echo` lines are used to show what DB2 environmental variables are available. These variables can be used to perform conditional functions inside the scripts. These variables are local to the DB2 shell script.

Script Parameters

Parameters are necessary in DB2 scripts to enable the DB2 commands to perform backup and restore operations. The parameters can come from one of these sources:

- Environmental Variables
- NetBackup `bp.conf`
- NetBackup `db2.conf`

Parameters from these sources are used to create DB2 scripts to perform different database backup and/or restore operations. For example, the *DB2_CLASS* variable can be defined in a DB2 script to perform different types of backups (on-line, off-line).

Environmental Variables

It is important to note that these environmental variables are created locally when a DB2 script is executed through:

- the NetBackup automatic scheduler
- a user-directed backup process

When the NetBackup automatic scheduler calls a DB2 script, the following environmental variables are created.

`DB2_CLASS`	Name of the DB2 class from which the *Automatic Backup* backup type was started. This class name is not necessarily the same class name that is in the `bp.conf` file or the `db2.conf` file. This variable is set only if the backup is initiated from the server (either automatically by the NetBackup scheduler or manually through the administrator interface). **Note** When a DB2 script is started from the Graphical User Interface client all of the same variables are created except for *`DB2_CLASS`* variable.
`DB2_SERVER`	Name of the NetBackup server.
`DB2_SCHED`	Name of the *Automatic Backup* backup type. This variable is set up only if the backup is initiated from the server (either automatically by the NetBackup scheduler or manually through the administrator interface).
`DB2_SCHEDULED`	Set to 1 if this is a scheduled backup type (*Automatic Backup*).
`DB2_USER_INITIATED`	Set to 1 if this is a user-initiated backup type (*Backup Policy* backup).
`DB2_FULL`	Set to 1 for a full backup.
`DB2_INCR`	Set to 1 for an incremental backup

Note The above environmental variables are only used in the executing script. They are unknown to the DB2 UDB backup/restore. For example, the `DB2_CLASS` variable will not be processed by the DB2 UDB backup or DB2 UDB restore. Instead it uses the `CLASS` name defined in the *install_path*`/netbackup/bin/bp.conf` file or the *$DB2_Instance_Home*`/db2.conf` file.

Create a db2.conf File

A db2.conf file is a control file that indicates what class, schedule, and database to use. You must place this same file in the *$DB2_Instance_Home*/db2.conf directory on all the NetBackup for DB2 on UNIX clients. A sample copy is provided in the sample directory.

Example

Assume we are backing up a database named *SAMPLE* and its archive logs. We have already configured two classes that have the required schedules for our backups.

One of the classes is for backing up the database. This class is named *db2_database_backup* and has both an Automatic Backup schedule and a Backup Policy schedule. The first entry in the example file below specifies this class and its Backup Policy schedule, which is named *Default-Policy*. The Automatic Backup schedule is not specified in db2.conf.

The other class is for backing up the archive logs. This class is named *db2_archive_logs_backup* and has a User Backup type schedule named *db2_Standard*. The second entry in the example file below specifies this class and its User-Backup schedule.

```
# The following entries define the CLASS and SCHEDULE to be used in NetBackup
# to backup the sample database.


DATABASE SAMPLE
OBJECTTYPE DATABASE
CLASS db2_database_backup
SCHEDULE Default-Policy
ENDOPER

# The following entries define the NetBackup attribute and the type of archive
# that should be performed on archive log for the sample database.  The
# NetBackup attributes are defined by the CLASS and SCHEDULE that should be
# used.  The type of archive is defined by the ARCFUNC, ARCDIR, and RETDIR
# fields.

DATABASE SAMPLE
OBJECTTYPE ARCHIVE
CLASS db2_archive_logs_backup
SCHEDULE db2_Standard
#ARCFUNC save
#ARCDIR /home/db2inst1/arcdir/
#RETDIR /home/db2inst1/arcdir
#NORETRY
ENDOPER
```


Important Points

Remember the following about the db2.conf file.

- A different CLASS name needs to be specified for OBJECTTYPE, DATABASE, and ARCHIVE.
- A db2.conf consists of a series of entries that define the class and schedule based off the OBJECTTYPE and DATABASE.
- OBJECTTYPE and CLASS are required fields and all other fields are optional.
- Each operation consists of a series of *keyword, value* pairs, which completely define the total action.
- The keyword is not case sensitive, but the value is.
- Entries are not nested.
- Within an entry, the *keyword, value* pairs can appear in any order. Each entry must be terminated by ENDOPER.
- Any line with a # in the first column is treated as a comment line.

Keywords

The following table describes the keywords and values used in db2.conf file.

Keyword	Value	Required	Default	Description
ARCDIR	*directory path*	yes, if the value for ARCFUNC is COPY no, if the value for ARCFUNC is SAVE	none	directory path name where archive logs are moved to.
ARCFUNC	SAVE|COPY	no	SAVE	Only for OBJECTTYPE is ARCHIVE. SAVE saves a backup/restore archive log to/from NetBackup. COPY copies an archive to/from ARCDIR/RETDIR directories.
CLASS	*NB classname*	yes	none	NetBackup class name.
DATABASE	*database_name*	no	none	DB2 database name. If OBJECTTYPE is ARCHIVE, then a Standard class must be specified. If OBJECTTYPE is DATABASE or TABLESPACE, then a DB2 class must be specified.
ENDOPER	none	yes	none	Terminates each entry.
OBJECTTYPE	DATABASE TABLESPACE ARCHIVE	yes	none	Type of backup/restore being performed. TABLESPACE are for DB2 class types. ARCHIVE is for a Standard class type.
RETDIR	*directory path*	yes if the value for ARCFUNC is COPY no if the value for ARCFUNC is SAVE	none	The directory path name where archive logs are retrieved from.
SCHEDULE	*nb schedname*	no	first *Backup Policy* in class	NetBackup schedule name in class.

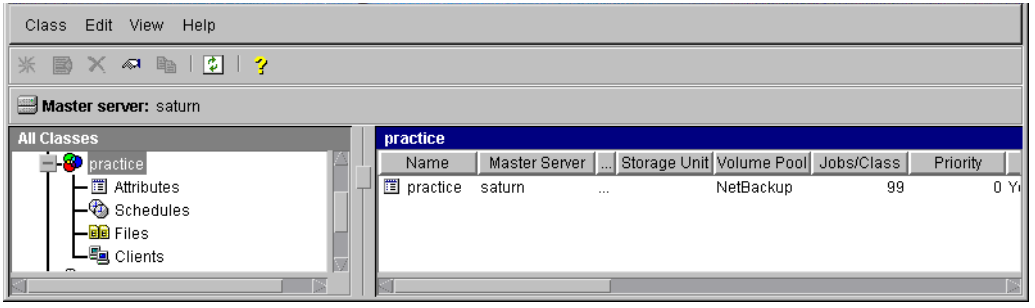
Test NetBackup for DB2 on UNIX Configuration Settings

After you have configured the master server for NetBackup for DB2 on UNIX, you should test the configuration settings. For a description of status codes, refer to the *NetBackup Troubleshooting Guide - Windows NT Server* if you are using a Windows NT/2000 server or the *NetBackup Troubleshooting Guide - UNIX* if you are using a UNIX server.

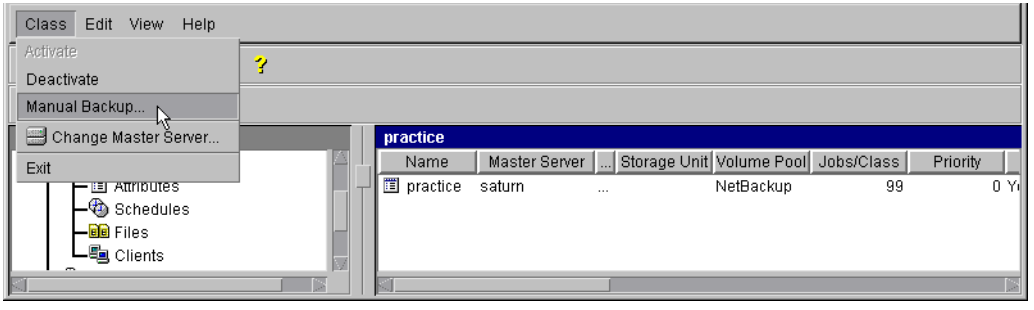
NetBackup Administration - Java Interface

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

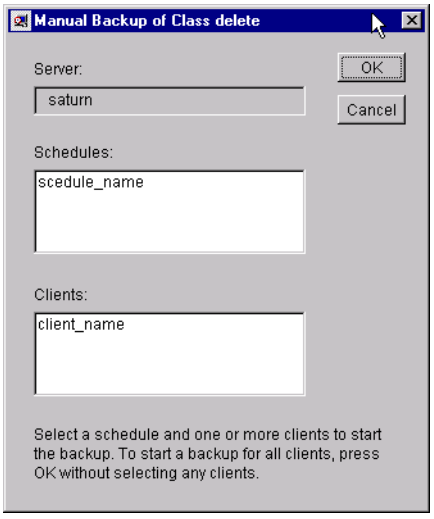
1. Log onto the server as root.
2. Start the NetBackup administrator interface.
3. Click the Backup Policy Management icon. The Backup Policy Management (Classes) - NetBackup dialog appears.
4. Select a class to back up.



5. On the Class menu, click Manual Backup.



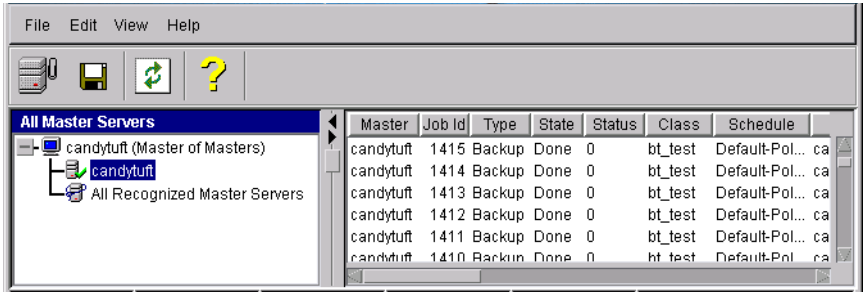
The Manual Backup dialog box appears.



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

6. Follow the instructions on the dialog box.

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



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

`xbpadm` Interface

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

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

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

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

   The NetBackup Administration dialog box will open.
3. Under Classes, select the DB2 class you configured.
4. Under Actions, select Manual Backup. The Manual Backup dialog box will appear.
   a. Select a schedule in the Schedules pane.
   b. Select a client in the Clients pane.
   c. Click OK. The Manual Backup dialog box will close.
5. Under File, select Job Monitor. The Job Monitor dialog box will appear. A status code will display in the Status column.

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

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

NetBackup Administration - Windows NT/2000 Interface

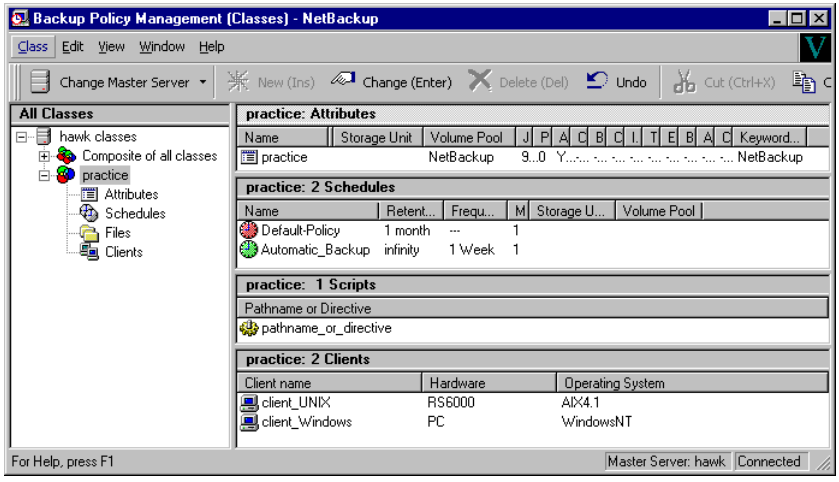
Use this procedure to test a class configuration from a Windows NT/2000 server or from the NetBackup Administration Client host.

1. Log onto the server as Administrator.

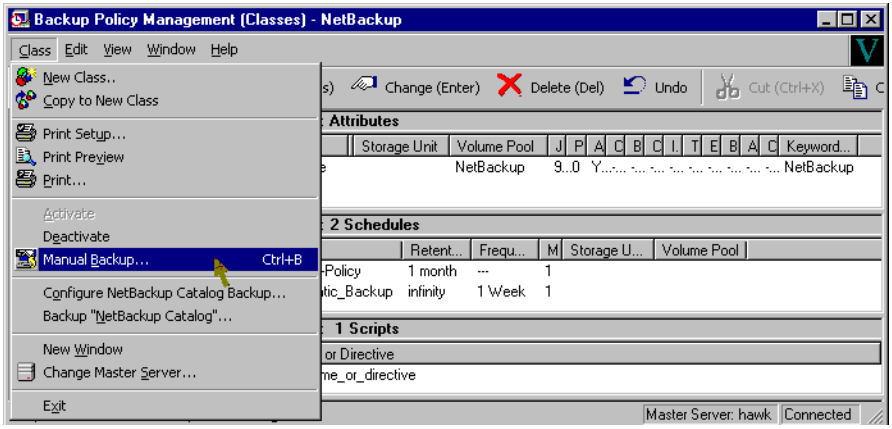
2. Start the NetBackup administrator interface.

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

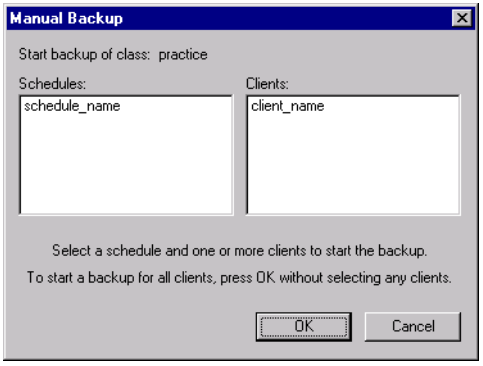
4. Select a class to back up.



5. On the Class menu, click Manual Backup.



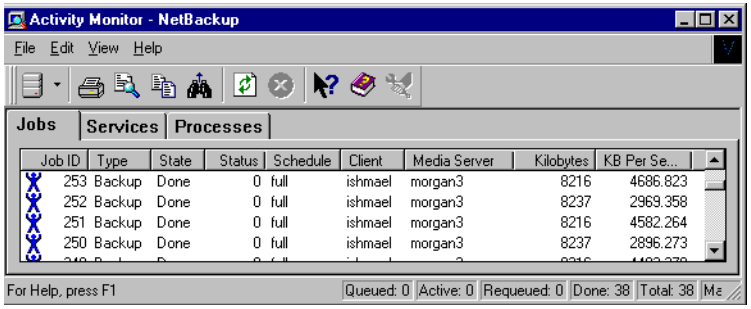
The Manual Backup dialog box appears.



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

6. Follow the instructions on the dialog box.

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



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

Using NetBackup for DB2 on UNIX 4

When all installation and configuration is complete, you can start DB2 backups and restores through NetBackup or execute DB2 UDB commands directly.

This chapter contains the following sections:

- Performing a Backup
- Browsing Back Ups
- Performing a Restore

Caution Always specify the correct DB2 script when configuring automatic backups or when starting operations through NetBackup (see the Configuration chapter). NetBackup for DB2 on UNIX will not generate an error if a restore DB2 script file is used for a backup operation or a backup DB2 script is used for a restore operation.

Performing a Backup

There are two types of DB2 backups: database and archive logs.

- A database backup is a copy of the entire database or tablespaces. This backup is accomplished by executing a DB2 `BACKUP DATABASE` command. A database backup can be initiated through NetBackup by an automatic backup of a DB2 class, a manual backup of a DB2 class, or a user-directed backup.
- An archive log backup is a backup of an archive log file for DB2. These backups are initiated by DB2 through a user exit program.

Automatic Backup of a DB2 Class

The most convenient way to back up your database is to set up schedules for automatic backups. When the NetBackup scheduler invokes a schedule for an automatic backup, the DB2 scripts run:

- In the same order as they appear in the file list
- On all clients listed in the Client list

The DB2 scripts will start the database backup.

To add a new schedule or change an existing schedule for automatic backups, follow the guidelines given in the Configuration chapter.

Manual Backup of a DB2 Class

The administrator on the master server can use the NetBackup administrator's interface to manually execute an Automatic Backup schedule for a DB2 class. The instructions for doing this are the same as given in "Test NetBackup for DB2 on UNIX Configuration Settings" on page 78.

Refer to "Test NetBackup for DB2 on UNIX Configuration Settings" on page 78 for instructions on initiating an backup of a DB2 class.

Using DB2 to Back Up

You can start a backup by executing the DB2 `BACKUP DATABASE` command from the command line on the client. For example:

For a Solaris client you would enter:

```
db2 backup database sample load /bp/bin/nbdb2.so
```

For an AIX client you would enter:

```
db2 backup database sample load /bp/bin/nbdb2.sl
```

Refer to the *Cmd Ref IBM DB2 Universal Database Command Reference* for details on using the DB2 `BACKUP DATABASE` command.

Using `xbp` to Perform a Backup

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

1. Log in as the DB2 administrator or as root.

   If a different user account is used, change the `su -` command to the DB2 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 DB2 scripts. For example:

   install_path`/netbackup/ext/db_ext/db2/scripts/`

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

5. Select the backup script from the Files pane.

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

7. Click OK.

   A NetBackup process called `bphdb` starts the DB2 script on the client.

8. View the status of the script execution.

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

   b. Select the log file for your backup.

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

9. View the log file for the NetBackup operation.

   a. Change directories to the bphdb log directory.

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

   b. Open the log file with the tail option.

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

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

Browsing Back Ups

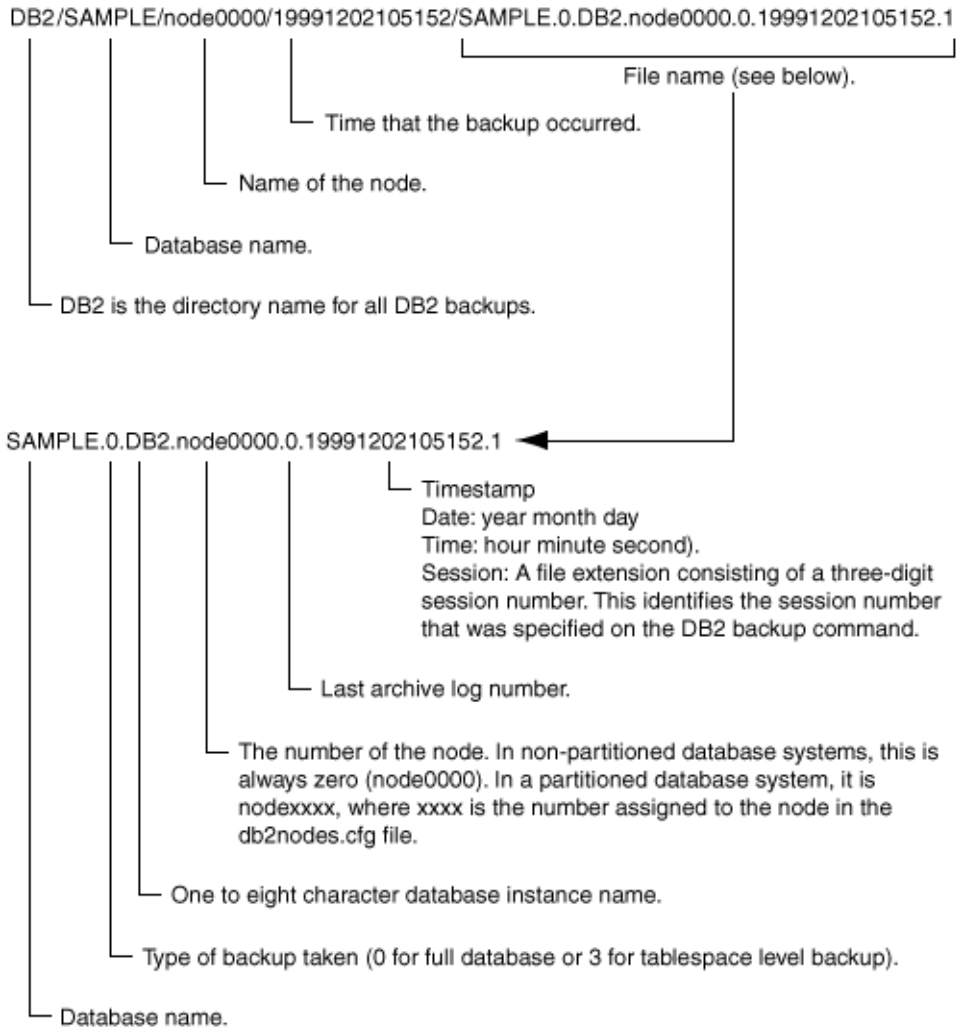
This section describes how to browse backup images. You can also use the `DB2 LIST BACKUP/HISTORY` command. For instructions on using this command, see the *Cmd Ref IBM DB2 Universal Database Command Reference* manual.

Using `bplist` to Browse

The following example uses `bplist` to search all DB2 backups (images) for the client named camel, which is also the master server. The information comes from the NetBackup catalog on the master server. The `-t 18` on this command specifies DB2 backup types. The `bplist` output shows the list of DB2 database backup images that are stored in the NetBackup database. See the NetBackup online help for more information on the `bplist` command.

```
install_path/bplist -C camel -S camel -t 18 -R /
/DB2/SAMPLE/node0000/19991202105152/SAMPLE.0.DB2.node0000.0.19991202105152.1
/DB2/SAMPLE/node0000/19991202104734/SAMPLE.0.DB2.node0000.0.19991202104734.1
/DB2/SAMPLE/node0000/19991201171209/SAMPLE.0.DB2.node0000.0.19991201171209.1
/DB2/SAMPLE/node0000/19991129154117/SAMPLE.3.DB2.node0000.4.19991129154117.1
/DB2/SAMPLE/node0000/19991129142046/SAMPLE.0.DB2.node0000.0.19991129142046.1
```

The following diagram explains how to interpret one of the lines from the listing.



Using `xbp` to Browse

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

1. Log in as the DB2 administrator or as root.

   If a different user account is used, change the `su` command to the DB2 administrator.

2. Execute `xbp` on the client.

   install_path`/netbackup/bin/xbp`

   The xbp dialog box appears.

3. From the File menu, click Configuration....

   The xbp_config dialog box appears.

   a. In the Class type of image to browse, specify the DB2 class.

   b. Click OK to close the dialog box.

   c. In the Directory To Search Box, enter / as the directory to search.

   d. Set the Range of Dates to include the date of your backup.

   e. Enter `9` in the Directory Depth Box.

   f. From the File menu, select Browse Backups (Restore). A list of backup images will appear in the dialog box.

Performing a Restore

The procedure for restoring a DB2 database depends on the database involved and the problems that you have on your system. See the *DB2 UDB Administration Guide* for a complete description of how to recover a DB2 database.

Automatic Restore of a DB2 Class

The following procedure shows how to restore our example database, SAMPLE, to the level of a recent database backup plus archive logs.

1. Perform a user-directed restore using DB2. See "Using DB2 to Restore" on page 89.
2. Browse and restore archive log.
3. Run the DB2 `ROLLFORWARD DATABASE` command. This brings the database back on-line. For example:

   ```
   db2 rollforward database sample to end of logs and stop
   ```

   For more information on this command, refer to the *Cmd Ref IBM DB2 Universal Database Command Reference* manual.

Using DB2 to Restore

You can also start a restore by executing the DB2 `RESTORE DATABASE` command from the command line on the client. For example:

For a Solaris client you would enter:

```
db2 restore database sample load /bp/bin/nbdb2.so
```

For an AIX client you would enter:

```
db2 restore database sample load /bp/bin/nbdb2.sl
```

Refer to the *Cmd Ref IBM DB2 Universal Database Command Reference* manual for details on using the DB2 `RESTORE DATABASE` command.

Using `xbp` to Perform a Restore

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

1. Log in as the DB2 administrator or as root.

   If a different user account is used, change the `su -` command to the DB2 administrator.

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

   install_path`/netbackup/bin/xbp`

Note You cannot restore a database to a remote machine.

3. In the Directory to Search Box, type in the path name of the location of the DB2 scripts. For example:

   install_path`/netbackup/ext/db_ext/db2/scripts/`

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

5. Select the restore script from the Files pane.

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

7. Click OK.

   A NetBackup process called `bphdb` starts the DB2 script on the client.

8. View the status of the script execution.

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

   b. Select the log file for your restore.

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

9. View the log file for the NetBackup operation.

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

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

   b. Open the log file with the tail option.

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

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

Troubleshooting 5

NetBackup, NetBackup for DB2 on UNIX, and the DB2 commands all provide reports on database operations. These reports are useful for finding errors associated with those applications.

NetBackup Reports

The NetBackup server and client software allow you to set up detailed activity logs for troubleshooting problems that occur outside of either NetBackup for DB2 on UNIX or the DB2 commands. See the *NetBackup Troubleshooting Guide - UNIX* or the *NetBackup Troubleshooting Guide - Windows NT Server* for a complete description of activity logs. Also see the *install_path*`/netbackup/logs/README.debug` file.

Note These logs do not reveal errors that occur during the execution of the DB2 commands, unless those errors also affect NetBackup for DB2 on UNIX. Your best sources for DB2 error information are the logs provided by the DB2.

Enable the NetBackup for DB2 on UNIX logs by performing the following steps.

1. Create the following directories on the client:

   install_path`/netbackup/logs/bphdb`
   install_path`/netbackup/logs/bpdb2`

   `% cd` *install_path*`/netbackup/logs`
   `% mkdir bphdb`
   `% mkdir bpdb2`

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

   `% chmod 777 bphdb`
   `% chmod 777 bpdb2`

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

bphdb Directory on the Client

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

db2_stdout.*mmddyy*

Unless redirected elsewhere, NetBackup places DB2 script output in this file.

db2_stderr.*mmddyy*

Unless redirected elsewhere, NetBackup places DB2 script errors in this file.

log.*mmddyy*

bphdb is the NetBackup Database Backup binary. This log contains debugging information for the bphdb process. NetBackup for DB2 on UNIX uses this client process for DB2 script execution. It is invoked when an automatic backup schedule is executed.

bpdb2 Directory on the Client

The *install_path*/netbackup/logs/bpdb2 directory contains the following execution log.

log.*mmddyy*

This log contains debugging information and execution status for the DB2 processes linked to the library provided with NetBackup for DB2 on UNIX.

NetBackup Server Reports

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

Setting the Debug Level

You can control the amount of information that the database extension writes to its log by changing the Verbose 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 it to 9 when a problem is being analyzed.

To change the debug level, enter the following line in the `bp.conf` file.

```
VERBOSE = 9
```

Using ARCFUNC to Backup Archive Logs

ARCFUNC can be used with two options: SAVE and COPY. The default option is SAVE.

When using ARCFUNC SAVE:

1. Create a class of class type STANDARD
2. Create a schedule for the class
3. Add the classname and schedule name to `db2.conf` file.

The following is an example of a `db2.conf` file for backing up archive log files for the database SAMPLE using ARCFUNC SAVE. The classname is db2_archive and the schedule name is db2_archive_sched

```
DATABASE SAMPLE
OBJECTTYPE ARCHIVE
CLASS db2_archive
SCHEDULE db2_archive_sched
ARCFUNC SAVE
ENDOPER
```

The ARCFUNC COPY function is different. It is a straight copy of the archive log(s) to the ARCDIR. There is no NetBackup class or schedule involved or needed. The user exit program (`db2uext2`) does the copy operation when called by DB2. However, you must setup ARCDIR and the RETDIR in the `db2.conf` file for the operation to function properly. The following example shows contents of a `db2.conf` file for the database SAMPLE.

```
DATABASE SAMPLE
OBJECTTYPE ARCHIVE
ARCFUNC copy
ARCDIR /sample/arcdir/
RETDIR /sample/arcdir/
ENDOPER
```


You will also need to manage the ARCDIR by creating another separate class to archive the files that are copied to the ARCDIR location. In other words, the ARCDIR is a directory that you specified in the `db2.conf` file for the `db2uext2` program to copy the archive log files to as above example shows. Potentially, your disk could get full and cause problems. To manage this you will need to create a separate class to archive the ARCDIR off to tapes or other devices.

1. Create a class of class type STANDARD

2. Create a schedule for the class

Note This class is managed by NetBackup only and has nothing to do with *$DB2_Instance_Home*`/db2.conf` file.

Using ARCFUNC During Restore of Archive Log Files

If your database is restored to a rollforward pending state, execute a `ROLLFORWARD DATABASE` command. DB2 will request the archive log files it needs to do the rollforward. DB2 will perform the rollforward through the user exit program.

When a restore request comes in from DB2 and the ARCFUNC option is SAVE, the user exit program will look for the file from tape or other device you setup for backup. When using this option, you will not need to worry about the ARCDIR or RETDIR options.

When the option for ARCFUNC is COPY, the user exit program will look for the file to restore from the RETDIR you specified in the `db2.conf` file. If you setup another class to manage the ARCDIR, you must first restore all files to the RETDIR before doing a `ROLLFORWARD DATABASE` command. The `ROLLFORWARD DATABASE` command will request the log files that DB2 needs from the user exit program. The user exit program will look in the RETDIR to find the file since the option for ARCFUNC is COPY. The user exit program will then copy the files to the DB2 primary log directory.

Using NET_BUFFER_SZ to Speed Up a Slow Restore

When the restore is slow you can speed it up by creating a file `/NET_BUFFER_SZ` on the NetBackup master server. In the file, add the size of the socket you want to set in number of bytes. For example, 32768 bytes = 32K.

Note This only applies when the NetBackup master server is a UNIX machine.

Reason Code

The following reason code can occur while accessing the NetBackup shared library during the processing of a DB2 database utility `BACKUP` or `RESTORE`. Refer to the log files for more detail information about an error message.

REASON CODE: 300

Message:

```
ERR - No match for a database image file was found based on
the following criteria.
```

Cause:

The restore criteria of database name, instance, type, and backup time object can not be found in the NetBackup database.

Action:

Make sure the image you are trying to restore exist by using `bplist` to list it.

Make sure the correct instance is being used.

Make sure the correct values are set in `db2.conf` and `bp.conf`.

If logging is turned on, check the current log file in *install_path*`/netbackup/logs/bpdb2` directory for more information.

REASON CODE: 305

Message:

```
ERR - found more than one object.
```

Cause:

More than one DB2 backup images were found in the NetBackup database that matched the restore criteria of database name, instance, type and backup time.

Action:

This should not happen under normal operation.

If logging is turned on, check the current log file in *install_path*`/netbackup/logs/bpdb2` directory for more information.

REASON CODE: 310

Message:

```
ERR - bp.config failed with <%d> status.
```


Cause:

Unable to read configuration file *install_path*/NetBackup/bp.conf.

Action:

Make sure this file exist and properly configured.

If logging is turned on, check the current log file in *install_path*/netbackup/logs/bpdb2 directory for more information.

REASON CODE: 315 Obsolete

Message:

```
ERR - in setting lock file.
```

Cause:

An error occurred while reading/writing to communication file in *install_path*/netbackup/comm directory.

Action:

Make sure the *install_path*/netbackup/comm directory is accessible.

Remove temporary communication files (if any) and try again.

REASON CODE: 320 Obsolete

Message:

```
ERR - cannot update session information.
```

Cause:

An error occurred while writing to communication file in the *install_path*/netbackup/comm directory.

Action:

Make sure the *install_path*/netbackup/comm directory is accessible.

Remove temporary files (if any) and try again.

REASON CODE: 325 Obsolete

Message:

```
ERR - cannot read session information.
```

Cause:

An error occurred while reading communication file in the *install_path*/netbackup/comm directory.

Action:

Make sure the *install_path*/netbackup/comm directory exists and is accessible.

Remove temporary communication files (if any) and try again.

REASON CODE: 330

Message:

```
ERR - Invalid options encountered for action %s.
```

Cause:

Invalid option(s) encountered for the action. The %s is for a string that will be inserted according to the error condition.

Action:

Make sure the action parameters are use properly.

REASON CODE: 335

Message:

```
ERR - in get DB2 UDB level.
```

Cause:

NetBackup server and NetBackup DB2 shared library are not the same level.

Action:

Make sure NetBackup and DB2 shared library are the same level. Check the log file in *install_path*/netbackup/logs/bpdb2 directory for the version number of the shared library and the version number for NetBackup. If they are not the same, you will need to install the same level.

REASON CODE: 340 Obsolete

Message:

```
ERR - ManageLockFile status=%d err=%d.
```

Cause:

Unable to clear the lock on the communication file in the *install_path*/netbackup/comm directory. The %d is for an integer that will be inserted according to the error condition.

Action:

Make sure the *install_path*`/netbackup/comm` directory is accessible.

Remove temporary communication files in the *install_path*`/netbackup/comm` directory (if any) and try again.

REASON CODE: 345

Message:

```
ERR - dbc_get failed with <%d> status.
```

Cause:

Unable to read from the NetBackup backup images.

Action:

Make sure the robot or tape drive is configured and running properly.

Look at the log files for more details.

REASON CODE: 350

Message:

```
ERR - dbc_put failed with <%d> status.
```

Cause:

Unable to write to DB2 database.

Action:

Make sure DB2 is up, running properly, and ready for restore.

Look at the log files for more details.

REASON CODE: 355

Message:

```
ERR - dbc_close failed with <%d> status.
```

Cause:

Unable to close socket connection between NetBackup and DB2.

Action:

Check the log files for more information.

Look at the log files for more information.

REASON CODE: 365

Message:

```
ERR - dbc_open failed with <%d> status.
```

Cause:

Device daemon may not be running

Action:

Make sure the device daemon is running and the robot or tape drives are configured and running properly. Look at the log files for more information.

REASON CODE: 370

Message:

```
ERR - error from build_bprd_request().
```

Cause:

The request to `bprd` did not go through.

Action:

Make sure NetBackup is configured properly and all the daemons are running.

Look at the log files for more details.

REASON CODE: 375 Obsolete

Message:

```
ERR - updating session file.
```

Cause:

Unable to update the communication file in the *install_path*`/netbackup/comm` directory.

Action:

Make sure the directory is accessible with read and write permission.

REASON CODE: 380

Message:

```
ERR - db2.conf read status error <%d>.
```

Cause:

`db2.conf` read status error.

Action:

Make sure the directory is accessible with read and write permission. Also make sure the file exist and has read permission.

REASON CODE: 385

Message:

```
ERR - Found multiple <DATABASE> entries before an <ENDOPER>
entries was encountered.
```

Cause:

Found multiple DATABASE entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*`/db2.conf` file.

Action:

Remove the extra DATABASE entry.

REASON CODE: 390

Message:

```
ERR - Found multiple <OBJECTTYPE> entries before an
<ENDOPER> entries was encountered.
```

Cause:

Found multiple OBJECTTYPE entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*`/db2.conf` file.

Action:

Remove the extra OBJECTTYPE entry.

REASON CODE: 395

Message:

```
ERR - Found multiple <CLASS> entries before an <ENDOPER>
entries was encountered.
```

Cause:

Found multiple CLASS entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*`/db2.conf` file.

Action:

Remove the extra CLASS entry.

REASON CODE: 400

Message:

```
ERR - Found multiple <SCHEDULE> entries before an <ENDOPER>
entries was encountered.
```

Cause:

Found multiple SCHEDULE entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*`/db2.conf` file.

Action:

Remove the extra SCHEDULE entry.

REASON CODE: 405

Message:

```
ERR - Found multiple <ARCFUNC>entries before an <ENDOPER>
entries was encountered.
```

Cause:

Found multiple ARCFUNC entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*`/db2.conf` file.

Action:

Remove the extra ARCFUNC entry.

REASON CODE: 410

Message:

```
ERR - Found multiple <ARCDIR> entries before an <ENDOPER>
entries was encountered.
```

Cause:

Found multiple ARCDIR entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*`/db2.conf` file.

Action:

Remove the extra ARCDIR entry.

REASON CODE: 415

Message:

```
ERR - Found multiple <RETDIR> entries before an <ENDOPER>
entries was encountered.
```

Cause:

Found multiple RETDIR entries before an ENDOPER entries was encountered in the *$DB2_Instance_Home*/db2.conf file.

Action:

Remove the extra RETDIR entry.

REASON CODE: 420

Message:

```
ERR - need to specify a valid CLASS or SCHEDULE in db2.conf
for <DATABASE %s> and <OBJECTTYPE %s>.
```

Cause:

Class name or schedule name is not specified in the CLASS SHEDULE entry in the *$DB2_Instance_Home*/db2.conf file.

Action:

Add an appropriate class name or schedule name to the CLASS or SCHEDULE entry.

REASON CODE: 425

Message:

```
ERR - need to specified a valid ARCDIR in db2.conf: Errno =
%d : %s.
```

Cause:

Invalid ARCDIR is specified in db2.conf.

Action:

Add an appropriate directory name to the ARCDIR entry.

REASON CODE: 430

Message:

```
ERR - ARCDIR field needs to be specified in the db2.conf
file.
```

Cause:

No ARCDIR entry found in the *$DB2_Instance_Home*/db2.conf file.

Action:

Add ARCDIR field to the *$DB2_Instance_Home*/db2.conf file with an appropriate directory name as a parameter.

REASON CODE: 435

Message:

```
ERR - RETDIR field needs to contain a valid file when
OBJECTTYPE is equal to ARCHIVE: %s.
```

Cause:

RETDIR field does not contain a valid file.

Action:

RETDIR field needs to contain a valid file when OBJECTTYPE is equal to ARCHIVE in the *$DB2_Instance_Home*/db2.conf file.

REASON CODE: 440

Message:

```
ERR - COPY or SAVE needs to be specified for ARCFUNC when
OBJECTTYPE is equal to ARCHIVE.
```

Cause:

Found OBJECTTYPE equal to ARCHIVE but no ARCFUNC is found in the db2.conf file.

Action:

Need to specify a copy or save parameter for ARCFUNC when OBJECTYPE is equal to ARCHIVE.

REASON CODE: 445

Message:

```
ERR - Invalid <OBJECTTYPE> entries: <%s>.
```

Cause:

Invalid OBJECTTYPE entry in the *$DB2_Instance_Home*/db2.conf file.

Action:

Add the appropriate object type to the *$DB2_Instance_Home*/db2.conf file.

REASON CODE: 450

Message:

```
ERR - OBJECTTYPE entry needs to be specified.
```

Cause:

OBJECTTYPE entry is not specified in the *$DB2_Instance_Home*/db2.conf file.

Action:

Add the appropriate object type to the *$DB2_Instance_Home*/db2.conf file.

REASON CODE: 455

Message:

```
ERR - CLASS entry needs to be specified.
```

Cause:

CLASS entry is not specified in the *$DB2_Instance_Home*/db2.conf file.

Action:

Add the appropriate class name to the CLASS entry in the *$DB2_Instance_Home*/db2.conf file.

REASON CODE: 460 Obsolete

Message:

```
WRN - lock operation failed: errno = %d.
```

Cause:

Unable to lock the communication file in the *install_path*/netbackup/comm directory.

Action:

Make sure the director is accessible for read and write.

REASON CODE: 465 Obsolete

Message:

```
WRN - invalid lock operation %d.
```

Cause:

Invalid lock operation was attempted.

Action:

Turn on the log file for `bpdb2` for more information.

REASON CODE: 470 Obsolete

Message:

```
WRN - unknown lock error %d.
```

Cause:

Unknown lock error returned on an attempt to lock a communication file.

Action:

Turn on the log file for `bpdb2` for more information.

REASON CODE: 475 Obsolete

Message:

```
ERR - session file information out of sync.
```

Cause:

Communication file is out of sync.

Action:

Remove all of the communication files in the *install_path*`/netbackup/comm` directory and try again.

Configuration for a DB2 Environment A

The following is the configuration procedure.

1. Configure the Media Manager.

   The instructions for configuring the Media Manager for DB2 are the same as those for DB2. Refer to "Configure Media Manager" on page 22.

2. Add NetBackup classes for the MPP DB2 environment.

   The instructions for adding classes to NetBackup are different for DB2. Refer to "Add NetBackup Classes for MPP DB2 Environment" on page 110.

3. Set the Maximum Jobs per Client Global attribute.

   The instructions for setting the Maximum Jobs per Client global attribute for DB2 are the same as those for DB2. Refer to "Create Scripts for DB2 Environment" on page 71.

4. Create DB2 Scripts for the MPP DB2 environment.

   The instructions for creating scripts for DB2 are the same as those for DB2. Refer to "Create Scripts for DB2 Environment" on page 71.

   Also refer to "Create DB2 Scripts for MPP DB2 Environment" on page 116 to view a DB2 script.

5. Create a *$DB2_Instance_Home*`/db2.conf` file.

   The instructions for configuring the `db2.conf` files for DB2 are the same as those for DB2. Refer to "Create a db2.conf File" on page 75.

6. Test NetBackup for DB2 configuration settings.

   The instructions for testing DB2 configuration settings are the same as those for DB2. Refer to "Test NetBackup for DB2 on UNIX Configuration Settings" on page 78.

Add NetBackup Classes for MPP DB2 Environment

The following classes must be configured for MPP DB2 environment.

- A DB2 type class that has an *Automatic Backup* backup type schedule.

  This class should contain only one *Automatic Backup* backup schedule type. It includes only the clients that:

  - contain the system catalog
  - run a DB2 script.

  The script uses the IBM `db2_all` command to archive the catalog nodes before any other node is backed up. For configuration instructions, see the next topic "Create a DB2 Class with Automatic Backup Backup" on page 110.

- A DB2 type class with a *Backup Policy* backup type schedule.

  This class should contain only one *Backup Policy* backup type schedule. This class includes *all* clients to be backed up in the client list, including the catalog node. For configuration instructions, see the "Create a DB2 Class With Backup Policy Backup" on page 112.

- An Standard type class with a User Backup type schedule.

  For configuration instruction, see "Create a DB2 Class With Backup Policy Backup" on page 112.

▼ Create a DB2 Class with *Automatic Backup* Backup

The instructions in this section supplement the class configuration instructions in the Configuration chapter. For detailed class configuration instructions, refer to:

- "NetBackup Administration - Windows NT/2000 Interface" on page 29 if you are using a Windows NT/2000 server
- "NetBackup Administration - Java Interface" on page 23 if you are using the Java interface

1. Log onto the master server.
2. Open NetBackup.
3. Open the Backup Policy Management (Classes) dialog box.
4. Click New Class. The Add a New Class dialog box appears.

a. In the Class Name box, type the new class name.

b. Click OK. The Add New Class dialog box appears (the name you specified appears in the title bar).

Note Do not specify this class or schedule name in the *$DB2_Instance_Home*`/db2.conf` file.

5. Specify the general attributes for the class:

a. Select DB2 for the class type.

b. Select the default storage unit for the class.

A storage unit is a group of one or more storage devices configured to store information from a backup.

c. Select the default volume pool for the class.

A volume pool is a group of volumes (removable media) configured for use by NetBackup only. These volumes are protected from use by other applications.

d. Specify other attributes as desired. Refer to the online help for information on them.

6. Delete the Default-Policy backup schedule.

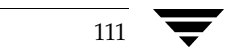
7. Configure a schedule for an *Automatic Backup* type of backup.

When the NetBackup scheduler invokes an *Automatic Backup* type of backup, NetBackup for DB2 on UNIX will execute the DB2 scripts listed in the File list, on each client listed in the Client list.

Since all the DB2 scripts execute during automatic backups, you may need a separate DB2 class for each type of backup you want to execute automatically on the same database. For example, to perform automatic full and partial backups of the same database, two different DB2 scripts are required. If you put both DB2 scripts in the same DB2 class, NetBackup for DB2 on UNIX executes both of them during each *Automatic Backup* session for that DB2 class. This means that you will be performing both full and partial backups during the same backup type, which is normally undesirable.

8. Configure the File list.

Note Specify a File list if unattended scheduled backups are going to be performed.



List the DB2 scripts that you want to execute on the client. Always specify the full path name for a DB2 script file list. For example:

/netbackup/ext/db_ext/db2/scripts/db2_offline_backup.sh

Note The scripts provided are not intended for production. Modify these scripts to suit your needs.

See "Create DB2 Scripts for MPP DB2 Environment" on page 116 for information on creating a DB2 script.

Caution NetBackup does not interpret a DB2 script. Be sure to use the correct DB2 script name in the file list to prevent an error or possibly a wrong operation.

9. Specify all DB2 clients that will run the DB2 script. These must be the clients that contain the system catalog. When you are done, click OK.

10. Click OK.

    The Add New Class dialog box closes. The classes you just configured appear in the Backup Policy Management window.

▼ Create a DB2 Class With *Backup Policy* Backup

The instructions in this section supplement the class configuration instructions in the Configuration chapter. For detailed class configuration instructions, refer to:

- "NetBackup Administration - Windows NT/2000 Interface" on page 29 if you are using a Windows NT/2000 server
- "NetBackup Administration - Java Interface" on page 23 if you are using the Java interface

1. Log onto the master server.

2. Open NetBackup.

3. Open the Backup Policy Management (Classes) dialog box.

4. Click New Class. The Add a New Class dialog box appears.

   a. In the Class Name box, type the new class name.

   b. Click OK. The Add New Class dialog box appears (the name you specified appears in the title bar).

Note Do not specify this class or schedule name in the *$DB2_Instance_Home*`/db2.conf` file.

5. Specify the general attributes for the class:

   a. Select DB2 for the class type.

   b. Select the default storage unit for the class.

      A storage unit is a group of one or more storage devices configured to store information from a backup.

   c. Select the default volume pool for the class.

      A volume pool is a group of volumes (removable media) configured for use by NetBackup only. These volumes are protected from use by other applications.

   d. Specify other attributes as desired. Refer to the online help for information on them.

6. Delete the Default-Policy backup schedule.

7. Configure a schedule for a *Backup Policy* type of backup.

8. Specify the clients that you want to back up.

   a. Click New.

   b. In the Client Names box, specify the client name. The client must:

      - Have DB2 UDB installed
      - Have NetBackup for DB2 on UNIX installed

   c. In the hardware and Operating System box, specify the hardware and operating system for the client.

   d. Repeat the above steps to add more clients. When you are done, click OK.

9. Click OK.

   The Add New Class dialog box closes. The classes you just configured appear in the Backup Policy Management window.

▼ Create a Standard Class

A Standard type class must be added when:

- `log retain` and `user exit for logging` is turned on in DB2 UDB.
- Client is a UNIXmachine.

1. Log onto the master server as root.
2. From the Start menu select Programs, VERITAS NetBackup, NetBackup Administration. A NetBackup Administration toolbar appears.
3. Click the Backup Policy Management icon. The Backup Policy Management (Classes) dialog box appears.
4. On the Edit menu, click New Class. The Add a New Class dialog box appears.
   a. In the Class Name dialog box, type the new class name.
   b. Click OK. The Add New Class dialog box appears (the name you specified appears in the title bar).

Note The name of the class must be specified in the *$DB2_Instance_Home*`/db2.conf` file on the client.

5. On the Attributes tab, specify the general attributes for the class:
   a. Select for the class type.
   b. Select the storage unit for the class.

      A storage unit is a group of one or more storage devices configured to store information from a backup.

   c. Select the volume pool for the class.

      A volume pool is a group of volumes (removable media) configured for use by NetBackup only. These volumes are protected from use by other applications.

   d. Specify other attributes as desired. Refer to the online help for information on them.
6. Configure the Schedules.

a. Click the Schedules tab.

b. Click New.

c. In the Name box, type the name of your schedule.

d. In the Type of Backup box, select User Backup.

This is a user backup that is started by the NetBackup for DB2 on UNIX user-exit program on the client. This schedule specifies the criteria for DB2 archive logs file backups.

e. In the Retention box, set the time period needed to retain two full backups of your database.

For example, if your database is backed up once every Sunday morning, select a retention period of at least two weeks.

f. In the Start Window section of the Schedules tab, set the time of day when you want backups to occur.

This schedule must encompass *all of the time periods* during which DB2 UDB can call the user-exit programs.

Note You do not configure a file list for this class because it will be a User Backup type schedule.

---

7. On the Clients tab, specify the clients that you will be backing up.

a. Click New.

b. In the Client Names box, specify the first client name. The client must have:

- DB2 UDB installed
- NetBackup for DB2 on UNIX installed
- The backup or restore script you are going to execute to perform the backup

c. In the Hardware and Operating System box, specify the hardware and operating system for the client.

d. Repeat the above steps to add more clients. When you are done, click OK.

8. Click OK.

The Add New Class dialog box closes. The class you just configured appears in the Backup Policy Management window.

Create DB2 Scripts for MPP DB2 Environment

1. If necessary, copy the example scripts to a different directory on your client. DB2 scripts can be located anywhere on the client.

2. Modify the script

   a. Use a text editor to open the script.

   b. Follow the instructions in the script.

Note Test the scripts you just created by backing up the class as explained in "Test NetBackup for DB2 on UNIX Configuration Settings" on page 78.

Example

The following shows a sample script:

install_path\dbext\db2\samples\db2_backup_mpp.sh:

```
#!/bin/sh

#bcpyrght
#*************************************************************************
#* $VRTScprght:  Copyright 1993 - 2000 VERITAS Software Corporation,       *
#* All Rights Reserved  $                                                  *
#*************************************************************************
#ecpyrght

# Purpose: This is an sample script that is used the "db2_all" command to
#          performs a backup in a MPP environment.  It needs to be modified
#          before it will work in your environment.  The following are same
#          of the line that need to be modified:
#              - USER="db2inst1"
#              - DB2_CMD="db2 BACKUP DATABASE sample .........
#              - DB2_ALL='db2_all "||\'<<+0< '
#          In order for this sample script two seperate class needs to be
#          define.  The first class should contain the following:
#             -  Clients: one client name that defines the catalog node
#             -  Schedules: define one "Automatic Backup" schedule
#             -  Files: the path name to a modified version of this sample
#                       scripted.
#          The second class should contain the following:
```

```
#             -  Clients: all the client name in the node list
#             -  Schedules: define one "Backup Policy" schedule
#             -  Files: none
#
# Logic Flow:  1. Backup the catalog node
#                 a. su to db2 user account
#                 b. set node through export
#                 c. call db2 backup command
#              2. Wait until catalog node backup completes successfully
#              3. Start backup of all other nodes in parallel.
#                 a. su to db2 user account
#                 b. call db2_all to backup all nodes except catalog node.
#                c. tell db2_all to exit after all backup commans are started.
#
# Environment Var:  The following is a list of environment variable that are
#                   set by bphdb (scheduler) or xbp.  These variable can be
#                   used to coniditionalize this script.  The variable are
#                   local to this script and are not pass on to "db2 backup"
#                   or "db2 restore".
#
#                      DB2_CLASS - class name
#                      DB2_SCHED - schedule name
#                      DB2_SERVER - server name
#                      DB2_USER_INITIATED = boolean, true if initiated by xbp
#                      DB2_SCHEDULED - boolean, true if initiated by scheduler


# ------------------------------------------------------------------------
# NOTE:  Set the USER variable to a valid db2 user name.  Since this script
#        is executed for root, we need to set the USER variable to a valid
#        user name that can perform DB2 backup/restore commands.  This
#        variable is used on the "su" command.
# ------------------------------------------------------------------------
USER="db2inst1"

NB_DIR="/usr/openv/netbackup"
LOG_DIR=$NB_DIR"/logs/bphdb"

# ------------------------------------------------------------------------
# NOTE: Define DB2_CMD to the call "db2 backup" correctly.  The correct
#       database name and other needed parameter should be define in the
#       DB2_CMD variable.
# ------------------------------------------------------------------------
SYSTEM=`uname`
case ${SYSTEM} in
        "AIX") DB2_CMD="db2 BACKUP DATABASE sample LOAD
"$NB_DIR"/bin/nbdb2.sl";;
```


```
        "SunOS") DB2_CMD="db2 BACKUP DATABASE sample LOAD
"$NB_DIR"/bin/nbdb2.so";;
esac


# ------------------------------------------------------------------------
# NOTE: Define DB2_ALL to call the "db2_all" command with the correct options.
#       It is currently defined to run the remote backup commands on all the
#       node except node 0 as parallel daemon i.e. in the background with stdin
#       stdout and stderr all close.  This option use the fews amount of
#       resource, but make debugging more difficult if error occur in
#       initialization process.  To help with debugging stdout is redirected
#       to the bphdb log directory.
# ------------------------------------------------------------------------
DB2_ALL='db2_all "||\'<<-0< '

EXP_NODE="export DB2NODE=0;"
EXP_DIR="export RAHBUFDIR="$LOG_DIR";"
EXP_NAM="export RAHBUFNAME=db2_rahout;"
TIME=`date +"%m%d%y"`
RETURN_STATUS=0

#
# Start the catalog node backup.
#

CMD_LINE=$EXP_NODE$DB2_CMD
#echo "Execute $CMD_LINE"
#su - $USER -c "$CMD_LINE"
#RETURN_STATUS=$?

#
# if the catalog node backup is succussfully start all other backups in
# in parallel by using db2_all
#

if [ $RETURN_STATUS -eq 0 ]
then

  CMD_LINE=$EXP_DIR$EXP_NAM$DB2_ALL$DB2_CMD' >> '$LOG_DIR'/db2_stdout.'$TIME'"'
  echo "Execute $CMD_LINE"
  su - $USER -c "$CMD_LINE"

  RETURN_STATUS=$?

fi
```

```
exit $RETURN_STATUS
```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