Dell EMC Avamar for IBM DB2

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User Guide

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Preface

As part of an effort to improve its product lines, Dell EMC periodically releases revisions of its software and hardware. Therefore, some functions that are described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

Contact a technical support professional when a product does not function correctly or does not function as described in this document.

Note: This document was accurate at publication time. To find the latest version of this document, go to Online Support (https://www.dell.com/support).

Purpose

This guide describes how to install Avamar in an IBM DB2 environment and how to back up and restore DB2 databases.

Audience

The audience for this guide includes DB2 system and database administrators.

Revision history

The following table presents the revision history of this document.

Revision history

Table 1 Revision history

Revision	Date	Description
03	April, 2020	Removed the following invalid sections from the Backup chapter: • High Availability and Clustering Solutions • Backup and Restore with DB2 CLP
02	November 15, 2019	Updates to the destination client and location instructions in the section "Restoring the database to a different client."
01	May 20, 2019	GA release of Avamar 19.3

Related documentation

The following publications provide additional information:

- *Avamar Administration Guide*
- *Avamar and Data Domain System Integration Guide*
- *Avamar Operational Best Practices Guide*
- *Avamar Product Security Guide*
- *Avamar Release Notes*

Special notice conventions used in this document

These conventions are used for special notices.

DANGER Indicates a hazardous situation which, if not avoided, results in death or serious injury.

WARNING Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE Addresses practices that are not related to personal injury.

Note: Presents information that is important, but not hazard-related.

Typographical conventions

These type style conventions are used in this document.

Table 2 Typographical conventions

Bold	Used for names of interface elements, such as names of windows, dialog boxes, buttons, fields, tab names, key names, and menu paths (what the user specifically selects or clicks)
Italic	Used for full titles of publications that are referenced in text
`Monospace`	Used for: • System code • System output, such as an error message or script • Pathnames, filenames, prompts, and syntax • Commands and options
Monospace italic	Used for variables
`Monospace bold`	Used for user input
[ ]	Square brackets enclose optional values
|	Vertical bar indicates alternate selections - the bar means “or”
{ }	Braces enclose content that the user must specify, such as x or y or z
...	Ellipses indicate nonessential information that is omitted from the example

Where to get help

The Avamar support page provides access to licensing information, product documentation, advisories, and downloads, as well as how-to and troubleshooting information. This information may resolve a product issue before contacting Customer Support.

To access the Avamar support page:

1. Go to https://www.dell.com/support.
2. Type a product name in the **Enter a Service Tag, Serial Number, Service Request, Model, or Keyword** search box.
3. Select the product from the list that appears. When you select a product, the **Product Support** page loads automatically.

4. (Optional) Add the product to the **My Products** list by clicking **Add to My Saved Products** in the upper right corner of the **Product Support** page.

Documentation

The Avamar product documentation provides a comprehensive set of feature overview, operational task, and technical reference information. To supplement the information in product administration and user guides, review the following documents:

- Release notes provide an overview of new features and known limitations for a release.
- Technical notes provide technical details about specific product features, including step-by-step tasks, where necessary.
- White papers provide an in-depth technical perspective of a product or products as applied to critical business issues or requirements.

Knowledgebase

The Knowledgebase contains applicable solutions that you can search for either by solution number (for example, KB000xxxxxx) or by keyword.

To search the Knowledgebase:

1. Go to https://www.dell.com/support.
2. Under the **Support** tab, click **Knowledge Base**.
3. Type either the solution number or keywords in the search box. Optionally, you can limit the search to specific products by typing a product name in the search box and then selecting the product from the list that appears.

Online communities

Go to Community Network at https://www.dell.com/community for peer contacts, conversations, and content on product support and solutions. Interactively engage online with customers, partners, and certified professionals for all products.

Live chat

To engage Customer Support by using live interactive chat, click **Join Live Chat** on the **Service Center** panel of the Avamar support page.

Service Requests

For in-depth help from Customer Support, submit a service request by clicking **Create Service Requests** on the **Service Center** panel of the Avamar support page.

> **Note:** To open a service request, you must have a valid support agreement. Contact a sales representative for details about obtaining a valid support agreement or with questions about an account.

To review an open service request, click the **Service Center** link on the **Service Center** panel, and then click **View and manage service requests**.

Enhancing support

It is recommended to enable ConnectEMC and Email Home on all Avamar systems:

- ConnectEMC automatically generates service requests for high priority events.
- Email Home sends configuration, capacity, and general system information to Customer Support.

Comments and suggestions

Comments and suggestions help to continue to improve the accuracy, organization, and overall quality of the user publications. Send comments and suggestions about this document to DPAD.Doc.Feedback@emc.com.

Please include the following information:

- Product name and version
- Document name, part number, and revision (for example, 01)
- Page numbers
- Other details to help address documentation issues

CHAPTER 1

Introduction

This chapter includes the following topics:

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- DB2 CLP support 20
- Database Partition Feature (DPF) backup and restore 20
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Architecture

The Avamar Plug-in for DB2 provides a complete deduplication backup and recovery solution for IBM DB2 servers. The Avamar Plug-in for DB2 works with the Avamar server, the Avamar client, and the DB2 API to back up DB2 databases and logs.

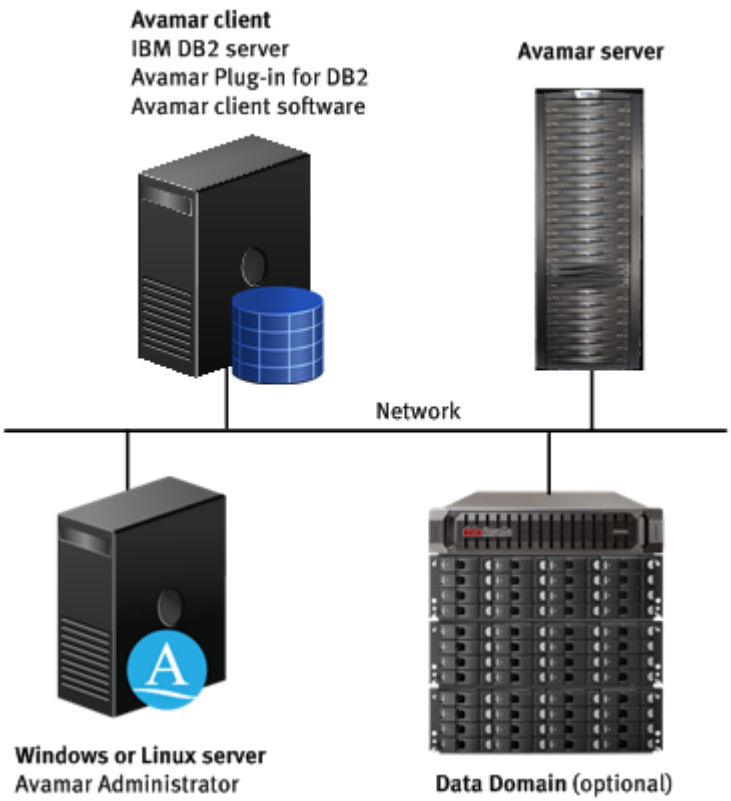
You can back up DB2 data to and restore DB2 data from an Avamar server or a Data Domain system. The Avamar Plug-in for DB2 serves as a backup module and the Avamar server or Data Domain system as a storage device.

The Avamar Plug-in for DB2 supports backups and restores of DB2 single or multiple instance configurations and DB2 configurations that implement DB2 Database Partitioning Feature (DPF).

Each DB2 server host requires the installation of the Avamar Plug-in for DB2 and an Avamar file system client. You can back up and restore DB2 databases by using Avamar Administrator, the AUI, or the DB2 Command Line Processor (CLP).

The following figure shows a configuration in which the Avamar Plug-in for DB2 backs up or restores DB2 databases to or from an Avamar server or a Data Domain system.

Figure 1 Avamar Plug-in for DB2 configuration



Note: The Avamar AUI is only supported in stand-alone environments.

Data Domain system support

The Avamar Plug-in for DB2 supports backups to and restores from Data Domain systems.

You can back up DB2 data to a Data Domain system by using Avamar Administrator or by using the DB2 CLP. Metadata for the backup is stored on the Avamar server.

You can restore backups from a Data Domain system the same way you restore backups from the Avamar server. There are no extra steps. You can follow the same restore procedure whether the data is on the Avamar server or on a Data Domain system.

The *Avamar and Data Domain System Integration Guide* provides more information about configuring Data Domain systems for use with Avamar systems.

Multiple DB2 versions on a single host

The Avamar Plug-in for DB2 supports multiple versions of the DB2 software. For example, the Avamar Plug-in for DB2 can support DB2 10.1 and DB2 9.7 on the same host. The Avamar Plug-in for DB2 also supports multiple DB2 instances within a single DB2 software installation.

DPF support

The Avamar Plug-in for DB2 supports backups and restores in configurations which use DPF. A DPF configuration allows you to partition a database across multiple servers or within a large Symmetric Multi-Processor (SMP) server.

The catalog node or partition is where you run the `CREATE DATABASE` command and where the backup process runs. All other partitions are called noncatalog nodes or partitions.

Log files

The Avamar Plug-in for DB2 creates log files during backup and restore operations. These log files are for debugging purposes.

Backup and restore operations from Avamar Administrator or AUI create log files in the *`install-directory`*`/var/clientlogs` directory. Backup and restore operations from the DB2 CLP create log files in the directory you specify with the `--logfile` option in the flag file.

Note: If the `--logfile` option is not specified in the Avamar Plug-in for DB2 flag file, the logs are generated under the *`install-dir`*`/var/clientlogs` directory.

Backup

The Avamar Plug-in for DB2 allows you to perform backups from Avamar Administrator, the AUI, or from the DB2 Command Line Processor (CLP).

Note: The Avamar AUI is only supported in stand-alone environments.

Backup types

The Avamar Plug-in for DB2 allows you to use Avamar Administrator, the AUI, and the DB2 CLP to perform full and incremental backups.

The Avamar Plug-in for DB2 supports the following types of backups:

- Full backups from Avamar Administrator or the AUI
- Full, incremental, and delta backups from the DB2 CLP
- Tablespace backups from the DB2 CLP
- Online backups

  You can perform an online backup while the database is active. When using this type of backup, users and applications can connect to the database and perform transactions. Online backups can either include or exclude archived logs.

- Offline backups

  You can perform an offline backup while the database is inactive. Offline backups do not allow connections to the database.
- On-demand or scheduled backups from Avamar Administrator or the AUI.

  You can perform either on-demand or scheduled backups while the database is online or offline.
- Backups of `load copy` images that are created by db2 load operations with the `copy yes` option

Data deduplication optimization

The Avamar Plug-in for DB2 supports the `dedup_device` option.

The `dedup_device` option for the `db2 backup database` command is available in the latest DB2 versions and fixpacks. Refer to the vendor documentation for the availability of `dedup_device` option.

The `dedup_device` option optimizes the format of data that is backed up to a deduplication device. The Avamar Plug-in for DB2 includes support for the `dedup_device` option for backups that are run from Avamar Administrator, the AUI, or the DB2 CLP.

- From Avamar Administrator or the AUI, specify the `Optimize backup images` option.
- From the DB2 CLP, specify the `dedup_device` option with the `db2 backup db` command.

Restore and recovery

The Avamar Plug-in for DB2 supports DB2 database restores from both online and offline backups.

You can restore and recover a database only while the database is offline. You cannot restore and recover a database that is online with connections. The restore and recovery operation automatically establishes a connection to the specified database. The connection terminates after the restore operation completes.

You can identify whether the backup is an online or offline backup by its backup label name. The Avamar Plug-in for DB2 uses a naming convention that specifies the type of backup. Backup naming conventions provide more information.

The Avamar Plug-in for DB2 restores and recovers databases and table spaces. The Avamar Plug-in for DB2 supports the following restore and recovery options from Avamar Administrator or the AUI:

- **Restore and roll forward database**
- **Restore only**
- **Restore only archive logs from an online backup**
- **Recover**

The Avamar Plug-in for DB2 includes the following recovery type options:

- **End of logs**
- **Point in Time**
- **End of Backup**

Restore options provides more information about restore and recover options available from Avamar Administrator or the AUI.

Note: The Avamar AUI is only supported in stand-alone environments.

Redirected restores

The Avamar Plug-in for DB2 supports redirected restores. A redirected restore enables you to restore a database to a different location on the original client or to a different client altogether. You can restore data from one instance to a different instance.

When you restore a database to a different location, you can only select one database for the restore operation. When performing a redirected restore, the restore target can be the same client from which the backup was originally taken or a different client. A redirected restore to the same client creates a clone of the original database. The new database contains the same contents of the original database. A redirected restore to a different client requires that the operating system version and DB2 version on the target client to be the same version as on the source client.

A non-automatic storage database (ASM) redirected restore that you perform with Avamar Administrator or the AUI sets the tablespace container pathname to the DB2 defaults. If the database contains a user-defined container pathname to a tablespace, the redirected restore redefines the default pathname. This process requires adequate space on the partition.

The Avamar Plug-in for DB2 supports redirected restores of automatic storage table spaces. To perform redirected restores of automatic storage table spaces requires you to change the storage and database pathnames by passing attributes to the restore operation. Restore and Recovery on page 49 provides more information about setting attributes to restore automatic storage tablespaces.

You cannot restore automatic storage table spaces and non-automatic storage table spaces in the same restore operation.

Tablespace restore and recovery from Avamar Administrator

The granular recovery feature enables you to restore one or more table spaces from a full database backup. During a full database backup from Avamar Administrator, the AUI, or the Avamar Plug-in for DB2 runs the `db2 list history` command, which compiles a list of backed-up table spaces. The Avamar Plug-in for DB2 then uses this list of table spaces for granular recovery operations.

You can perform a tablespace restore and recovery while the database is online or offline. The exception is the SYSCATSPACE tablespace. Perform a SYSCATSPACE tablespace restore and recovery while the database is offline.

Use the `DB2 rollforward` command to manually roll forward the tablespace after you restore a tablespace from an offline backup or a DPF environment.

An end of backup or point-in-time recovery of a tablespace leaves the tablespace in a backup pending state. When a table is in a backup pending state, the database is read-only. Do not modify the tablespace. After performing an end of backup or point-in-time recovery of a tablespace, you must perform an online or offline backup to reset the tablespace state.

You can restore a renamed tablespace by using the `renamed_tablespace_list` option.

Granular recovery

The following restrictions apply to the granular recovery:

- The Avamar Plug-in for DB2 does not support the end of logs, point-in-time, or end of backup recovery types for a tablespace in a DPF environment.
- DB2 does not support restores of a tablespace to a database other than the one from which the backup was taken. You cannot restore a tablespace to a different location on the same host or to a different host.
- The Avamar Plug-in for DB2 does not support restores of dropped table spaces.

Restore and recovery from the Cloud

For Elastic Cloud Storage (ECS), when backups are in the Cloud and absent on Active tier, direct read from ECS for DB2 enables common restore scenarios by using the plugin restore operations with DD 6.1 and later. When the user performs restores of backups in the ECS, Avamar plug-in for DB2 transparently restores data from ECS without performing a recall operation first.

For other Cloud providers, a two step process is in place for restoring and recovering data:

- Recall data from the Cloud
- Restore and recover data

Refer to *Restore operations for cloud tier* in the *Avamar Data Domain System Integration Guide* for more information.

Concurrent backups and restores

The Avamar Plug-in for DB2 supports a maximum of six concurrent backups or restore operations. Each backup or restore operation can run multiple data sessions to or from the Avamar server or the Data Domain system.

All backup images that you create by specifying multiple sessions use a sequence number as an extension. The sequence number identifies the backup piece. After a successful backup, the Avamar Plug-in for DB2 represents all backup pieces from all backup sessions as one backup image or label.

You can restore backups that you create with multiple sessions in a single restore session. The Avamar Plug-in for DB2 restores the entire backup image even when you select only one backup piece. To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.

Multi-streaming on page 22 provides more information about running multiple data sessions.

DB2 CLP support

You can use the DB2 CLP for backup, restore, recovery, and roll forward operations.

The Avamar Plug-in for DB2 supports the `db2 backup`, `db2 restore`, `db2 recover`, and `db2 rollforward` commands. The plugin also supports `db2 load` command with `copy yes` option. Backup and Restore with DB2 CLP on page 93 provides more information.

Database Partition Feature (DPF) backup and restore

The Avamar Plug-in for DB2 supports backups and restores of DB2 database partitions.

DPF backup

The Avamar Plug-in for DB2 backs up database partitions that are local to the catalog node or remote (found on remote nodes).

To back up database partitions, the Avamar Plug-in for DB2 backup process first connects to the database that you select for backup and runs a query to determine configuration details:

- If the query determines that database partition is local, the backup process continues on the DB2 server.

- If the query determines that the database partition is on a remote node, the Avamar Plug-in for DB2 forwards the backup request to the remote node's host. The host then acts with the DB2 backup request at the remote host.

DPF restore and recovery

The Avamar Plug-in for DB2 supports database partition restores in configurations which use the DPF.

Unlike the backup process, which must run only from the catalog partition, the restore operation runs on each partition:

- To restore partitions from the catalog partition, you perform a restore to the original location. Restoring database partitions to the original location on page 75 provides instructions.
- To restore partitions from non-catalog partitions, you perform a restore to a different location. Restoring database partitions to a different location on page 77 provides instructions.

Avamar Administrator lists all backed up partitions for the selected client. The Avamar Plug-in for DB2 restores each partition backup separately. You cannot restore all partition backups in a single restore operation. However, the limitation of one DPF node and one database at a time on a host also applies to restore operations from the DB2 CLP. DB2 CLP limitations on page 105 provides more information.

The roll-forward and recovery operations of DPF nodes from either Avamar Administrator, the AUI, or the DB2 CLP must be run in DPF mode and must be run at the catalog node.

DB2 HADR backup and restore

The Avamar Plug-in for DB2 supports backup and restore of DB2 High Availability Disaster Recovery (HADR) databases by using the Avamar client for DB2 HADR. The Avamar client for DB2 HADR is provided as part of the Avamar Plug-in for DB2.

The Avamar client for DB2 HADR is installed along the base Avamar client. The Avamar agent for the HADR client also runs in parallel with the agent of the base Avamar client. The HADR client is not tied to any specific client host. At any point in time, the HADR client is only active on the primary node, and can be moved from one host to another when its role changes.

All operations on the HADR client, including backups, restores and log archiving, require that the DB2 HADR client process (`avagent`) is active on one of the HADR nodes. All work orders are directed to this node. Database backup images and archive log files from all HADR nodes are stored under the same common account in Avamar.

The Avamar Plug-in for DB2 includes a utility to configure the Avamar client for DB2 HADR that performs the following configuration steps:

- Creates the required directories and installs required files.
- Adjusts scripts and configuration files.
- Creates the service/daemon for HADR `avagent` client process.
- Registers the common account with the Management Console server.

A deconfiguration utility removes files and stops the HADR `avagent` client process, but retains logs and configuration files.

Backups and restores of the file system or stand-alone DB2 databases on the same node should not be performed by the Avamar client for DB2 HADR. These activities must be performed by using the base Avamar client that is configured and registered during the Avamar client software installation.

Archived log backup and restore

The Avamar Plug-in for DB2 supports backups of archived transaction logs, which you can later use for roll-forward operations.

Circular and archive logging

DB2 transaction logs keep records of database changes. DB2 software provides circular and archive logging:

- Circular logging supports full offline database backups.
- Archive logging supports online database backups and roll-forward recovery.

The IBM DB2 documentation provides more information about circular and archive logging.

Transaction logs

Consider the following:

- You can configure the DB2 server to back up a transaction log as soon as it is archived.
- During a recovery or roll-forward operation, the DB2 server requests the restore of archived logs that are not available on the system from the Avamar Plug-in for DB2.
- To skip the overhead process of searching for the available saved archived logs, the Avamar File System plug-in can be used to restore missing archived logs before you restore the database. Specify the location of the log files when you perform a database roll-forward operation.

Multi-streaming

The Avamar Plug-in for DB2 enables you to use multiple data streams for backups and restores. DB2 supports the use of multiple data streams (or sessions) to back up or restore database objects. You can specify multiple sessions for backups and restores from Avamar Administrator and the DB2 CLP.

The use of multiple data sessions for a backup or restore increases system performance when you back up or restore a large database. However, multi-streaming can place additional demands on computer hardware and resources beyond the base requirements for the Avamar Plug-in for DB2.

CHAPTER 2

Installation

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Preparing to install the Avamar Plug-in for DB2

Review the system requirements for Avamar Plug-in for DB2 to ensure that the environment meets these requirements before its installation. Download the Avamar file system client and Avamar Plug-in for DB2 packages from the Avamar server.

System requirements

Before you install the Avamar Plug-in for DB2, ensure that the environment meets all software and hardware requirements.

Client compatibility requirements are available in the *E-LAB Navigator* at https://elabnavigator.emc.com/eln/modernHomeDataProtection. The requirements in the *E-LAB Navigator* include supported operating systems and application versions. The Avamar file system client and the Avamar Plug-in for DB2 that you install on the host must be the same version number.

DB2 server requirements

Ensure that the environment meets the DB2 requirements. You must have the operating system root privileges on the computer that hosts the DB2 server.

The Avamar server must be operational and accessible to the DB2 server on a network. To verify network connectivity, open a command shell on the DB2 server and type the following command:

`ping` *Avamar_server*

where *Avamar_server* is the network hostname or IP address of the Avamar server.

Downloading the software

Download the installation package for the Avamar Plug-in for DB2 from the Avamar server. Then save the package to a temporary directory.

Procedure

1. Log in to the DB2 server with the necessary privileges for an installation to be performed.
2. Open a web browser and type the following URL:

   `https://Avamar_server`

   where *Avamar_server* is the DNS name or IP address of the Avamar server.

   The **Avamar Web Restore** page appears.
3. Click **Downloads**.

   The **Downloads** list appears.
4. Click **+** next to the platform heading for the DB2 server.
5. Click **+** next to the operating system heading for the DB2 server.
6. Click the link for the Avamar Plug-in for DB2 installation package.
7. Save the Avamar Plug-in for DB2 installation package to a temporary directory.

Installing the Avamar file system client

Install the appropriate Avamar file system client before you install the Avamar Plug-in for DB2.

Procedure

- For HP-UX, IBM AIX, Linux, and Solaris systems, follow the instructions in the *Avamar Backup Clients User Guide*.
- For Windows systems, follow the instructions in the *Avamar for Windows Server User Guide*.

Installing, upgrading, and uninstalling on HP-UX

You can install, upgrade, and uninstall the Avamar Plug-in for DB2 on HP-UX.

Installing the Avamar Plug-in for DB2 on HP-UX

You can use the `swinstall` command to install the Avamar Plug-in for DB2 in the default `var` directory or in a new location. You can specify a new location for the `var` directory during the Avamar Client for HP-UX installation by using the `-x ask=true` option with the `swinstall` command.

About this task

When you install the Avamar Plug-in for DB2 after installing the Avamar Client for HP-UX, the plug-in installation does not automatically use the same location for the `var` directory that you specified during the Avamar Client for HP-UX installation. Install the Avamar Plug-in for DB2 by using the `-x ask=true` option with the `swinstall` command.

Ensure that you install the Avamar Plug-in for DB2 in the same directory as Avamar Client for HP-UX.

Procedure

1. Log in to the DB2 server as root.
2. Change the directory to the temporary directory by typing the following command:

   cd /*tmp*

   where *tmp* is the temporary directory.
3. To install the Avamar Plug-in for DB2 in the default directory, type the following command:

   swinstall -s AvamarDB2-*platform-version*.depot *

   where:

   - *platform* is the HP-UX platform type.
   - *version* is the Avamar software version.
4. To install the Avamar Plug-in for DB2 in an alternate directory:

   a. Type the `swinstall` command:

   swinstall -x ask=true -s /*tmp*/AvamarDB2-*platform-version*.depot hpuxavdb2,l=/*install_path*

   where:

   - *platform* is the HP-UX platform type.
   - *version* is the Avamar software version.

- *install_path* is the installation directory.

b. Type the name of the directory for the installation.

The following output appears in the command shell:

```
Confirm '/install_path/' is the desired location. [n]
```

c. Type `y` to confirm the location.

Upgrading the Avamar Plug-in for DB2 on HP-UX

Complete the required steps to upgrade the Avamar Plug-in for DB2 on HP-UX. The version of the Avamar Client for HP-UX and Avamar Plug-in for DB2 must be the same version.

About this task

Procedure

1. Uninstall the Avamar Plug-in for DB2. Uninstalling the Avamar Plug-in for DB2 on HP-UX on page 26 provides instructions.
2. Uninstall the Avamar Client for HP-UX. The *Avamar Backup Clients User Guide* provides instructions.
3. Download and install the new version of the Avamar Client for HP-UX. The *Avamar Backup Clients User Guide* provides instructions.
4. Download the Avamar Plug-in for DB2 installation package. Downloading the software on page 24 provides instructions.
5. Install the new version of the Avamar Plug-in for DB2. Installing the Avamar Plug-in for DB2 on HP-UX on page 25 provides instructions.

Uninstalling the Avamar Plug-in for DB2 on HP-UX

You can uninstall the Avamar Plug-in for DB2 from an HP-UX system by using the `swremove` command.

About this task

When you uninstall the Avamar Plug-in for DB2 and the Avamar Client for HP-UX from the host system, scheduled backups no longer occur for the client. You cannot restore backups to the client after uninstalling the software.

You can retire or delete a client either before or after you uninstall the Avamar Plug-in for DB2.

- To keep the backups for the client so that you can restore the backups to a different client, retire the client by using Avamar Administrator.
- To delete the backups for the client, delete the client by using Avamar Administrator.

The *Avamar Administration Guide* provides more information.

Note: If High Availability Disaster Recovery (HADR) clients are being used, before uninstalling the Avamar Plug-in for DB2, you must first unconfigure all HADR clients by following the procedures at Removing the DB2 HADR client from UNIX and Linux on page 90.

Procedure

1. Log in to the DB2 server as root.
2. Uninstall the Avamar Plug-in for DB2 by typing the following command:

```
swremove hpuxavdb2
```

Installing, upgrading, and uninstalling on IBM AIX

You can install, upgrade, and uninstall the Avamar Plug-in for DB2 on IBM AIX.

Installing the Avamar Plug-in for DB2 on IBM AIX

You can install the Avamar Client for AIX software in either the default installation directory or an alternate directory. Use the `geninstall` command to install the Avamar Plug-in for DB2 in the default `var` directory or use the `installp` command to install the Avamar Plug-in for DB2 in a new location.

About this task

Ensure that you install the Avamar Plug-in for DB2 in the same directory as Avamar Client for AIX. The installation returns an error if you try to install the Avamar Plug-in for DB2 in the default directory after installing the Avamar Client for AIX in an alternate directory.

Procedure

1. Log in to the DB2 server as root.
2. Change the directory to the temporary directory by typing the following command:

   cd /*tmp*

   where *tmp* is the temporary install directory.
3. To install the Avamar Plug-in for DB2 in the default directory, type the following command:

   geninstall -d AvamarDB2-aix6-ppc64-*version*.bff all

   where *version* is the Avamar software version.
4. To install the Avamar Plug-in for DB2 in an alternate directory, type the following command:

   installp -R /*install_path* -d AvamarDB2-aix6-ppc64-*version*.bff all

   where:

   - *install_path* is the directory for the installation files.
   - *version* is the Avamar software version.

Upgrading the Avamar Plug-in for DB2 on IBM AIX

Use the `geninstall` command to upgrade the software in the default directory or use the `installp` command to upgrade the software in an alternate directory. Upgrade the Avamar Plug-in for DB2 before upgrading the Avamar Client for AIX. The versions of the Avamar Client for AIX and Avamar Plug-in for DB2 must be the same.

Procedure

1. Download the Avamar Plug-in for DB2 installation package. Downloading the software on page 24 provides instructions.
2. Log in to the DB2 server as root.
3. Change the directory to the temporary directory by typing the following command:

   cd /*tmp*

   where *tmp* is the temporary install directory.
4. To upgrade the Avamar Plug-in for DB2 in the default directory, type the following command:

```
geninstall -d AvamarDB2-aix6-ppc64-version.bff all
```

where *version* is the Avamar software version.

5. To upgrade the Avamar Plug-in for DB2 in an alternate directory, type the following command:

```
installp -R /install_path -d AvamarDB2-aix6-ppc64-version.bff all
```

where:

- *install_path* is the directory for the installation files.
- *version* is the Avamar software version.

6. Download the Avamar Client for AIX. The *Avamar Backup Clients User Guide* provides instructions.
7. To upgrade the Avamar Client for AIX in the default directory, type the following command:

```
geninstall -d AvamarClient-aix6-ppc-version.bff all
```

where *version* is the Avamar software version.

8. To upgrade the Avamar Client for AIX in an alternate installation directory, type the following command:

```
installp -R /install_path -d AvamarClient-aix6-ppc-version.bff all
```

where:

- *install_path* is the directory for the installation files.
- *version* is the Avamar software version.

Uninstalling the Avamar Plug-in for DB2 on IBM AIX

You can uninstall the Avamar Plug-in for DB2 from an IBM AIX system by using the `geninstall` or `installp` command. Use the `geninstall` command to uninstall the software in the default directory or use the `installp` command to uninstall the software in an alternate directory.

About this task

When you uninstall the Avamar Plug-in for DB2 and the Avamar Client for AIX from the host system, scheduled backups no longer occur for the client. You cannot restore backups to the client after you uninstall the software.

You can retire or delete a client either before or after you uninstall the Avamar Plug-in for DB2.

- To keep the backups for the client so that you can restore the backups to a different client, retire the client by using Avamar Administrator.
- To delete the backups for the client, delete the client by using Avamar Administrator.

The *Avamar Administration Guide* provides more information.

Note: If High Availability Disaster Recovery (HADR) clients are being used, before uninstalling the Avamar Plug-in for DB2, you must first unconfigure all HADR clients by following the procedures at Removing the DB2 HADR client from UNIX and Linux on page 90.

Procedure

1. Log in to the DB2 server host as root.
2. View all Avamar packages that are installed on the system by typing the following command:

```
lslpp -l | grep Avamar
```

The following output appears in the command shell:

```
AvamarClient-aix6-ppc VERSION COMMITTED Avamar client VERSION
AvamarDB2-aix6-ppc64 VERSION COMMITTED Avamar client VERSION
```

3. To uninstall the Avamar Plug-in for DB2 software in the default directory, type the following command:

   geninstall -u AvamarDB2-aix6-ppc64

4. To uninstall the Avamar Plug-in for DB2 software in an alternate directory, type the following command:

   installp –R /*install_path* –u AvamarDB2-aix6-ppc

   where *install_path* is the directory for the installation files.

5. Uninstall the Avamar Client for AIX software by typing the following command:

   geninstall -u AvamarClient-aix6-ppc

Installing, upgrading, and uninstalling on Linux

You can install, upgrade, and uninstall the Avamar Plug-in for DB2 on Linux.

Installing the Avamar Plug-in for DB2 on Linux

You can install the Avamar Plug-in for DB2 software in either the default installation directory or an alternate directory by using the `rpm` command.

About this task

Ensure that you install the Avamar Plug-in for DB2 in the same directory as the Avamar Client for Linux.

Procedure

1. Log in to the DB2 server as root.
2. Change the directory to the temporary directory by typing the following command:

   cd /*tmp*

   where *tmp* is the temporary install directory.

3. To install the software in the default directory, type the following command:

   rpm -ivh AvamarDB2-linux-*platform-version*.rpm

   where:

   - *platform* is the Linux platform type.
   - *version* is the Avamar software version.

4. To install the software in an alternate directory, type the following command:

   rpm --relocate /usr/local/avamar=/*install_path* -ivh AvamarDB2-linux-*platform-version*.rpm

   where:

   - *install_path* is the directory where you installed the Avamar Client for Linux.

- *platform* is the Linux platform type.
- *version* is the Avamar software version.

Upgrading the Avamar Plug-in for DB2 on Linux

Use the `rpm` command to upgrade the software in the default directory or the `rpm` command with the `--relocate` option to upgrade the software in an alternate directory. The versions of the Avamar Client for Linux and Avamar Plug-in for DB2 must be the same.

Procedure

1. To upgrade the Avamar Client for Linux, use the instructions in the *Avamar Backup Clients User Guide*.
2. To upgrade the software in the default directory, type the following command:

   `rpm -Uvh AvamarDB2-linux-`*`platform-version`*`.rpm`

   where:

   - *platform* is the Linux platform type.
   - *version* is the Avamar software version.

3. To upgrade the software in an alternate directory, type the following command:

   `rpm -Uvh --relocate /usr/local/avamar=`*`install_path`* `AvamarDB2-linux-`*`platform-version`*`.rpm`

   where:

   - *install_path* is the directory where you installed the Avamar Client for Linux.
   - *platform* is the Linux platform type.
   - *version* is the Avamar software version.

Uninstalling the Avamar Plug-in for DB2 on Linux

You can uninstall the Avamar Plug-in for DB2 from a Linux system by using the `rpm -e` command.

About this task

When you uninstall the Avamar Plug-in for DB2 and the Avamar Client for Linux from the host system, scheduled backups no longer occur for the client. You cannot restore backups to the client after you uninstall the software.

You can retire or delete a client either before or after you uninstall the Avamar Plug-in for DB2.

- To keep the backups for the client so that you can restore the backups to a different client, retire the client by using Avamar Administrator.
- To delete the backups for the client, delete the client by using Avamar Administrator.

The *Avamar Administration Guide* provides more information.

Note: If High Availability Disaster Recovery (HADR) clients are being used, before uninstalling the Avamar Plug-in for DB2, you must first unconfigure all HADR clients by following the procedures at Removing the DB2 HADR client from UNIX and Linux on page 90.

Procedure

1. Log in to the DB2 server host as root.
2. List the Avamar software that is installed on the system by typing the following command:

   ```
   rpm -qa | grep Av
   ```

   A list of Avamar software appears in the command shell:

   ```
   AvamarClient-version
   AvamarDB2-version
   ```

3. Uninstall the Avamar Plug-in for DB2 by typing the following command:

   ```
   rpm -e AvamarDB2-version
   ```

   where AvamarDB2-*version* is the Avamar Plug-in for DB2 installation package.

4. Uninstall the Avamar Client for Linux by typing the following command:

   ```
   rpm -e AvamarClient-version
   ```

   where AvamarClient-*version* is the Avamar software installation package.

Installing, upgrading, and uninstalling on Solaris

You can install, upgrade, and uninstall the Avamar Plug-in for DB2 on Solaris.

Installing the Avamar Plug-in for DB2 on Solaris

You can install the Avamar Client for Solaris software by using the `pkgadd` command.

About this task

Ensure that you install the Avamar Plug-in for DB2 in the same directory as the Avamar Client for Solaris.

Procedure

1. Log in to the DB2 server as root.
2. Change the directory to the temporary directory by typing the following command:

   ```
   cd /tmp
   ```

   where *tmp* is the temporary install directory.

3. Install the software by typing the following command:

   ```
   pkgadd -d AvamarDB2-solaris10-platform-version.pkg
   ```

   where *platform-version* is the platform type and Avamar version number.

   The following output appears in the command shell:

   ```
   The following packages are available:
   1 AVMRdb2 Avamar Client Plugin for DB2
   (sparc) 7.2.100-nnn
   Select package(s) you wish to process (or 'all' to process
   all packages). (default: all) [?,??,q]:
   ```

4. Type `1` and press **Enter**.

   The following output appears in the command shell:

   ```
   Processing package instance <AVMRdb2> from
   </tmp/AvamarDB2-solaris10-sparc-7.2.100-nnn.pkg>
   ```

```
Avamar Client Plugin for DB2(sparc) 7.2.100-nnn
Relocate install from /opt/AVMRclnt? [n]
```

5. Press **Enter** to accept the default install location.

   The following output appears in the command shell:

```
## Executing checkinstall script.
Using as the package base directory.
## Processing package information.
## Processing system information.
## Verifying package dependencies.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.
This package contains scripts which will be executed with
super-user permission during the process of installing this
package.
Do you want to continue with the installation of <AVMRdb2> [y,n,?]
```

6. Type **y** and press **Enter.**

   The following output appears in the command shell:

```
## Executing checkinstall script.
Using as the package base directory.
## Processing package information.
## Processing system information.
3 package pathnames are already properly installed.
## Verifying package dependencies.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
The following files are already installed on the system and
are being used by another package: /opt/AVMRclnt/lib/libgcc_s.so.1
Do you want to install these conflicting files [y,n,?,q]
```

7. Type **y** and press **Enter.**

   The following output appears in the command shell:

```
## Checking for setuid/setgid programs.
This package contains scripts which will be executed with super-
user
permission during the process of installing this package.
Do you want to continue with the installation of <AVMRdb2> [y,n,?]
```

8. Type **y** and press **Enter.**

   The installation runs to completion.

Upgrading the Avamar Plug-in for DB2 on Solaris

To upgrade the Avamar Plug-in for DB2 on a Solaris system, complete the required steps. The versions of the Avamar Client for Solaris and Avamar Plug-in for DB2 must be the same.

Procedure

1. Uninstall the Avamar Plug-in for DB2. Uninstalling the Avamar Plug-in for DB2 on Solaris on page 33 provides instructions.
2. Uninstall the Avamar Client for Solaris. The *Avamar Backup Clients User Guide* provides instructions.

3. Download the Avamar Plug-in for DB2 installation package. Downloading the software on page 24 provides instructions.
4. Download and install the new version of the Avamar Client for Solaris. The *Avamar Backup Clients User Guide* provides instructions.
5. Install the new version of the Avamar Plug-in for DB2. Installing the Avamar Plug-in for DB2 on Solaris on page 31 provides instructions.

Uninstalling the Avamar Plug-in for DB2 on Solaris

You can uninstall the Avamar Plug-in for DB2 from a Solaris system by using the `pkgrm` command.

About this task

When you uninstall the Avamar Plug-in for DB2 and the Avamar Client for Solaris from the host system, scheduled backups no longer occur for the client. You cannot restore backups to the client after you uninstall the software.

You can retire or delete a client either before or after you uninstall the Avamar Plug-in for DB2.

- To keep the backups for the client so that you can restore the backups to a different client, retire the client by using Avamar Administrator.
- To delete the backups for the client, delete the client by using Avamar Administrator.

The *Avamar Administration Guide* provides more information.

Note: If High Availability Disaster Recovery (HADR) clients are being used, before uninstalling the Avamar Plug-in for DB2, you must first unconfigure all HADR clients by following the procedures at Removing the DB2 HADR client from UNIX and Linux on page 90.

Procedure

1. Log in to the DB2 server host as root.
2. Display all Avamar packages that are installed on the system by typing the following command:

   `pkginfo | grep AVMR`

   Information similar to the following appears in the command shell:

   ```
   The following packages are currently installed:
   1 AVMRclnt Avamar Client
   (sparc) 7.2.100-nnn
   2 AVMRdb2 Avamar Client Plugin for DB2
   (sparc) 7.2.100-nnn
   ```

3. Note the package names.
4. Uninstall the software by typing the following command:

   `pkgrm` *`package_name`*

   where *package_name* is the Avamar plug-in package.

   The following output appears in the command shell:

   ```
   The following package is currently installed:
   package_name
   Do you want to remove this package?
   ```

5. Type **`y`** and press **Enter.**

   The following output appears in the command shell:

```
Removal of package_name was successful.
```

Installing, upgrading, and uninstalling on Windows

You can install, upgrade, and uninstall the Avamar Plug-in for DB2 on Windows.

Installing the Avamar Plug-in for DB2 on Windows

You can install the Avamar Client for Windows software in either the default installation directory or an alternate directory. The installation process automatically installs the Avamar Plug-in for DB2 in the same directory as the Avamar Client for Windows.

About this task

If UAC is enabled on the client computer, you must start the setup wizard by using administrator privileges. Otherwise, the software does not install correctly. This procedure provides one method to bypass UAC. The Microsoft documentation provides other methods and additional information.

Procedure

1. Log in to the DB2 server as an administrator.
2. Go to the temporary directory that contains the installation package that you downloaded in Downloading the software.
3. Start the Avamar Plug-in for DB2 installation by using the correct method:
   - If UAC is disabled, double-click the installation package.
   - If UAC is enabled, right-click the **Command Prompt** icon and select **Run as administrator**. Change to the directory that contains the installation package and type the following command:

     ```
     msiexec /I AvamarDB2-windows-platform-version.msi
     ```

     where:

     - *platform* is the Windows platform type.
     - *version* is the Avamar software version.

   The welcome page appears.
4. Click **Next.**

   The **Ready to Install Avamar Plug-in for DB2** page appears.
5. Click **Install**.

   The **Installing Avamar Backup Plug-in for DB2** page appears. A status bar shows the installation's progress. After the installation completes, the **Completed the Avamar Backup Plug-in for DB2 Setup Wizard** page appears.
6. Click **Finish.**

Upgrading the Avamar Plug-in for DB2 on Windows

When you upgrade the Avamar Plug-in for DB2, you do not need to uninstall earlier versions before you install a new version. The installation determines that an earlier version is installed, and then prompts you to upgrade to the new version or remove the current version.

Procedure

1. Ensure that you meet all system requirements for the new version. Preparing to install the Avamar Plug-in for DB2 on page 24 provides information.

2. Upgrade the Avamar Client for Windows by running the Windows client installation wizard for the new version on the client computer. The *Avamar for Windows Server User Guide* provides instructions.
3. Upgrade the Avamar Plug-in for DB2 by running the plug-in installation wizard for the new version on the Windows server. Installing the Avamar Plug-in for DB2 on Windows on page 34 provides instructions.

Uninstalling the Avamar Plug-in for DB2 on Windows

When you uninstall the Avamar Plug-in for DB2 and the Avamar Client for Windows from the host system, scheduled backups no longer occur for the client. You cannot restore backups to the client after you uninstall the software.

About this task

You can retire or delete a client either before or after you uninstall the Avamar Plug-in for DB2.

- To keep the backups for the client so that you can restore the backups to a different client, retire the client by using Avamar Administrator.
- To delete the backups for the client, delete the client by using Avamar Administrator.

The *Avamar Administration Guide* provides more information.

Note: If High Availability Disaster Recovery (HADR) clients are being used, before uninstalling the Avamar Plug-in for DB2, you must first unconfigure all HADR clients by following the procedures at Removing the DB2 HADR client from Microsoft Windows on page 90.

Procedure

1. Uninstall the Avamar Plug-in for DB2 by using **Programs and Features**.
2. Uninstall the Avamar Client for Windows by using **Programs and Features**.

CHAPTER 3

Backup

This chapter includes the following topics:

- Architecture 38
- Archived log backup and restore 39
- Backup 39
- Preparing the database for backup 39
- Performing on-demand backups 41
- Scheduling backups 45
- Monitoring backups 47
- Cancel backups 48
- Enforcement of backups to Data Domain 48

Architecture

The Avamar Plug-in for DB2 provides a complete deduplication backup and recovery solution for IBM DB2 servers. The Avamar Plug-in for DB2 works with the Avamar server, the Avamar client, and the DB2 API to back up DB2 databases and logs.

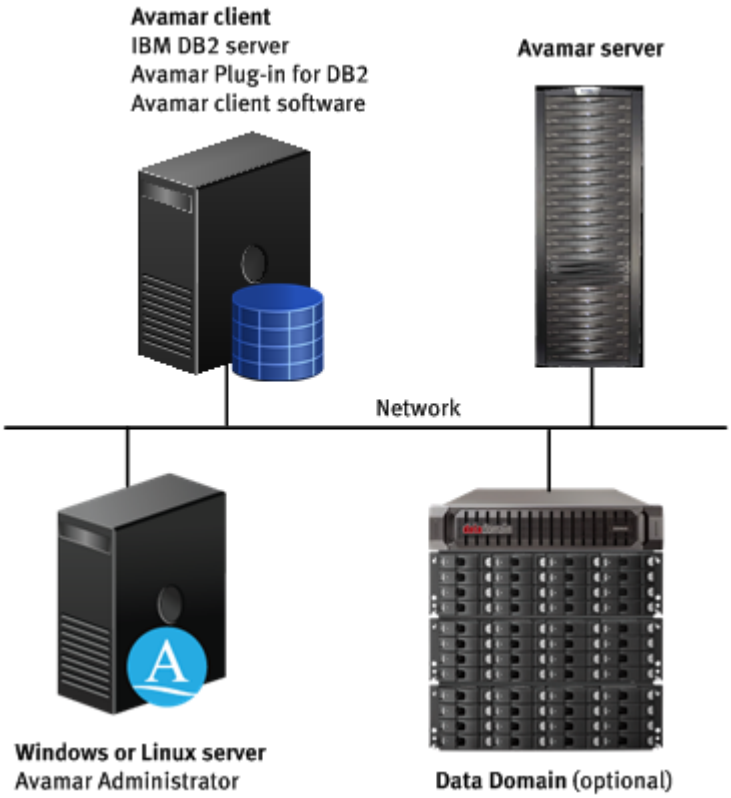
You can back up DB2 data to and restore DB2 data from an Avamar server or a Data Domain system. The Avamar Plug-in for DB2 serves as a backup module and the Avamar server or Data Domain system as a storage device.

The Avamar Plug-in for DB2 supports backups and restores of DB2 single or multiple instance configurations and DB2 configurations that implement DB2 Database Partitioning Feature (DPF).

Each DB2 server host requires the installation of the Avamar Plug-in for DB2 and an Avamar file system client. You can back up and restore DB2 databases by using Avamar Administrator, the AUI, or the DB2 Command Line Processor (CLP).

The following figure shows a configuration in which the Avamar Plug-in for DB2 backs up or restores DB2 databases to or from an Avamar server or a Data Domain system.

Figure 2 Avamar Plug-in for DB2 configuration



Note: The Avamar AUI is only supported in stand-alone environments.

Archived log backup and restore

The Avamar Plug-in for DB2 supports backups of archived transaction logs, which you can later use for roll-forward operations.

Circular and archive logging

DB2 transaction logs keep records of database changes. DB2 software provides circular and archive logging:

- Circular logging supports full offline database backups.
- Archive logging supports online database backups and roll-forward recovery.

The IBM DB2 documentation provides more information about circular and archive logging.

Transaction logs

Consider the following:

- You can configure the DB2 server to back up a transaction log as soon as it is archived.
- During a recovery or roll-forward operation, the DB2 server requests the restore of archived logs that are not available on the system from the Avamar Plug-in for DB2.
- To skip the overhead process of searching for the available saved archived logs, the Avamar File System plug-in can be used to restore missing archived logs before you restore the database. Specify the location of the log files when you perform a database roll-forward operation.

Backup

The Avamar Plug-in for DB2 allows you to perform backups from Avamar Administrator, the AUI, or from the DB2 Command Line Processor (CLP).

Note: The Avamar AUI is only supported in stand-alone environments.

Preparing the database for backup

Before you use the Avamar Plug-in for DB2 to perform backups, you must configure the database appropriately.

Configuring automatic backups for DB2 transaction logs

You can configure the DB2 database to enable automatic backups of transaction logs.

About this task

DB2 uses the `LOGARCHMETH1` and `LOGARCHOPT1` parameters to enable automatic backups of a transaction log as soon as it is archived. DB2 10.1 includes a new parameter, `LOGARCHCOMPR1`, to enable archive log compression. Leave this parameter set to its default value since Avamar performs its own compression.

Procedure

1. Create the Avamar Plug-in for DB2 flag file. Creating the Avamar Plug-in for DB2 flag file on page 40 provides instructions.
2. Configure the database for log backups by typing the following command:

```
db2 update db cfg for database_name using logarchmeth1
VENDOR:vendor_library logarchopt1 @pathname
```

where:

- *database_name* is the name of the database to back up.
- *vendor_library* is the full pathname to the shared library of the Avamar Plug-in for DB2.
- *pathname* is the absolute pathname to the flag file that you created in step 1.

Creating the Avamar Plug-in for DB2 flag file

Before you back up a DB2 data, create a flag file. You can choose any name for the flag file. For example, `avdb2.flg`. Specify the Avamar server user credentials and other parameters in the flag file. To perform log backups, the Avamar Plug-in for DB2 requires you to set Avamar server user credentials in the flag file.

Procedure

1. Create a text file.
2. Type the required information in the text file. The following file is an example flag file:

```
--id=user-1@/clients/hostA.avamar.emc
--password=obfuscated password
--sysdir=c:\Progra~1\avs\etc
--dbpartitionnums=0,1,2,3
--catnode=0
--logfile=e:\avdb2-cli.log
--labelnum=256
--ddr=true
--ddr-index=1
--avtar-before-after-days-search=1
```

where:

- `--id`, `--password`, and `--sysdir` are mandatory.
- `--dbpartitionnums` specifies the list of partitions for a single-system view.

  The `--dbpartitionnums` flag is mandatory for DPF configurations.
- `--catnode` specifies the partition number of the catalog node.

  The `--catnode` flag is mandatory for DPF configurations.
- `--logfile` is optional.
- `--labelnum` is mandatory to restore backups from Avamar releases before 7.0.
- `--ddr` and `--ddr-index` are mandatory for backups to Data Domain systems.
- `--avtar-before-after-days-search` is an optional flag that provides a range for searching and retrieving the DB2 database backup image. This option helps to reduce the search time. The range is internally constructed by avtar as:
  - `--before` is the DB2 backup timestamp plus the number of specified days.
  - `--after` is the DB2 backup timestamp minus the number of specified days.

Note: The `--id` and `--password` parameters are not necessary for database backups when you include them in the `avdb2.cmd` file.

3. Save the text file and ensure that the mode of the file is set correctly for DB2-user read permission.

Performing offline backups

DB2 databases must not have any application connections when you perform an offline backup.

Procedure

1. Ensure that no clients are connected to the database during the backup operation.
2. Ensure that no changes to the database are taking place during the backup window.

   A database modification during a backup can cause the backup to fail.

Performing online backups

The Avamar Plug-in for DB2 supports setting up log archiving only with the `LOGRETAIN` and `VENDOR` parameters. Before you perform the first online backup, enable archiving logging by configuring the `LOGRETAIN` and `VENDOR` parameters.

Procedure

1. For DB2 version 9.1 and earlier, to use the `LOGRETAIN` parameter, type the following command:

   ```
   db2 update db cfg for database_name using LOGRETAIN ON
   ```

   where *database_name* is the name of the database to back up.
2. For DB2 version 9.5 and later, to use the `LOGRETAIN` parameter, type the following commands:

   ```
   update db cfg for database_name using LOGARCHMETH1 LOGRETAIN
   update db cfg for database-name using LOGARCHMETH1 DISK
   ```

   where *database_name* is the name of the database to back up.
3. To use the `VENDOR` parameter, use the `db2 update db cfg` command in Configuring automatic backups for DB2 transaction logs.
4. Select the **Create an online backup** option for the dataset or for an on-demand backup.

Performing on-demand backups

An on-demand backup is a user-initiated backup of specific data that you select. Perform an on-demand backup for the first backup of the client immediately after you install the Avamar client software, and before system maintenance, software installations, or software upgrades.

Procedure

1. In the AUI navigation pane on the left, click ≫, and then click **Asset Management**.

   The **Asset Management** window is displayed.
2. In the domain tree, select the domain that contains the host of the DB2 server.

   A list of Avamar clients is displayed in the pane under the domains list.
3. In the list of clients, select the host of the DB2 server, the host of a DPF node, or the DPF catalog node.

   In a DPF environment, select the host of a DPF node to back up individual partitions in a database, or select the catalog node to back up a combination of partitions or all partitions.

You can only view clients in the domain for the login account. To view all clients, log in to the root domain.

4. Click **Backup**.

   The **Backup wizard** is displayed. In the **Plugin** pane, a list of plug-ins that are installed on the DB2 server are displayed.

5. In the **Plugin** pane, perform the following steps:

   a. Select the DB2 plug-in for the platform.

   b. In the **DB2 Instance Name** field, type the name of the DB2 instance to browse.

   c. In the **Instance Admin Username** field, type the instance owner or system admin username.

   d. In the **Instance Admin Password** field, type the password for the username

   e. Click **SUBMIT**.

   f. Click **NEXT**.

   The **Basic Configuration** window is displayed.

6. In the **Basic Configuration** window, perform the following steps:

   a. Select the backup retention policy settings:

      - To automatically delete this backup from the Avamar server after a specific amount of time, select **Retention period**. Specify the number of days, weeks, months, or years for the retention period.
      - To automatically delete this backup from the Avamar server on a specific calendar date, select **End date** and browse to that date on the calendar.
      - To keep this backup for as long as this client remains active in the Avamar server, select **No end date**.

   b. From the **Avamar encryption method** list, select the encryption method to use for data transfer between the client and the Avamar server during the backup.

      The encryption technology and bit strength for a client/server connection depends on several factors, including the client operating system and Avamar server version. The *Avamar Product Security Guide* provides additional information.

   c. From the **Optionally select a proxy to perform backup** list, select the proxy.

      The default setting is **Automatic**, which enables the Avamar server to choose the best proxy for this operation.

   d. Click **NEXT**.

      The **More Options** window is displayed.

7. (Optional) To view advanced configuration options, click **Show Advanced Options**.

   Plug-in Options provides more information about the advanced backup options.

8. (Advanced option) To write maximum information to log files, select **Enable debugging message**. Selecting this option creates very large log files.

9. Set the plug-in options:

   a. To store the backup on a Data Domain system instead of the Avamar server, select the **Store backup on Data Domain system** check box and then select the Data Domain system from the list.

b. In the **Encryption method to Data Domain system** list, select the encryption method to use for data transfer between the client and the Data Domain system during the backup.

c. In the **Backup label** list menu, type a name for the backup label.

d. In the **List backup contents** field, select a method to list the backups.

e. In the **Informational message level** field, select the level of messaging.

f. To review advanced statistics, select the **Report advanced statistics** check box.

g. To set the file system traversal, select **Do not traverse any mounts**.

10. Click **FINISH**.

    The following status message is displayed:

    `Backup initiated.`

11. Select **Actions** > **View Activity** to view status details for the backup.

Backup types

The Avamar Plug-in for DB2 allows you to use Avamar Administrator, the AUI, and the DB2 CLP to perform full and incremental backups.

The Avamar Plug-in for DB2 supports the following types of backups:

- Full backups from Avamar Administrator or the AUI
- Full, incremental, and delta backups from the DB2 CLP
- Tablespace backups from the DB2 CLP
- Online backups

  You can perform an online backup while the database is active. When using this type of backup, users and applications can connect to the database and perform transactions. Online backups can either include or exclude archived logs.
- Offline backups

  You can perform an offline backup while the database is inactive. Offline backups do not allow connections to the database.
- On-demand or scheduled backups from Avamar Administrator or the AUI.

  You can perform either on-demand or scheduled backups while the database is online or offline.
- Backups of `load copy` images that are created by db2 load operations with the `copy yes` option

Data deduplication optimization

The Avamar Plug-in for DB2 supports the `dedup_device` option.

The `dedup_device` option for the `db2 backup database` command is available in the latest DB2 versions and fixpacks. Refer to the vendor documentation for the availability of `dedup_device` option.

The `dedup_device` option optimizes the format of data that is backed up to a deduplication device. The Avamar Plug-in for DB2 includes support for the `dedup_device` option for backups that are run from Avamar Administrator, the AUI, or the DB2 CLP.

- From Avamar Administrator or the AUI, specify the `Optimize backup images` option.

- From the DB2 CLP, specify the `dedup_device` option with the `db2 backup db` command.

Data Domain system support

The Avamar Plug-in for DB2 supports backups to and restores from Data Domain systems.

You can back up DB2 data to a Data Domain system by using Avamar Administrator or by using the DB2 CLP. Metadata for the backup is stored on the Avamar server.

You can restore backups from a Data Domain system the same way you restore backups from the Avamar server. There are no extra steps. You can follow the same restore procedure whether the data is on the Avamar server or on a Data Domain system.

The *Avamar and Data Domain System Integration Guide* provides more information about configuring Data Domain systems for use with Avamar systems.

DB2 CLP support

You can use the DB2 CLP for backup, restore, recovery, and roll forward operations.

The Avamar Plug-in for DB2 supports the `db2 backup`, `db2 restore`, `db2 recover`, and `db2 rollforward` commands. The plugin also supports `db2 load` command with `copy yes` option. Backup and Restore with DB2 CLP on page 93 provides more information.

DPF restore and recovery

The Avamar Plug-in for DB2 supports database partition restores in configurations which use the DPF.

Unlike the backup process, which must run only from the catalog partition, the restore operation runs on each partition:

- To restore partitions from the catalog partition, you perform a restore to the original location. Restoring database partitions to the original location on page 75 provides instructions.
- To restore partitions from non-catalog partitions, you perform a restore to a different location. Restoring database partitions to a different location on page 77 provides instructions.

Avamar Administrator lists all backed up partitions for the selected client. The Avamar Plug-in for DB2 restores each partition backup separately. You cannot restore all partition backups in a single restore operation. However, the limitation of one DPF node and one database at a time on a host also applies to restore operations from the DB2 CLP. DB2 CLP limitations on page 105 provides more information.

The roll-forward and recovery operations of DPF nodes from either Avamar Administrator, the AUI, or the DB2 CLP must be run in DPF mode and must be run at the catalog node.

HADR backups

This section describes how to perform DB2 HADR backups using the Avamar client for DB2 HADR.

Management Console-initiated on-demand backups of an HADR database are performed the same way as with the stand-alone databases. Management Console-initiated on-demand backups require that the Avamar client for DB2 HADR is started on the Primary node.

To configure the scheduled backups, replace the base Avamar client with the Avamar client for DB2 HADR by following instructions in Scheduling backups on page 45.

CLP-backups of an HADR database can be performed the same way as on a stand-alone database. Avamar Plug-in for DB2 flag file configuration on page 95 contains details on how to prepare the flag file. The `--account` option must contain the path to the Avamar client for DB2 HADR, and the `--sysdir` option must contain the path to the `etc` directory of the Avamar client for DB2 HADR.

For Microsoft Windows clients, the following options must also be set:

- `--vardir` must contain the path to the `var` directory of the Avamar client for DB2 HADR defined during the HADR client configuration.
- `--logfile` must contain the path to the logs and the prefix.

For example:

```
--sysdir=C:\Progra~1\avs\etc
--account=/clients/db2_hadr_win
--vardir=C:\Progra~1\avs\var\db2_hadr_win_var\
--logfile=C:\Progra~1\avs\var\db2_hadr_win_var\clientlogs\avdb2-log
```

Note: For Microsoft Windows clients, the `etc` directory for the HADR client is shared with the base client. For UNIX and Linux client, the `etc` directory is created separately from the base client.

Scheduling backups

Scheduled backups run automatically to ensure that backups of the DB2 data occur on an ongoing basis. You can schedule backups to run daily, weekly, or monthly. The scheduled backup can include multiple clients or a single server.

About this task

You can schedule backups by using the Policy wizard to create a policy for a backup.

Perform the following steps within the **Policy** wizard. The *Avamar Administration Guide* provides more information about policies, datasets, schedules, and retention settings.

Procedure

1. Assign members to the new backup policy.
2. Assign a dataset to the new backup policy.

   To create a dataset, use the Policy wizard or select **Settings** > **Dataset** > **Add**.
3. Assign a schedule to the new backup policy.

   To create a schedule, use the Policy wizard or select **Settings** > **Schedule** > **Add**.
4. Assign a retention policy to the new backup policy.

   To create a retention policy, use the Policy wizard or select **Settings** > **Retention** > **Add**.
5. Enable scheduling for the backup policy.

Creating a dataset

A dataset specifies the data to include in a scheduled backup and the options to use for the backup. Create at least one dataset for scheduled backups on a client or group of clients. Create multiple datasets to segregate client data.

Procedure

1. In the AUI navigation pane on the left, click ≫, and then click **Settings**.

   The **Setting** pane is displayed.
2. Click the **Dataset** tab.
3. Click **ADD**.

   The **Create Dataset** window is displayed.

4. In the **Dataset Name** field, type a name for the dataset.

   The name can include alphanumeric characters (A-Z, a-z, 0–9) and the following special characters: period (.), hyphen (-), and underscore (_). Do not use Unicode characters or the following special characters: ` ~ ! @ # $ % ^ & * ( ) = + [ ] { } | \ / ; : ' " < > , ?

5. From the **Plugins** list, select the DB2 plug-in for the platform.

   The DB2 plug-in options are displayed.

6. Click the **Options** tab and set the following plug-in options:

   a. To perform an online backup, select **Create an online backup**.

   b. To exclude archive logs from an online backup, select **Exclude archive logs in online backup**.

   c. To enable the DB2 dedup_device option for this backup, select **Optimize backup deduplication**.

   > **Note:** Only specific DB2 versions support the `dedup_device` option. To determine if the DB2 version supports the `dedup_device` option, check the vendor documentation. If you select the **Optimized backup deduplication** option for a backup of a DB2 database that does not support the `dedup_device` option, a backup might fail.

   d. In the **Instance Admin Username** field, type the instance owner or system admin username.

   e. In the **Instance Admin Password** field, type the password for the username.

   f. In the **Database Partition Numbers** field, specify the partitions to include in the backup:

   - To specify all database partitions, type **`ALL`** or **`all`**.
     > **Note:** Specifying all partitions numerically is not the same as using **`ALL`** or **`all`**.
   - To specify a list of partitions, type the partition numbers in a comma-separated list. For a single partition setup, leave this field blank.

   g. In the **Number of sessions during backup** list, select the number of sessions to use for the backup.

   Concurrent backups and restores on page 20 provides more information about how Avamar Plug-in for DB2 handles multiple backup sessions.

   h. To store the backup on a Data Domain system instead of the Avamar server, select **Store backup on Data Domain system**.

   i. (Advanced option) To write maximum information to log files, select **Enable debugging message**. Selecting this option creates very large log files.

   j. In the **Encryption method to Data Domain system** list, select the encryption method to use for data transfer between the client and the Data Domain system during the backup.

7. Click the **Source Data** tab and set the following plug-in options:

   a. In the **File/Folder Path**, type the file path.

   b. Click **ADD**.

8. Click **SUBMIT**.

Creating a backup policy

A backup policy is a collection of Avamar clients that use the same dataset, schedule, and retention settings to implement scheduled backups.

About this task

Member clients must all be in the same Avamar domain. When you create a backup policy, you define the dataset, schedule, and retention settings that apply for scheduled backups. These settings comprise the backup policy, which controls backup behavior for all members of the backup policy unless you override these settings at the client level.

The *Avamar Administration Guide* provides information about creating and editing backup policies, schedules, or retention settings.

Enabling a scheduled backup for a backup policy

Scheduled backups occur only for enabled backup policies. Backup policies are disabled by default unless you select the **Enabled** check box on the first page of the **New Policy** wizard. If you did not enable the backup policy when you created it, use the menu options in the **Policy** window to enable backups.

Procedure

1. In the AUI navigation pane on the left, click ≫, and then click **Backup Policy**.

   The **Policy** page is displayed.
2. In the domain tree, select a domain or subdomain for the backup policy.

   To select a subdomain for the backup policy, toggle the **Include Sub-domain** switch to on.
3. Select a backup policy from the list.
4. To enable a backup policy, click **MORE ACTIONS** > **Enable Policy**.
5. To disable a backup policy, click **MORE ACTIONS** > **Disable Policy**.

Monitoring backups

You can monitor and view status information for backup and restore operations by using the **Activity Monitor**.

About this task

To access the **Activity Monitor**, open the navigation pane, and then click **Activity**. The **Activity Monitor** appears with a list of all activities.

> **Note:** The AUI **Activity Monitor** window has been optimized for at least 1366 pixels-wide screens. Display issues might occur for smaller screens. To properly display the AUI, ensure that your display is at least 1366 pixels wide.

The **Activity Monitor** provides you with options to filter the information that appears:

- Filter activities by duration—By default, the **Activity Monitor** displays the most recent 5,000 client activities. To select a different duration, in the **Filter activities by duration** drop-down list, select **Last 24 hours** or **Last 72 hours**.
- Filter activities by domain—By default, the **Activity Monitor** displays all activities regardless of domain. To display only the activities for a specific domain, in the **Filter activities by domain** drop-down list, select a domain or subdomain.
- Filter activities by status—By default, the **Activity Monitor** displays all activities regardless of status.

To display only activities with a specific status, at the top of the **Activity Monitor**, select one of the following options:

- Canceled
- Completed
- Completed with Exceptions
- Failed
- Running
- Waiting

To filter activities by client, start time, plug-in, or type, click in their respective column.

The **Activity Monitor** displays the date and time that an activity began, and the total number of bytes examined during an activity.

To view activity details, expand the **Details** pane, by clicking .

Cancel backups

You can cancel a backup any time before it completes. The cancellation might take 5 minutes or longer. The backup might complete before the cancellation finishes.

Procedure

1. In the AUI navigation pane on the left, click , and then click **Activity**.

   The **Activity Monitor** appears with a list of activities.
2. Select the backup from the list.
3. Click **CANCEL**.

   A confirmation dialog box is displayed.
4. Click **YES**.

Enforcement of backups to Data Domain

If the Avamar server is configured to enforce backups to a Data Domain system, the server rejects backups that are not destined for the Data Domain. This enforcement covers backups that you configure through the Avamar Administrator and the AUI, as well as from command-line interfaces and other tools.

These backups must have additional flags that indicate the storage target. The *Avamar and Data Domain System Integration Guide* provides more information about backup enforcement and the related client version requirements. Backup enforcement is disabled by default.

CHAPTER 4

Restore and Recovery

This chapter includes the following topics:

- Backup naming conventions 50
- Restoring DB2 databases to the original location 51
- Restoring DB2 databases to a different client 61
- Restoring table spaces in a stand-alone DB2 environment 65
- Recovering retired clients 67
- Disaster recovery 69
- Monitor restores 70
- Cancel restores 71

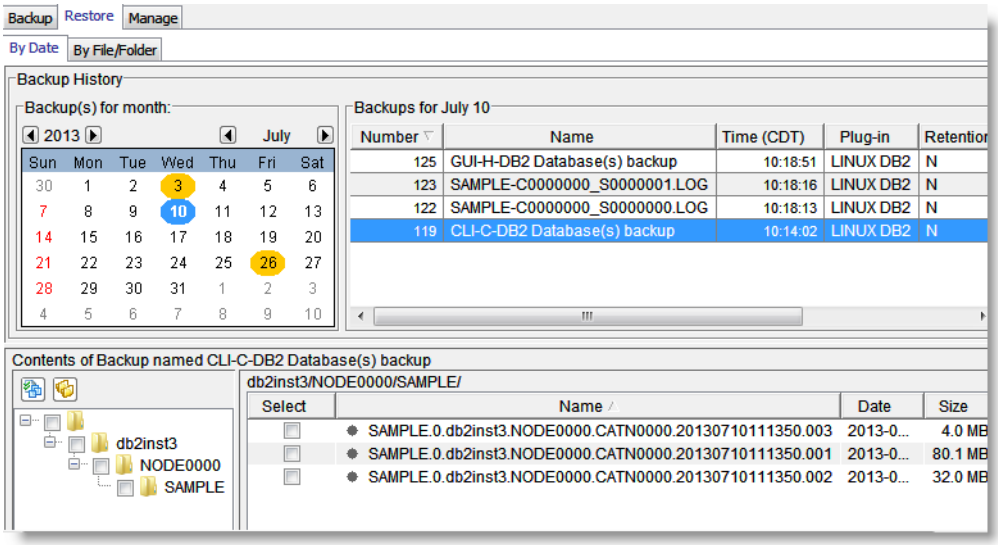
Backup naming conventions

The naming convention that the Avamar Plug-in for DB2 uses is based on the standard naming convention that DB2 uses.

The **Backup, Restore and Manage** window in Avamar Administrator displays backup label and backup image names for backups available to restore. Backup labels appear to the right of the calendar in the **Backups** table. Backup image names appear below the **Backups** table in the **Contents of Backup** table.

The following figure shows the label name and image name for a backup that a user selects for restore.

Figure 3 Backup label and image names



Backup labels and image names for a database backup

Backup labels for database backups contain specific elements. For example, a backup label contains an element that shows you whether the CLI or GUI was used to create the backup.

Backup labels for database backups use the following naming convention:

interface-database_status-backup_type

where:

- *interface* is CLI or GUI.
- *database_status* is C for an offline database backup and H for an online database backup.
- *backup_type* is DB2 Database(s) backup or DB2 LOAD_COPY image.

`CLI-C-DB2 Databases(s) backup`, for example, is the backup label that is selected in Figure 3 on page 50.

Backup image names for database backups are specific to the version of DB2. Versions 9.5 and 9.7 use the following naming convention:

db_name.DB2_backup_type.instance_name.node_id.catalognode_id.DB2_backup_timestamp.stream_sequence_number

where the value of *DB2_backup_type* is 0, 3, or 4:

- 0 represents a full backup of a database.
- 3 represents a backup of a table space.
- 4 represents a backup image the `LOAD ... COPY TO` command creates.

Backup image names in DB2 10 use a different naming convention. The *node_id.catalognode_id* format changes to *part_id*.

Note: The Avamar image format for DB2 10 is the same as DB2 versions 9.7 and 9.5. The DB2 10 native format is different than DB2 9.7.

`AVAMAR1.0.db2inst1.NODE0000.CATN0000.20121129175842.001`, for example, is a backup image name. The 0 (zero) value for *DB2_backup_type* in this backup image name indicates that the image backup is a full backup of a database.

Backup labels and image names for log backups

Backup labels for log backups contain specific elements. A backup label, for example, contains an element that shows you the sequence number of the log backup.

Backup labels for log backups use the following naming convention:

db_name-chain-number_sequence-number`.LOG`

`AVAMAR1-C0000042_S0000038.LOG` is an example backup label name for a log backup.

Backup image names for log backups use the following naming convention:

chain-number_sequence-number`.LOG`

`C0000042_S0000038.LOG` is an example backup image name for a log backup.

The display for the directory structure that contains the log files shows the instance, the database, and the node for the log files.

The backup image name is the same for backups from Avamar Administrator and from the DB2 CLP.

Restoring DB2 databases to the original location

You can restore DB2 databases to the original directory on the original client. The Avamar Plug-in for DB2 can restore offline backups, online backups that include archive log, online backups that do not include archive logs, and backups of archive logs.

Restoring offline backups

You can restore an offline backup to the original directory. A backup label, for example, `GUI-C-DB2 Database(s) backup` contains a “C” in its name. The “C” indicates that the backup is for an offline database.

Before you begin

Ensure that the DB2 database is inactive. During the restore operation, do not connect to the database.

Procedure

1. In the AUI navigation pane on the left, click ≫, and then click **Asset Management**.

   The **Asset Management** window is displayed.

2. In the domain tree, select the domain that contains the DB2 server.

   You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

A list of Avamar clients is displayed in the pane below the domains list.

3. In the list of clients, select the client that runs the DB2 server.
4. (Optional) To locate backups by date:
   a. In the right pane, click **VIEW MORE**.
   b. Click **SEARCH**.
   c. In the **From** and **To** fields, specify the date range.
   d. Click **RETRIEVE**.
   e. In the list of backups, select a backup.

   The list of backups for the date range is displayed.
5. Click the **Restore** tab.

   The **Restore** wizard is displayed and the **Destination Client** pane is displayed on the right.
6. In the **Destination Client** pane, perform the following steps:
   a. Select **Restore to original client**.
   b. Click **NEXT**.

   The **Backup Content** pane is displayed.
7. In the **Backup Content** pane, perform the following steps:
   a. In the left pane, select the DB2 instance folder.

      The **Contents of Backup** pane displays a list of files that are contained within that folder.

   b. In the right pane, select one or more database backups to restore.

      Note: For DPF restore operations from Avamar Administrator, the Avamar Plug-in for DB2 limits the selection of DPF nodes to one node and one database.

   c. Click **NEXT**.

   The **Destination Location** pane is displayed.
8. In the **Destination Location** pane, perform the following steps:
   a. Select **Restore everything to its original location**.
   b. Click **Next**.

   The **More Options** pane is displayed.
9. In the **More Options** pane, set the plug-in options:
   a. In the **Encryption method from Data Domain system** list, select an encryption method to use for client/server data transfer during this restore.

      The encryption technology and bit strength for a client/server connection depend on several factors, including the client platform and Avamar server version. The *Avamar Product Security Guide* provides more information.

   b. Select **Restore only**.

      Note: Leave the **Recovery Type** panel as is. The **Recovery Type** options apply only to the **Restore and roll forward database** option and the **Recover** option.

c. In the **Number of sessions** during restore list, select the number of sessions to use for the restore.

> **Note:** To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.

d. In the **Instance Admin Username** field, type the instance owner or system admin username.

e. In the **Instance Admin Password** field, type the password for the username.

f. Leave the **Database Partition Numbers** field blank. This field only applies to DPF environments.

g. Leave the **Directory Path to Restore Archive Logs** field blank. This field only applies to online backups that include archive logs.

If the **Directory Path to Restore Archive Logs** field contains a pathname, a restore of an offline backup fails. The error message for this type of failure is similar to the following message:

```
restore: Invalid option for archive logs. Backup image
db2inst1/c-AVAMAR1-1-sles10-32-db2-95-dpf does not contain
archive logs
```

h. Leave **Database Name** field blank. This field only applies to redirected restores.

i. In the **Instance Name** field, type the name of the instance. This field only applies to redirected restores.

j. If the target database exists and you want to overwrite it, select the **Replace existing database** check box.

10. Click **NEXT**.

The **Summary** pane is displayed.

11. In the **Summay** pane, review the provided information, and then click **FINISH**.

The following status message is displayed:

```
Restore request initiated.
```

Restoring online backups that include archive logs

You can restore an online backup that includes archive logs to the original directory by specifying the **End of logs**, **Point In Time**, or **End of Backup** recovery types. The **End of Backup** recovery type is available only for database backups of DB2 9.5 and later.

Procedure

1. In the AUI navigation pane on the left, click ≫, and then click **Asset Management**.

The **Asset Management** window is displayed.

2. In the domain tree, select the domain that contains the DB2 server.

You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

A list of Avamar clients is displayed in the pane below the domains list.

3. In the list of clients, select the client that runs the DB2 server.

4. (Optional) To locate backups by date:

a. In the right pane, click **VIEW MORE**.

b. Click **SEARCH**.

c. In the **From** and **To** fields, specify the date range.

d. Click **RETRIEVE**.

e. In the list of backups, select a backup.

The list of backups for the date range is displayed.

5. Click the **Restore** tab.

   The **Restore** wizard is displayed and the **Destination Client** pane is displayed on the right.

6. In the **Destination Client** pane, perform the following steps:

   a. Select **Restore to original client**.

   b. Click **NEXT**.

   The **Backup Content** pane is displayed.

7. In the **Backup Content** pane, perform the following steps:

   a. In the left pane, select the DB2 instance folder.

      The **Contents of Backup** pane displays a list of files that are contained within that folder.

   b. In the right pane, select one or more database backups to restore.

      Note: For DPF restore operations from Avamar Administrator, the Avamar Plug-in for DB2 limits the selection of DPF nodes to one node and one database.

   c. Click **NEXT**.

   The **Destination Location** pane is displayed.

8. In the **Destination Location** pane, perform the following steps:

   a. Select **Restore everything to its original location**.

   b. Click **Next**.

   The **More Options** pane is displayed.

9. In the **More Options** pane, set the plug-in options:

   a. In the **Encryption method from Data Domain system** list, select an encryption method to use for client/server data transfer during this restore.

      The encryption technology and bit strength for a client/server connection depend on several factors, including the client platform and Avamar server version. The *Avamar Product Security Guide* provides more information.

   b. Select **Restore and roll forward database**.

   c. Select a recovery type from the **Type of Recovery** list:

      - **End of logs** recovers the database by performing a rollforward operation to the end of the logs.
      - **Point In Time** recovers the database by performing a rollforward operation to a specific point-in-time.

> **Note:** Using the **Point In Time** recovery type requires you to type a date and time in the **Date and Time** field. Use the *yyyy-mm-dd hh:mm:ss* format. The time must be in the time zone of the client system.

- **End of Backup** recovers the database by performing a rollforward operation to the end of the backup. The **End of Backup** option is valid for DB2 versions 9.5 and later.

d. In the **Number of sessions** during restore list, select the number of sessions to use for the restore.

> **Note:** To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.

e. In the **Instance Admin Username** field, type the instance owner or system admin username.

f. In the **Instance Admin Password** field, type the password for the username.

g. Leave the **Database Partition Numbers** field blank. This field only applies to DPF environments.

h. In the **Directory Path to Restore Archive Logs** field, type the fully qualified pathname of an existing top-level directory.

The restore operation creates a subdirectory below the directory pathname you specify and restores the archive logs to this subdirectory.

i. Leave the **Database Name** field blank. This field only applies to redirected restores.

j. Leave the **Instance Name** field blank. This field only applies to redirected restores.

k. If the target database exists and you want to overwrite it, select the **Replace existing database** check box.

10. Click **NEXT**.

The **Summary** pane is displayed.

11. In the **Summay** pane, review the provided information, and then click **FINISH**.

The following status message is displayed:

```
Restore request initiated.
```

Restoring online backups that do not include archive logs

You can restore an online backup that does not include archive logs. Afterwards, you can use the `rollforward` command to roll the database forward to a desired point-in-time.

Procedure

1. In the AUI navigation pane on the left, click ≫, and then click **Asset Management**.

The **Asset Management** window is displayed.

2. In the domain tree, select the domain that contains the DB2 server.

You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

A list of Avamar clients is displayed in the pane below the domains list.

3. In the list of clients, select the client that runs the DB2 server.
4. (Optional) To locate backups by date:

a. In the right pane, click **VIEW MORE**.

b. Click **SEARCH**.

c. In the **From** and **To** fields, specify the date range.

d. Click **RETRIEVE**.

e. In the list of backups, select a backup.

The list of backups for the date range is displayed.

5. Click the **Restore** tab.

   The **Restore** wizard is displayed and the **Destination Client** pane is displayed on the right.

6. In the **Destination Client** pane, perform the following steps:

   a. Select **Restore to original client**.

   b. Click **NEXT**.

   The **Backup Content** pane is displayed.

7. In the **Backup Content** pane, perform the following steps:

   a. In the left pane, select the DB2 instance folder.

      The **Contents of Backup** pane displays a list of files that are contained within that folder.

   b. In the right pane, select one or more database backups to restore.

      Note: For DPF restore operations from Avamar Administrator, the Avamar Plug-in for DB2 limits the selection of DPF nodes to one node and one database.

   c. Click **NEXT**.

   The **Destination Location** pane is displayed.

8. In the **Destination Location** pane, perform the following steps:

   a. Select **Restore everything to its original location**.

   b. Click **Next**.

   The **More Options** pane is displayed.

9. In the **More Options** pane, set the plug-in options:

   a. In the **Encryption method from Data Domain system** list, select an encryption method to use for client/server data transfer during this restore.

      The encryption technology and bit strength for a client/server connection depend on several factors, including the client platform and Avamar server version. The *Avamar Product Security Guide* provides more information.

   b. Select the **Restore only** option.

   c. Leave **Type of Recovery** blank.

   d. In the **Number of sessions during restore** list, select the number of sessions to use for the restore.

      Note: To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.

e. In the **Instance Admin Username** field, type the instance owner or system admin username.

f. In the **Instance Admin Password** field, type the password for the username.

g. Leave the **Database Partition Numbers** field blank. This field only applies to DPF environments.

h. Leave the **Directory Path to Restore Archive Logs** field blank.

i. Leave the **Database Name** field blank. This field only applies to redirected restores.

j. Leave the **Instance Name** field blank. This field only applies to redirected restores.

k. If the target database exists and you want to overwrite it, select the **Replace existing database** check box.

10. Click **NEXT**.

    The **Summary** pane is displayed.

11. In the **Summay** pane, review the provided information, and then click **FINISH**.

    The following status message is displayed:

    `Restore request initiated.`

12. After the restore completes, roll the database forward:

    a. If archived logs are not enabled for backup, restore the archive logs from a file system backup to the `SQLOGDIR` directory.

    The `DB2 SQLOGDIR` variable stores the location of the `SQLOGDIR` directory.

    Note: To skip the overhead process of searching for the available saved archived logs, you can use the Avamar file system plug-in instead of the Avamar Plug-in for DB2 to restore missing archived logs before you restore the database. Then specify the location of the log files when you perform a database rollforward operation.

    b. Use the `rollforward` command on the DB2 server to roll the database forward to the desired point-in-time.

    The following commands performs a rollforward operation on the database to the end of the archive logs:

    ```
    db2 rollforward db db_name to end of logs and complete
    db2 rollforward db db_name to end of logs and complete overflow log
    path(/tmp/alogs)
    ```

    where *db_name* is the database name.

    Note: If a database is in a rollforward pending state and you do not run the `rollforward` command, the next Avamar Plug-in for DB2 backup of this database fails with an error message. The error message recommends that you roll the database forward. You can perform one more restore operation on a database that is in a rollforward pending state.

Restoring only the archive logs

You can restore an online backup that includes only archive logs from an online backup.

Procedure

1. In the AUI navigation pane on the left, click ≫, and then click **Asset Management**.

   The **Asset Management** window is displayed.
2. In the domain tree, select the domain that contains the DB2 server.

   You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

   A list of Avamar clients is displayed in the pane below the domains list.
3. In the list of clients, select the client that runs the DB2 server.
4. (Optional) To locate backups by date:

   a. In the right pane, click **VIEW MORE**.

   b. Click **SEARCH**.

   c. In the **From** and **To** fields, specify the date range.

   d. Click **RETRIEVE**.

   e. In the list of backups, select a backup.

   The list of backups for the date range is displayed.
5. Click the **Restore** tab.

   The **Restore** wizard is displayed and the **Destination Client** pane is displayed on the right.
6. In the **Destination Client** pane, perform the following steps:

   a. Select **Restore to original client**.

   b. Click **NEXT**.

   The **Backup Content** pane is displayed.
7. In the **Backup Content** pane, perform the following steps:

   a. In the left pane, select the DB2 instance folder.

   The **Contents of Backup** pane displays a list of files that are contained within that folder.

   b. In the right pane, select one or more database backups to restore.

   Note: For DPF restore operations from Avamar Administrator, the Avamar Plug-in for DB2 limits the selection of DPF nodes to one node and one database.

   c. Click **NEXT**.

   The **Destination Location** pane is displayed.
8. In the **Destination Location** pane, perform the following steps:

   a. Select **Restore everything to its original location**.

   b. Click **Next**.

   The **More Options** pane is displayed.

9. In the **More Options** pane, set the plug-in options:
   a. In the **Encryption method from Data Domain system** list, select an encryption method to use for client/server data transfer during this restore.

      The encryption technology and bit strength for a client/server connection depend on several factors, including the client platform and Avamar server version. The *Avamar Product Security Guide* provides more information.

   b. Select **Restore only archive logs from an online backup**.
   c. Leave **Type of Recovery** blank.
   d. In the **Number of sessions during restore** list, select the number of sessions to use for the restore.

      Note: To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.

   e. In the **Instance Admin Username** field, type the instance owner or system admin username.
   f. In the **Instance Admin Password** field, type the password for the username.
   g. Leave the **Database Partition Numbers** field blank. This field only applies to DPF environments.
   h. In the **Directory Path to Restore Archive Logs** field, type the fully qualified pathname of an existing top-level directory.

      Note: The restore operation creates a subdirectory below the directory pathname you specify and restores the archive logs to this subdirectory.

   i. Leave the **Database Name** field blank. This field only applies to redirected restores.
   j. Leave the **Instance Name** field blank. This field only applies to redirected restores.
10. Click **NEXT**.

    The **Summary** pane is displayed.
11. In the **Summay** pane, review the provided information, and then click **FINISH**.

    The following status message is displayed:

    ```
    Restore request initiated.
    ```

Recovering a database

Before you recover a database, you create an Avamar Plug-in for DB2 flag file and configure the `VENDOROPT` configuration parameter, and then recover the database.

About this task

You must recover one database at a time. Recovery of multiple databases in a single recovery operation is not supported.

Procedure

1. In the AUI navigation pane on the left, click ≫, and then click **Asset Management**.

   The **Asset Management** window is displayed.
2. In the domain tree, select the domain that contains the DB2 server.

   You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

A list of Avamar clients is displayed in the pane below the domains list.

3. In the list of clients, select the client that runs the DB2 server.
4. (Optional) To locate backups by date:
   a. In the right pane, click **VIEW MORE**.
   b. Click **SEARCH**.
   c. In the **From** and **To** fields, specify the date range.
   d. Click **RETRIEVE**.
   e. In the list of backups, select a backup.

   The list of backups for the date range is displayed.
5. Click the **Restore** tab.

   The **Restore** wizard is displayed and the **Destination Client** pane is displayed on the right.
6. In the **Destination Client** pane, perform the following steps:
   a. Select **Restore to original client**.
   b. Click **NEXT**.

   The **Backup Content** pane is displayed.
7. In the **Backup Content** pane, perform the following steps:
   a. In the left pane, select the DB2 instance folder.

      The **Contents of Backup** pane displays a list of files that are contained within that folder.

   b. In the right pane, select the database that you want to restore.

      Note: For DPF restore operations from Avamar Administrator, the Avamar Plug-in for DB2 limits the selection of DPF nodes to one node and one database.

   c. Click **NEXT**.

   The **Destination Location** pane is displayed.
8. In the **Destination Location** pane, perform the following steps:
   a. Select **Restore everything to its original location**.
   b. Click **Next**.

   The **More Options** pane is displayed.
9. In the **More Options** pane, set the plug-in options:
   a. In the **Encryption method from Data Domain system** list, select an encryption method to use for client/server data transfer during this restore.

      The encryption technology and bit strength for a client/server connection depend on several factors, including the client platform and Avamar server version. The *Avamar Product Security Guide* provides more information.

   b. Select the **Recover** option.
   c. In the **Type of Recovery** list, select **End of Logs or Point in Time** .

      Note: The **End of Logs** and **Point in Time** options are valid only for the **Recover** option.

d. Leave the **Number of sessions during restore** list set to `1`.

e. In the **Instance Admin Username** field, type the instance owner or system admin username.

f. In the **Instance Admin Password** field, type the password for the username.

g. Leave the **Database Partition Numbers** field blank.

> **Note:** The **Recover** option supports only a recovery of a single database at a time.

h. In the **Directory Path to Restore Archive Logs** field, type the fully qualified pathname of an existing top-level directory.

The restore operation creates a subdirectory below the directory pathname you specify and restores the archive logs to this subdirectory.

i. Leave the **Database Name** field and the **Instance Name** field blank.

j. If the target database exists and you want to overwrite it, select the **Replace existing database** check box.

10. Click **NEXT**.

The **Summary** pane is displayed.

11. In the **Summay** pane, review the provided information, and then click **FINISH**.

The following status message is displayed:

```
Restore request initiated.
```

Restoring DB2 databases to a different client

You can restore DB2 databases, including automatic storage databases, to a client other than the original client. This type of restore is known as a redirected restore.

Setting flags for automatic storage databases

To perform a redirected restore of an automatic storage database, you must set the `asm-restore-set-storagepaths` flag, the `restore-set-dbpath` flag, or both.

- The `asm-restore-set-storagepaths` flag set to true corresponds to the DB2's `ON path-list` parameter. A comma-separated list of directories that you select appears in the **Destination** column in the **Restore Options** dialog box. The `ON path-list` parameter redefines the storage paths associated with automatic storage databases.
- The `restore-set-dbpath` flag set to 1 corresponds to the new `DBPATH` as the first entry that you specify in a comma-separated list of directories in the **Destination** column in the **Restore Options** dialog box. The new storage path list does not use this `DBPATH`. The `restore-set-dbpath` flag is only relevant for automatic storage database restores.

Rollforward after a redirected restore to a different host

The Avamar Plug-in for DB2 backup process does not save vendor configuration files during a database or log backup. A manual rollforward after a redirected restore requires these configuration files. Otherwise, the rollforward fails because it cannot find the log files.

1. Before you perform a manual rollforward after a redirected restore, ensure that all database vendor configuration files are available on the target system.

Database configuration files include the file with the `logarchopt1` parameter setting. You can set up these configuration settings for the target database after the redirected restore completes.

2. Configure the `--logdest-id` and `--logdest-ap` parameters.
   A manual rollforward after a redirected restore to a different host requires these parameters. Add these parameters to the DB2 flag file. You can also configure the optional parameter, `--logdest-account`. DB2 vendor parameters on page 112 provides more information about these parameters. Creating the Avamar Plug-in for DB2 flag file on page 40 provides more information about parameters in the flag file.

   Note: The use of the `--logdest-id`, `--logdest-ap`, and `--logdest-account` parameters is specific to an archived log backup of the destination database. An archived log backup of the destination database can happen if a rollback occurs when a rollforward completes. These parameters replace the `--id`, `--account`, and `--ap` parameters that you set for the source client and use for archived log retrieval during a rollforward.

3. After the rollforward completes, you must remove the `--logdest-id`, `--logdest-ap`, and `--logdest-account` parameters from the DB2 flag file and replace the `--id`, `--account`, and `--ap` parameters. The values for the `--id`, `--account`, and `--ap` parameters correspond to the destination client.
4. After a restore or a change to database configuration settings, perform a full database backup to create a new baseline for the database backup and recovery history.

Restoring the database to a different client

Procedure

1. In the AUI navigation pane on the left, click ≫, and then click **Asset Management**.

   The **Asset Management** window is displayed.
2. In the domain tree, select the domain that contains the DB2 server.

   You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

   A list of Avamar clients is displayed in the pane below the domains list.
3. In the list of clients, select the client that runs the DB2 server.
4. (Optional) To locate backups by date:

   a. In the right pane, click **VIEW MORE**.

   b. Click **SEARCH**.

   c. In the **From** and **To** fields, specify the date range.

   d. Click **RETRIEVE**.

   e. In the list of backups, select a backup.

   The list of backups for the date range is displayed.
5. Click the **Restore** tab.

   The **Restore** wizard is displayed and the **Destination Client** pane is displayed on the right.
6. In the **Destination Client** pane, perform the following steps:

   a. Select **Restore everything to a different client**.

   b. In the domain tree, select the domain for the client.

c. From the list of clients, select the destination client for the redirected restore.

d. Click **NEXT**.

The **Backup Content** pane is displayed.

7. In the **Backup Content** pane, perform the following steps:

a. In the left pane, select the DB2 instance folder.

The **Contents of Backup** pane displays a list of files that are contained within that folder.

b. In the right pane, one or more database backups to restore.

Note: For DPF restore operations from Avamar Administrator, the Avamar Plug-in for DB2 limits the selection of DPF nodes to one node and one database.

c. Click **NEXT**.

The **Destination Location** pane is displayed.

8. In the **Destination Location** pane, perform the following steps:

a. Select **Restore everything to a different location**.

b. In the **Restore Location** field, specify the target location where you want to restore the data:

- On Windows platforms, specify the target location manually. For example, `E:\DATABASE\BACKUPS\`.
- On other platforms, click **CHOOSE** and select the target location. Or you can specify the target location manually. For example, `/database/backups`.

c. Click **NEXT**.

The **More Options** pane is displayed.

9. In the **More Options** pane, set the plug-in options:

a. In the **Encryption method from Data Domain system** list, select the encryption method to use for data transfer between the Data Domain system and the client during the restore.

b. Select the **Restore only** option.

c. Leave the **Recovery Type** panel blank. The **Recovery Type** options apply only to the **Recover** option.

d. In the **Number of sessions during restore** list, select the number of sessions to use for the restore.

Note: To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.

e. Type the instance owner or system admin username in the **Instance Admin Username** field and the instance owner's password in the **Instance Admin Password** field.

f. In the **Directory Path to Restore Archive Logs** field, type the fully qualified pathname of an existing top-level directory.

The restore operation creates a subdirectory below the directory pathname you specify and restores the archive logs to this subdirectory.

g. In the **Database Name** field, type the name of the database.

h. In the **Instance Name** field, type the name of the instance.

i. If the target database exists and you want to overwrite it, select the **Replace existing database** check box.

j. (Automatic storage databases only) To display the **Enter Attribute** and **Enter Attribute Value** fields, click **More**.

k. In the **Enter Attribute** field, type `--[avdb2]asm-restore-set-storagepaths`.

> **Note:** You must precede the attribute with `--[avdb2]`.

l. In the **Enter Attribute Value** filed, type `true`.

m. Click +.

n. In the **Enter Attribute** field, type `--[avdb2]restore-set-dbpath`.

o. In the **Enter Attribute Value** field, type **1**.

p. To set NEWLOGPATH, in the **Enter Attribute** field, type `--[avdb2]new-log-path`. In the Enter Attribute Value field, type the absolute path for log files after restore.

q. In the **Enter Attribute Value** field, type the absolute path for log files after restore.

The new-log-path flag allows you to specify a string representing the path to be used for logging after the restore has completed. This flag is optional.

r. Click +, and then click **OK** .

The `asm-restore-set-storagepaths` and `restore-set-dbpath` flags appear in the box below the **+** and **-** buttons.

10. Click **NEXT**.

The **Summary** pane is displayed.

11. In the **Summay** pane, review the provided information, and then click **FINISH**.

The following status message is displayed:

```
Restore request initiated.
```

12. Roll the database forward. Rolling forward the database on page 64 provides instructions.

Rolling forward the database

Roll forward the database if you used the **Restore only** option to restore an online backup. A rollforward operation does not apply to restores of offline backups.

Procedure

- To manually roll forward the database to the desired point-in-time, use the `rollforward` command on the DB2 server. The following command is an example:

  `db2 rollforward db` ***`db_name`*** **`to end of logs and complete`**
  where *db_name* is the database name.

  This example command rolls forward the database to the end of the archive logs.

  > **Note:** If you do not run the `rollforward` command, subsequent Avamar Plug-in for DB2 backups and restores fail with an error message, which recommends that you roll forward the database.

Restoring table spaces in a stand-alone DB2 environment

You can restore one or more table spaces from a backup.

About this task

To restore the SYSCATSPACE table space from DB2 version 10.1 or later databases, you must specify the `tbs-offline-restore-mode=true` option in the **Enter Attribute** and **Enter Attribute Value** fields. The following procedure includes instructions.

Procedure

1. In the AUI navigation pane on the left, click ≫, and then click **Asset Management**.

   The **Asset Management** window is displayed.
2. In the domain tree, select the domain that contains the DB2 server.

   You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

   A list of Avamar clients is displayed in the pane below the domains list.
3. In the list of clients, select the client that runs the DB2 server.
4. (Optional) To locate backups by date:

   a. In the right pane, click **VIEW MORE**.

   b. Click **SEARCH**.

   c. In the **From** and **To** fields, specify the date range.

   d. Click **RETRIEVE**.

   e. In the list of backups, select a backup.

   The list of backups for the date range is displayed.
5. Click the **Restore** tab.

   The **Restore** wizard is displayed and the **Destination Client** pane is displayed on the right.
6. In the **Destination Client** pane, perform the following steps:

   Note: You cannot perform a redirected restore of a DB2 table space to a DB2 stand-alone environment.

   a. Select **Restore to original client**.

   b. Click **NEXT**.

   The **Backup Content** pane is displayed.
7. In the **Backup Content** pane, perform the following steps:

   a. To perform a granular level recovery, select the **GLR** switch.

   b. In the left pane, select the top-level folder to select the entire plug-in, or select one or more databases for the granular browse operation.

   Note: You cannot use the Granular level browse feature for database backups that you create by using the DB2 CLP.

   c. In the right pane, perform the following steps:

a. Select a full backup to restore.

b. To view table spaces available for restore, expand the folders in the directory tree.

c. Select one or more table spaces.

> **Note:** For DPF restore operations from Avamar Administrator, the Avamar Plug-in for DB2 limits the selection of DPF nodes to one node and one database.

d. Click **NEXT**.

The **Destination Location** pane is displayed.

8. In the **Destination Location** pane, perform the following steps:

   a. Select **Restore everything to its original location**.

   b. Click **Next**.

   The **More Options** pane is displayed.

9. In the **More Options** pane, set the plug-in options:

   a. In the **Encryption method from Data Domain system** list, select the encryption method to use for data transfer between the Data Domain system and the client during the restore.

   b. To restore table spaces other than the SYSCATSPACE table space, select **Restore only**.

   c. To restore the SYSCATSPACE table space:

      a. Select **Restore and roll forward database**.

      b. In the **Type of Recovery** list, select **End of logs**.

   d. In the **Number of sessions during restore** list, select the number of sessions to use for the restore.

   > **Note:** To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.

   e. In the **Instance Admin Username** field, type the instance owner or system admin username.

   f. In the **Instance Admin Password** field, type the password for the username.

   g. Leave the **Database Partition Numbers** field blank.

   h. Leave the **Directory Path to Restore Archive Logs** field blank.

   i. Leave the **Database Name** field blank.

10. (Renamed table spaces only) Complete the following steps to restore renamed table spaces:

    a. To display the **Enter Attribute** and **Enter Attribute Value** fields, click **More**.

    b. In the **Enter Attribute** field, type `--[avdb2]renamed_tablespace_list`.

    c. In the **Enter Attribute Value** field, type the name of the renamed table space.

    d. Click **+**.

    The attribute and value is displayed in the box below the **+** and **-** buttons.

11. (SYSCATSPACE table space from DB2 version 10.1 or later) Complete the following steps to restore the SYSCATSPACE table space from DB2 version 10.1 or later databases:

    a. To display the **Enter Attribute** and **Enter Attribute Value** field, click **More**.

b. In the **Enter Attribute** field, type `--[avdb2]tbs-offline-restore-mode`.

c. In the **Enter Attribute Value** field, type `true`.

d. Click **+**.

12. Click **NEXT**.

    The **Summary** pane is displayed.

13. In the **Summay** pane, review the provided information, and then click **FINISH**.

    The following status message is displayed:

    ```
    Restore request initiated.
    ```

Recovering retired clients

The Avamar system maintains backups for retired clients for the length of time that is determined by the retention policy. You can restore a backup from a retired client.

Procedure

1. In the AUI navigation pane on the left, click ≫, and then click **Asset Management**.

   The **Asset Management** window is displayed.

2. In the domain tree, select the `MC_RETIRED` domain.

   You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

   A list of Avamar clients is displayed in the pane below the domains list.

3. In the list of clients, select the target client.

   Note: The target client name has the same name as the MC_RETIRED client name.

4. (Optional) To locate backups by date:

   a. In the right pane, click **VIEW MORE**.

   b. Click **SEARCH**.

   c. In the **From** and **To** fields, specify the date range.

   d. Click **RETRIEVE**.

   e. In the list of backups, select a backup.

   The list of backups for the date range is displayed.

5. Click the **Restore** tab.

   The **Restore** wizard is displayed and the **Destination Client** pane is displayed on the right.

6. In the **Destination Client** pane, perform the following steps:

   Note: You cannot perform a redirected restore of a DB2 table space to a DB2 stand-alone environment.

   a. Select **Restore to original client**.

   b. Click **NEXT**.

   The **Backup Content** pane is displayed.

7. In the **Backup Content** pane, perform the following steps:
   a. In the left pane, select the DB2 instance folder.

      The **Contents of Backup** pane displays a list of files that are contained within that folder.

   b. In the right pane, one or more database backups to restore.

      Note: For DPF restore operations, the Avamar Plug-in for DB2 limits the selection of DPF nodes to one node and one database.

   c. Click **NEXT**.

   The **Destination Location** pane is displayed.
8. In the **Destination Location** pane, perform the following steps:
   a. Select **Restore everything to a different location**.
   b. In the **Restore Location** field, type the file path of the target location where you want to restore the data.

      For example: E:/dbrestore_dir/

   c. Click **NEXT**.

      The **More Options** pane is displayed.
9. In the **More Options** pane, set the plug-in options:
   a. Type the DB2 instance credentials:
      a. In the **DB2 Instance Name** field, type the name of the DB2 instance to browse.
      b. In the **Instance Admin Username**, type the instance owner or system admin username.
      c. In the **Instance Admin Password** , type the password for the username.

   b. In the **Encryption method from Data Domain system** list, select an encryption method to use for client/server data transfer during this restore.

      The encryption technology and bit strength for a client/server connection depend on several factors, including the client platform and Avamar server version. The *Avamar Product Security Guide* provides more information.

   c. Select the **Restore and roll forward database** option.

      Note: Alternately, you can select the **Restore only** option and perform a manual rollforward operation after the restore completes.
      To perform a manual rollforward operation, use the `overflow log path` option with the `rollforward` command, and then recover the database to the end of logs or to a point-in-time. DB2 documentation provides more information about the `rollforward` command.

   d. In the **Type of Recovery** list, select one of the following recovery types:
      - **End of logs** recovers the database by performing a rollforward operation to the end of logs.
      - **Point In Time** recovers the database by performing a rollforward operation to a specific point-in-time. To use the **Point In Time** recovery type requires you to type a date and time in the **Date and Time** field. Use the *yyyy-mm-dd hh:mm:ss* format. The time must be in the time zone of the client system.

- **End of Backup** recovers the database by performing a rollforward operation to the end of the backup. The **End of Backup** option is valid for DB2 versions 9.5 and later.

e. In the **Number of sessions during restore** list, select the number of sessions to use for the restore.

> **Note:** To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.

f. In the **Instance Admin Username** field, type the instance owner or system admin username.

g. In the **Instance Admin Password** field, type the password for the username.

h. Leave the **Database Partition Numbers** field blank.

i. In the **Directory Path to Restore Archive Logs** field, type the fully qualified pathname of an existing top-level directory.

The restore operation creates a subdirectory below the directory pathname you specify and restores the archive logs to this subdirectory.

j. In the **Database Name** field, type the name of the database from which the backup was originally taken.

k. In the **Instance Name** field, type the name of the DB2 instance.

l. If the target database exists and you want to overwrite it, select the **Replace existing database** check box.

10. Click **NEXT**.

The **Summary** pane is displayed.

11. In the **Summay** pane, review the provided information, and then click **FINISH**.

The following status message is displayed:

```
Restore request initiated.
```

Disaster recovery

With an effective data backup plan in place, you can successfully recover a DB2 server after the loss of the DB2 application or server hardware.

> **Note:** To perform a manual rollforward after you restore the DB2 server and DB2 applications, follow the guidelines in Rollforward after a redirected restore to a different host on page 61.

Recovering the DB2 application

About this task

As long as Avamar components on a DB2 server are intact, you can recover only the DB2 application.

Procedure

1. Uninstall the current installation of the DB2 application.
2. Delete all DB2 application files and directories.
3. Install the same version of the DB2 application that was previously installed.
4. Re-create the DB2 instance (UNIX) or DB2 copy (Windows) with the same name that was previously used.

5. Restore a full backup of the DB2 database to the original location by completing the appropriate instructions in Restoring DB2 databases to the original location.

Recovering the DB2 server

About this task

In the event of the loss of the DB2 server hardware, you then need a replacement host computer. The DB2 server is restored to the replacement host computer.

Procedure

1. Install the same version and release of the operating system on the replacement computer.
2. Log in to the computer.
3. Configure the computer with the IP address and hostname from the old computer.
4. Install the same version of the DB2 application.
5. Re-create the DB2 instance (UNIX) or DB2 copy (Windows) with the same name that was previously used.

   Refer to the vendor documentation for instructions.
6. Install and register the Avamar file system client. Installing the Avamar file system client on page 25 provides instructions.
7. Install the Avamar Plug-in for DB2. Installation on page 23 provides instructions.

Monitor restores

You can monitor and view status information for backup and restore operations in the **Activity Monitor**.

About this task

To access the **Activity Monitor**, open the navigation pane, and then click **Activity**. The **Activity Monitor** appears with a list of all activities.

> **Note:** The AUI **Activity Monitor** window has been optimized for at least 1366 pixels-wide screens. Display issues might occur for smaller screens. To properly display the AUI, ensure that your display is at least 1366 pixels wide.

The **Activity Monitor** provides you with options to filter the information that appears:

- Filter activities by duration—By default, the **Activity Monitor** displays the most recent 5,000 client activities. To select a different duration, in the **Filter activities by duration** drop-down list, select **Last 24 hours** or **Last 72 hours**.
- Filter activities by domain—By default, the **Activity Monitor** displays all activities regardless of domain. To display only the activities for a specific domain, in the **Filter activities by domain** drop-down list, select a domain or subdomain.
- Filter activities by status—By default, the **Activity Monitor** displays all activities regardless of status.
  To display only activities with a specific status, at the top of the **Activity Monitor**, select one of the following options:
  - Canceled
  - Completed
  - Completed with Exceptions
  - Failed

- Running
- Waiting

To filter activities by client, start time, plug-in, or type, click in their respective column.

The **Activity Monitor** displays the date and time that an activity began, and the total number of bytes examined during an activity.

To view activity details, expand the **Details** pane, by clicking .

Cancel restores

You can cancel a restore any time before it completes. The cancellation might take 5 minutes or longer. The restore might complete before the cancellation finishes.

Procedure

1. In the AUI navigation pane on the left, click , and then click **Activity**.

   The **Activity Monitor** appears with a list of activities.
2. Select the restore from the list.
3. Click **CANCEL**.

   A confirmation dialog box is displayed.
4. Click **YES**.

CHAPTER 5

High Availability and Clustering Solutions

This chapter includes the following topics:

- Database Partition Feature (DPF) backup and restore 74
- DB2 High Availability Disaster Recovery (HADR) backup and recovery 84

Database Partition Feature (DPF) backup and restore

The Avamar Plug-in for DB2 supports backups and restores of DB2 database partitions.

Preparing for DPF backups

In a DPF environment, you can back up individual partitions in a database or select the catalog node to back up a combination of partitions or all partitions.

Configuring the backup agent for DPF backups

Before you back up a DB2 database partition, you must configure the **Backup agent** service on all Windows systems in the DPF environment to use the domain administrator account.

Procedure

1. From the Windows **Start** menu, select **Run**.

   The **Run** dialog box appears.
2. Type `services.msc` in the **Open** field.

   The **Services** window appears.
3. Configure the **Backup agent** service:
   a. Right-click **Backup agent**, and then select **Properties.**

      The **Backup agent Properties** dialog box appears.
   b. Click the **Log On** tab, and then select **This account**.
   c. Click **Browse**.

      The **Select User** dialog box appears.
   d. Select the domain administrator account, and then click **OK**.
   e. Click **OK** to close the **Backup agent Properties** dialog box.
4. In the **Services** window, right-click **Backup agent** and select **Restart**.

DPF backup limitations

You cannot perform a database partition backup from a non-catalog node. Doing so returns the following error:

```
Cannot perform multi-partition backup.
The catalog node for the database is not present on this server.
```

You cannot back up a node in a multi-partition configuration unless all nodes are online. A multi-partition backup fails if one or more nodes is offline. The backup returns the following error messages for this type of failure:

```
2012/4/1-13:14:07.21048 [avdb2ctlplugin_assist] snapup: return
from db2 API
2012-4-1 18:44:07 avdb2 Error <0000>: snapup: failed to create
backup of database [db2inst1/AVAMAR2]. db2 errcode -1170
2012-4-1 18:44:07 avdb2 Error <9018>: DB2 returned error -1170
2012/4/1-13:14:07.21122 [avdb2ctlplugin_assist] retire_manager:
force terminate
```

Restoring and recovering DPF

You can restore DB2 database partitions to the original location or to a different location by using Avamar Administrator.

Whether you restore the partition to the original location or to a different location depends on the location of the partition:

- If the partition is on the catalog partition, restore the partition to the original location. Restoring database partitions to the original location on page 75 provides instructions.
- If the partition is on a non-catalog partition, perform a redirected restore. Restore the partition to a different location from the viewpoint of the catalog node. Restoring database partitions to a different location on page 77 provides instructions.

Avamar Administrator lists all partition backups under the client that contains the catalog partition. Restore database partitions from the catalog partition only. The Avamar Plug-in for DB2 restores each partition backup separately. You cannot restore all partition backups in a single restore operation.

Select the **Restore only** option in the **Restore Command Line Options** dialog box for all database partition restore operations. The **Restore and roll forward** option is not supported for database partition restore operations.

Note: For an ASM redirected restore of a DPF database, pass the `ON` *path-list* option from the CLP to change the storage paths. Perform this operation from the catalog node only. Afterwards, the redirected restore continues to restore the non-catalog node without the need to pass the `ON` *path-list* option from the CLP. When you pass an `ON` *path-list* option during a redirected restore on an ASM non-catalog node, the restore fails.

Restoring database partitions to the original location

Restore the partition to the original location when the partition is located on the catalog partition.

Procedure

1. In Avamar Administrator, click the **Backup & Restore** launcher link button.

   The **Backup, Restore and Manage** window appears.
2. Click the **Restore** tab.

   The top-left pane contains a list of domains.
3. Select the domain that contains the host of the DB2 server.

   You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

   A list of Avamar clients appears in the pane below the domains list.
4. Select the host of the DB2 server.
5. Click the **By Date** tab.
6. Select the backup date from the calendar. Valid backups occurred on dates with a yellow highlight.

   A list of backups that were performed on that date appears in the **Backups** table next to the calendar.
7. Select a backup from the **Backups** table.

   The backup contents appear in the **Contents for Backup** pane.
8. Expand the DB2 instance folder.

9. Select a partition to restore.
10. Select **Actions** > **Restore Now**.

    The **Restore Options** dialog box appears.
11. In the **Avamar encryption method** list, select an encryption method to use for client/server data transfer during this restore.

    The encryption technology and bit strength for a client/server connection depend on several factors, including the client platform and Avamar server version. The *Avamar Product Security Guide* provides more information.
12. Select **Restore everything to its original location**.
13. Click **More Options**.

    The **Restore Command Line Options** dialog box appears.
14. Set the plug-in options:

    a. In the **Encryption method from Data Domain system** list, select the encryption method to use for data transfer between the Data Domain system and the client during the restore.

    b. Select the **Restore only** option.

    > **Note:** The **Restore and roll forward database** option is not supported for database partition restore operations. Restore options on page 110 provides more information about restore plug-in options.

    c. Leave the **Type of Recovery** list blank.

    d. Select the number of sessions to use for the restore from the **Number of sessions during restore** list.

    > **Note:** To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.

    e. Type the instance owner or system admin username in the **Instance Admin Username** field.

    f. Type the password for the username in the **Instance Admin Password** field.

    g. Leave the **Database Partition Numbers** field blank.

    h. Type the fully qualified pathname of an existing top-level directory in the **Directory Path to Restore Archive Logs** field.

    The restore operation creates a subdirectory below the directory pathname you specify and restores the archive logs to this subdirectory.

    i. Leave the **Database Name** field blank.

    j. Leave the **Instance Name** field blank.

    k. If the target database exists and you want to overwrite it, select the **Replace existing database** checkbox.

    l. Click **OK** to close the **Restore Command Line Options** dialog box.
15. Click **OK** to close the **Restore Options** dialog box.
16. Click **OK**.

Restoring database partitions to a different location

Restore the partition to a different location when the partition is located on a non-catalog partition. This type of restore is called a redirected restore.

Procedure

1. In Avamar Administrator, click the **Backup & Restore** launcher link button.

   The **Backup, Restore and Manage** window appears.
2. Click the **Restore** tab.

   The top-left pane contains a list of domains.
3. Select the domain that contains the host of the DB2 server.

   You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

   A list of Avamar clients appears in the pane below the domains list.
4. Select the host of the DB2 server.
5. Click the **By Date** tab.
6. Select the backup date from the calendar. Valid backups occurred on dates with a yellow highlight.

   A list of backups that were performed on that date appears in the **Backups** table next to the calendar.
7. Select a backup from the **Backups** table.

   The backup contents appear in the **Contents of Backup** pane.
8. Expand the DB2 instance folder.
9. Select a partition to restore.
10. Select **Actions** > **Restore Now**.

    The **Restore Options** dialog box appears.
11. In the **Avamar encryption method** list, select an encryption method to use for client/server data transfer during this restore.

    The encryption technology and bit strength for a client/server connection depend on several factors, including the client platform and Avamar server version. The *Avamar Product Security Guide* provides more information.
12. Select **Restore everything to a different location**.
13. Click **Browse**.

    The **Browse for Restore Client** dialog box appears.
14. Select the target client from the client tree, and then click **OK**.

    The client name appears in the **Restore Destination Client** text box.
15. Click **Set Destination**.

    The **Set Destination** dialog box appears.
16. Type the destination for the restore in the **Save Target(s) in Directory** field. For an ASM restore, type a list of directories for storage paths. Separate entries in the list with a comma.
17. Click **OK**.

    The destination appears in the **Destination** column.

18. Click **More Options**.

    The **Restore Command Line Options** dialog box appears.

19. Set the plug-in options:

    a. In the **Encryption method from Data Domain system** list, select the encryption method to use for data transfer between the Data Domain system and the client during the restore.

    b. Select the **Restore only** option.

    > **Note:** The **Restore and roll forward database** option is not supported for database partition restore operations. Restore options on page 110 provides more information about restore plug-in options.

    c. Leave **Type of Recovery** blank.

    d. Select the number of sessions to use for the restore from the **Number of sessions during restore** list.

    > **Note:** To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.

    e. Type the instance owner or system admin username in the **Instance Admin Username** field.

    f. Type the password for the username in the **Instance Admin Password** field.

    g. Leave the **Database Partition Numbers** field blank.

    h. Type the fully qualified pathname of an existing top-level directory in the **Directory Path to Restore Archive Logs** field.

    The restore operation creates a subdirectory below the directory pathname you specify and restores the archive logs to this subdirectory.

    i. Type the name of the database in the **Database Name** field.

    j. Type the name of the DB2 instance in the **Instance Name** field.

    k. If the target database exists and you want to overwrite it, select the **Replace existing database** checkbox.

    l. Click **More** to display the **Enter Attribute** and **Enter Attribute Value** fields.

20. (ASM database restores only) Type the appropriate attributes and values to direct the Avamar Plug-in for DB2 to use storage redefinition options for ASM database restores:

    - To use a value from the **Destination** field as the storage paths for the new database, set `asm-restore-set-storagepaths` to **`true`**:

      `--[avdb2]asm-restore-set-storagepaths=true`

      > **Note:** When you enable ASM mode for a restore, you can specify multiple values in the **Destination** field. Separate values for multiple storage paths with commas.

    - To use a value from the **Destination** field as the new target database pathname for the new database, set `restore-set-dbpath` to **`1`**:

      `--[avdb2]restore-set-dbpath=1`

      > **Note:** The value 1 enables the `DBPATH ON` option. When the new *db_path* is the first pathname listed in the **Destination** field, the *db_path* is then not used in the new

storage pathname list. You must set the `restore_set-storagepaths` flag, the `restore-set-dbpath` flag, or both flags to enable ASM mode for the restore.

- To use values from the **Destination** field as the storage paths and the `redirect_restore_target_path` values for the new target database pathname for the new database, set both of the following attributes:

  `--[avdb2]asm-restore-set-storagepaths=true`
  `--[avdb2]restore-set-dbpath=1`

  Note: To comply with DB2 guidelines, call out the `ON` *path-list* from only the catalog node. For a catalog node, specify a list of locations for the storage paths in the **Destination** field. For a non-catalog nodes, specify only a single location in the **Destination** field with the effective *db_path* value that you used for restoring the catalog node.

After you set the options and attributes appear in the box below the **+** and **-** buttons.

21. To set NEWLOGPATH: In the **Enter Attribute** field, type **`--[avdb2]new-log-path`**. In the Enter Attribute Value field, type the absolute path for log files after restore.

    a. In the **Enter Attribute** field, type **`--[avdb2]new-log-path`**. In the Enter Attribute Value field, type the absolute path for log files after restore.

    b. In the **Enter Attribute Value** field, type the absolute path for log files after restore.

    The new-log-path flag allows you to specify a string representing the path to be used for logging after the restore has completed. This flag is optional.

22. Click **OK** to close the **Restore Command Line Options** dialog box.
23. Click **OK** to close the **Restore Options** dialog box.

    The following status message appears:

    `Restore initiated.`

24. Click **OK**.

After you finish

Perform a rollforward operation from the catalog node. Rolling forward the database on page 64 provides more information.

Recovering partitions

You can recover partitions, one at a time, by using Avamar Administrator. Before you perform a recovery operation from Avamar Administrator, create an Avamar Plug-in for DB2 flag file. The recovery operation requires you to configure the `VENDOROPT` configuration parameter. The IBM DB2 documentation provides more information about the `VENDOROPT` parameter.

About this task

Note: You must recover one partition at a time. Recovery of multiple partitions in a single recovery operation is not supported.

Procedure

1. In Avamar Administrator, click the **Backup & Restore** launcher link button.

   The **Backup, Restore and Manage** window appears.

2. Click the **Restore** tab.

   The top-left pane contains a list of domains.

3. Select the domain that contains the host of the DB2 server.

   You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

   A list of Avamar clients appears in the pane below the domains list.
4. Select the host of the DB2 server.
5. Click the **By Date** tab.
6. Select the backup date from the calendar. Valid backups occurred on dates with a yellow highlight.

   A list of backups that were performed on that date appears in the **Backups** table next to the calendar.
7. Select a backup from the **Backups** table.

   The backup contents appear in the **Contents of Backup** pane.
8. Expand the DB2 instance folder.
9. Select a partition to restore.
10. Select **Actions** > **Restore Now**.

    The **Restore Options** dialog box appears.
11. In the **Avamar encryption method** list, select an encryption method to use for client/server data transfer during this restore.

    The encryption technology and bit strength for a client/server connection depend on several factors, including the client platform and Avamar server version. The *Avamar Product Security Guide* provides more information.
12. Select **Restore everything to its original location**.
13. Click **More Options**.

    The **Restore Command Line Options** dialog box appears.
14. Set the plug-in options:

    a. In the **Encryption method from Data Domain system** list, select the encryption method to use for data transfer between the Data Domain system and the client during the restore.

    b. Select the **Recover** option.

    c. Select **End of Logs** or **Point in Time** from the **Type of Recovery** list.

    > **Note:** The **End of Logs** and **Point in Time** options are valid only for the **Recover** option.

    d. Leave the **Number of sessions during restore** list set to 1.

    e. Type the instance owner or system admin username in the **Instance Admin Username** field.

    f. Type the password for the username In the **Instance Admin Password** field.

    g. Specify a single partition number in the **Database Partition Numbers** field.

    > **Note:** The **Recover** option supports only a recovery of a single partition at a time.

    h. Type the fully qualified pathname of an existing top-level directory in the **Directory Path to Restore Archive Logs** field.

The restore operation creates a subdirectory below the directory pathname you specify and restores the archive logs to this subdirectory.

i. Leave the **Database Name** field and the **Instance Name** field blank.

j. If the target database exists and you want to overwrite it, select the **Replace existing database** checkbox.

k. Click **OK** to close the **Restore Command Line Options** dialog box.

15. Click **OK** to close the **Restore Options** dialog box.

    The following status message appears:

    ```
    Restore initiated.
    ```

16. Click **OK**.

Restoring table spaces in a DB2 DPF environment

You can use Avamar Administrator to restore a table space that is not local to the catalog partition by performing a redirected restore from the catalog node to the target node.

About this task

To restore the SYSCATSPACE table space from DB2 version 10.1 or later databases, you must specify the `tbs-offline-restore-mode=true` option in the **Enter Attribute** and **Enter Attribute Value** fields. The following procedure includes instructions.

Note: You cannot specify a recovery type for a table space restore in a DPF environment.

Procedure

1. In Avamar Administrator, click the **Backup & Restore** launcher link button.

   The **Backup, Restore and Manage** window appears.

2. Click the **Restore** tab.

   The top-left pane contains a list of domains.

3. Select the domain that contains the host of the DB2 server.

   You cannot view clients outside the domain for the login account. To view all clients, log in to the root domain.

   A list of Avamar clients appears in the pane below the domains list.

4. Select the host of the DB2 server.

5. Click the **By Date** tab.

6. Select the backup date from the calendar. Valid backups occurred on dates with a yellow highlight.

   A list of backups that were performed on that date appears in the **Backups** table next to the calendar.

7. Select a full backup from the **Backups** table.

   The backup contents appear in the **Contents of Backup** pane.

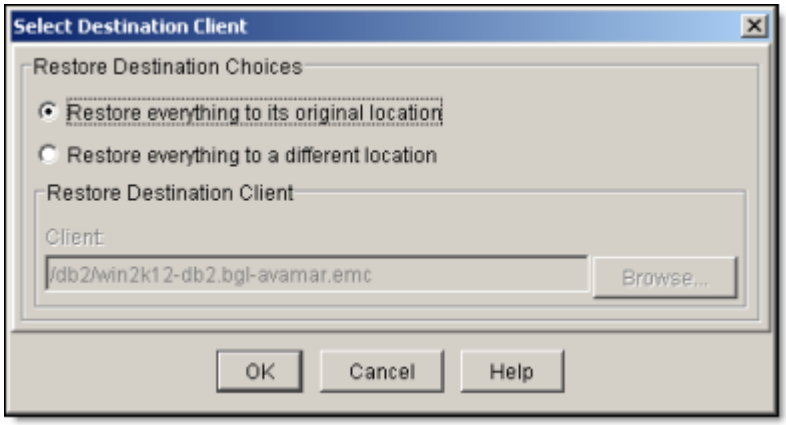
   The **Browse for Image Restore** and **Browse for Granular Restore** buttons appear above the directory tree in the **Contents of Backup** pane.

8. Select the top-level folder to select the entire plug-in, or select one or more databases for the granular browse operation.

9. Click the **Browse for Granular Restore** button ( ).

   The **Select Destination Client** dialog box appears.

Figure 4 Select Destination Client



10. Set the options:
    a. Click **Restore everything to a different location**.
    b. Click **Browse**.

       The **Browse for Restore Client** dialog box appears.
    c. Click the domain that contains the target DPF node.
    d. Select the DPF node that contains the target partition for the table space restore.
    e. Click **OK** to close the **Browse for Restore Client** dialog box.
    f. Click **OK** again to close the **Set Destination Client** dialog box.
11. Expand the folders in the directory tree to view table spaces available for restore.
12. Select one or more table spaces.

    Note: The **Backup, Restore and Manage** window does not display the table space size correctly in the **Size** column. We plan to fix this issue in a future release.

13. Select **Actions** > **Restore Now**.

    The **Restore Options** dialog box appears.
14. In the **Avamar encryption method** list, select an encryption method to use for client/server data transfer during this restore.

    The encryption technology and bit strength for a client/server connection depend on several factors, including the client platform and Avamar server version. The *Avamar Product Security Guide* provides more information.
15. Select **Restore everything to a different location**.
16. Click **Browse**.

    The **Browse for Restore Client** dialog box appears.
17. Select the same DPF node that you previously selected.
18. In the **Destination** field, type the pathname to the database.
19. Click **More Options**.

    The **Restore Command Line Options** dialog box appears.
20. Set the plug-in options:

a. In the **Encryption method from Data Domain system** list, select the encryption method to use for data transfer between the Data Domain system and the client during the restore.

b. Select **Restore only** to restore table spaces other than the SYSCATSPACE table space.

c. To restore the SYSCATSPACE table space, select **Restore and roll forward database**, and then select **End of logs** from the **Type of Recovery** list.

d. Select the number of sessions to use for the restore from the **Number of sessions during restore** list.

> **Note:** To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.

e. Type the instance owner or system admin username in the **Instance Admin Username** field.

f. Type the password for the username in the **Instance Admin Password** field.

g. Leave the **Database Partition Numbers** field blank.

h. Type the fully qualified pathname of an existing top-level directory in the **Directory Path to Restore Archive Logs** field.

> **Note:** If the backup for this restore operation is an online backup and you intend to restore archive log files, you must complete the **Directory Path to Restore Archive Logs** field.

The restore operation creates a subdirectory below the directory pathname you specify and restores the archive logs to this subdirectory.

i. Type the name of the database from which the backup was originally taken in the **Database Name** field.

j. Type the name of the DB2 instance in the **Instance Name** field.

k. If the target database exists and you want to overwrite it, select the **Replace existing database** checkbox.

l. (SYSCATSPACE table space from DB2 version 10.1 or later) Complete the following steps to restore the SYSCATSPACE table space from DB2 version 10.1 or later databases:

   a. Click **More** to display the **Enter Attribute** and **Enter Attribute Values** fields.

   b. Type `--[avdb2]tbs-offline-restore-mode` in the **Enter Attribute** field.

   c. Type `true` in the **Enter Attribute Value** field.

   d. Click **+**.

m. Click **OK** to close the **Restore Command Line Options** dialog box.

21. Click **OK** to close the **Restore Options** dialog box.

    The following status message appears:

    ```
    Restore initiated.
    ```

22. Click **OK**.

23. Manually roll the table space forward to the desired point-in-time by using the DB2 `rollforward` command on the DB2 server.

Disaster Recovery of the DB2 server in a DPF environment

Follow this procedure to recover the DB2 server in a DPF environment in the event of a disaster.

Procedure

1. Install the DB2 application on the catalog node and other participating nodes.
2. Re-create the DB2 instance (UNIX) or DB2 copy (Windows) with the same name that was previously used.
3. Restore the catalog node backup by performing a restore from the catalog node. Restoring and recovering DPF on page 75 provides more information.
4. Restore all other node backups by performing a redirected restore. Restoring and recovering DPF on page 75 provides more information.

DB2 High Availability Disaster Recovery (HADR) backup and recovery

The following sections detail configuration of the Avamar Plug-in for DB2 for the High Availability Disaster Recovery (HADR) feature, as well as backup, recovery, and disaster recovery procedures.

Preparing for HADR backups

To backup, restore, and roll forward the database in the HADR environment, you must configure the Avamar client for DB2 HADR as described in the following sections.

Configuring the DB2 HADR client for Microsoft Windows

This section describes how to configure the Avamar client for DB2 HADR for backups in Microsoft Windows environments.

About this task

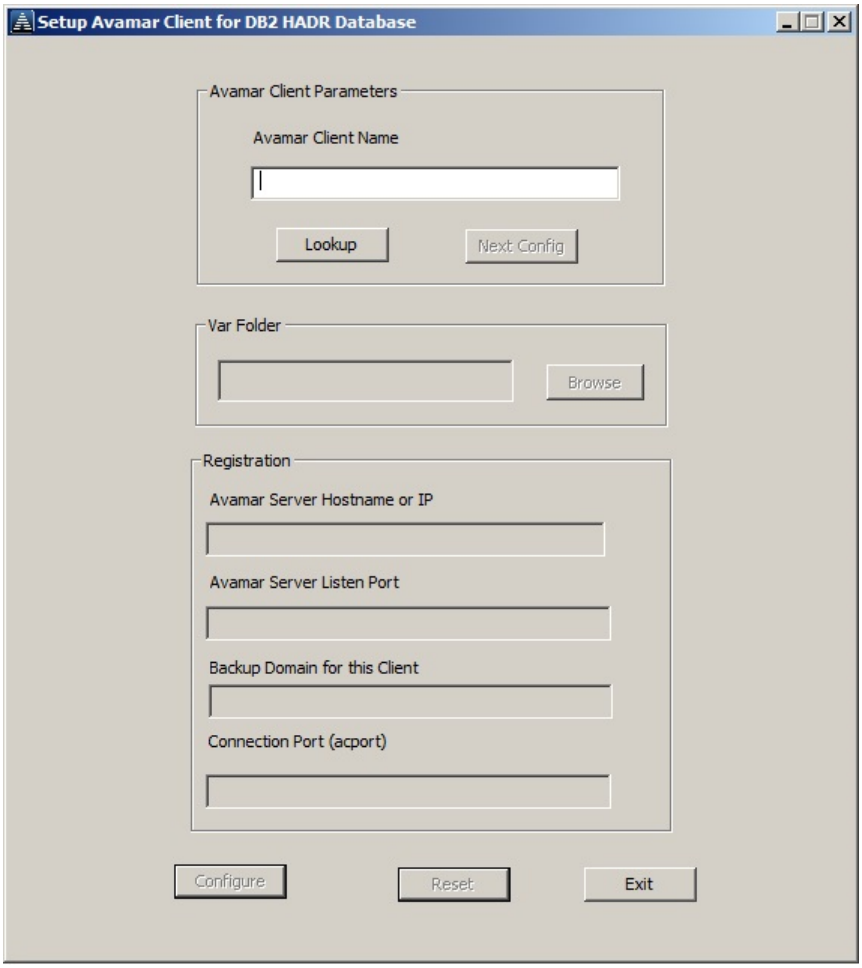
Each node of a DB2 HADR system has to be configured and registered with the same Avamar server using the same client name before any backup or restore operations can be performed.

Procedure

1. Log in to one of the DB2 HADR nodes where the Avamar client for DB2 HADR should be configured.
2. Locate the `AvamarHADRConfiguration.exe` file that is located in the *`installpath`* `\bin\` directory. Right-click and select **Run as Administrator**.

   The **Setup Avamar for DB2 HADR Database** window opens.

Figure 5 Setup Avamar for DB2 HADR Database



a. In the **Avamar Client Name** text box, type the name of the HADR client and click **Lookup**.

Information about the client is populated in the window.

> **Note:** The HADR client name is a user-defined short descriptive Avamar account name for this HADR system. This name must be unique and shows how that HADR client appears in Avamar Administrator.

b. Verify or complete the following fields:

- **Var Folder** — The path to the Avamar var directory for the Avamar client for DB2 HADR.
- **Avamar Server Hostname or IP** — The hostname or IP address of the Avamar server.
- **Avamar Server Listen Port** — The port on which the Avamar server listens for client requests.
- **Backup Domain for this Client** — The backup domain to which this client is configured.
- **Connection Port (acport)** — The port number to be used by Avamar agent for DB2 HADR. If not specified, the default value of 28003 is used.

c. Click **Configure**.

A message indicates that the configuration was successful. To clear the message, click **OK**.

3. Repeat the previous steps on all DB2 HADR nodes.
4. Once all HADR nodes have been configured, start the DB2 HADR client agent on the primary node.

   Note: Do not start the DB2 HADR client agent until all HADR nodes have been configured. Starting the DB2 HADR client agent before all nodes have been configured may cause failures during the configuration of the other nodes or during backup.

Configuring the DB2 HADR client on UNIX and Linux

This section describes how to configure the Avamar client for DB2 HADR for backups in UNIX and Linux environments.

Procedure

1. Log in as root to the primary HADR node.
2. Run the `hadr_config` script from the Avamar `bin` directory:

```
/avamar_install_dir/bin/hadr_config [-s MCSAddr] [-d Domain] [-c
Client] [-p ACPort] [-n Nodes] [-h]
```

   where:

   - *avamar_install_dir* is the path of the Avamar client for DB2 HADR installation.
   - *MCSAddr* is the IP address or host name of the Avamar server. If this option is not specified, the script prompts you to enter it.
   - *Domain* is the backup domain to which this client is configured. If this option is not specified, the script then prompts you to enter it.
   - *Client* is the user-defined short descriptive Avamar account name for this HADR Client. This name is how that HADR system appears in Avamar Administrator. If this option is not specified, the script then prompts you to enter it.
   - *ACPort* is the port number of the connection port of the DB2 server. If this option is not specified, the default value of 28003 is used.
   - *Nodes* is a comma-separated list (with no spaces) of the DB2 HADR nodes that the script should configure. The specified nodes are added to the `.HADR_Nodes` file, which is used afterwards for the automatic configuration removal. If this option is not used, only the local node is configured.
     Notes:
     - Remote node configuration requires `ssh` to be correctly configured on all nodes.
     - If the password is requested, provide the root password for the node that is being configured. This action allows the script to configure remote HADR nodes.
     - If remote execution as root via `ssh` cannot be performed, you must configure each node separately by running this command locally on all nodes without the `-n Nodes` option. All options must be the same when the script is run on each node.
   - -h echoes the complete list of supported option for the command.

Results

After configuration is complete, the `hadr_config` script automatically starts the Avamar client for DB2 HADR agent on the current node.

The following is a command line example for running the `hadr_config` script:

```
/usr/local/avamar/bin/hadr_config -s AvamarSrvr -n hadr1,hadr2
```

Starting and stopping the Avamar client for DB2 HADR and changing HADR roles

This section provides procedures for starting and stopping the Avamar client for DB2 HADR and for changing the client's HADR role.

Starting and stopping HADR requires the sequence of operation to be performed in the order that is specified in these sections. Takeover requires stopping the DB2 HADR client's agent on the previous primary node and starting it on the new primary.

Starting the Avamar client for DB2 HADR

This procedure describes how to start the Avamar client for DB2 HADR on Microsoft Windows and UNIX/Linux systems.

Procedure

1. Log in to the node and start HADR as Standby. Refer to the vendor documentation for detailed DB2 HADR instructions.
2. Start the Avamar client for DB2 HADR agent on the Primary node by doing one of the following:
   - On Microsoft Windows, log in to the Primary Node and start the HADR client backup service:
     a. In the **Start** menu, select **All Programs** > **Administrative Tools** > **Services**.
     b. Right-click **Avamar** ***Client_name*** **Backup Agent** and select **Start**.
   - On UNIX or Linux, log in to the Primary Node as root and start the Avamar client for DB2 HADR agent by using the following command:

     ```
     /avamar_installation_path/db2_hadr/etc/start.sh
     ```

     where:
     - *avamar_installation_path* is the path to the Avamar client installation.
     - *db2_hadr* is the name of the DB2 HADR client.
3. Start HADR as Primary. Refer to the vendor documentation for detailed DB2 HADR instructions.

Stopping the Avamar client for DB2 HADR

To stop HADR system, stop HADR on Primary node first, then stop HADR on Standby nodes.

Procedure

1. Log in to the Primary node and stop HADR. Refer to the vendor documentation for detailed DB2 HADR instructions.
2. Stop the Avamar client for DB2 HADR agent on the Primary node by doing one of the following:

- On Microsoft Windows, log in to the Primary node and stop the HADR client backup service:
  a. In the **Start** menu, select **All Programs** > **Administrative Tools** > **Services**.
  b. Right-click **Avamar** ***Client_name*** **Backup Agent** and select **Stop**.
- On UNIX or Linux, log in to the Primary Node as root and stop the Avamar client for DB2 HADR agent by using the following command:

```
/avamar_installation_path/db2_hadr/etc/stop.sh
```

  where:
  - *avamar_installation_path* is the path to the Avamar client installation.
  - *db2_hadr* is the name of the DB2 HADR client.

Changing HADR roles

This section describes how to change the HADR Primary node on when using the Avamar client for DB2 HADR.

Procedure

1. Log in to the current Primary node and stop the Avamar client for DB2 HADR as described in Stopping the Avamar client for DB2 HADR on page 87.
2. Log in to the node that becomes the Primary node and start the Avamar client for DB2 HADR as described in Starting the Avamar client for DB2 HADR on page 87.
3. Use the `db2 takeover` command on the node that becomes the new Primary node to perform the takeover. Refer to the vendor documentation for detailed DB2 HADR instructions.

HADR backups

This section describes how to perform DB2 HADR backups using the Avamar client for DB2 HADR.

Management Console-initiated on-demand backups of an HADR database are performed the same way as with the stand-alone databases. Management Console-initiated on-demand backups require that the Avamar client for DB2 HADR is started on the Primary node.

To configure the scheduled backups, replace the base Avamar client with the Avamar client for DB2 HADR by following instructions in Scheduling backups on page 45.

CLP-backups of an HADR database can be performed the same way as on a stand-alone database. Avamar Plug-in for DB2 flag file configuration on page 95 contains details on how to prepare the flag file. The `--account` option must contain the path to the Avamar client for DB2 HADR, and the `--sysdir` option must contain the path to the `etc` directory of the Avamar client for DB2 HADR.

For Microsoft Windows clients, the following options must also be set:

- `--vardir` must contain the path to the `var` directory of the Avamar client for DB2 HADR defined during the HADR client configuration.
- `--logfile` must contain the path to the logs and the prefix.

For example:

```
--sysdir=C:\Progra~1\avs\etc
--account=/clients/db2_hadr_win
```

```
--vardir=C:\Progra~1\avs\var\db2_hadr_win_var\
--logfile=C:\Progra~1\avs\var\db2_hadr_win_var\clientlogs\avdb2-log
```

Note: For Microsoft Windows clients, the `etc` directory for the HADR client is shared with the base client. For UNIX and Linux client, the `etc` directory is created separately from the base client.

Archive log backups with DB2 HADR

This section describes issues that are related to archive log backups with the Avamar client for DB2 HADR.

With DB2 HADR, only the Primary database generates archive logs while Standby databases do not. All archive log backups are initiated by DB2 while the Avamar server does not directly initiate log backups.

To configure the archive log backups, follow instructions in Configuring automatic backups for DB2 transaction logs on page 39. The `--account` option must contain the path to the Avamar client for DB2 HADR, and the `--sysdir` option must contain the path to the `etc` directory of the Avamar client for DB2 HADR. The logs are stored under the client specified by the `--account` option. For Microsoft Windows clients, the `--vardir` and `--logfile` options must also be set, as described in HADR backups on page 44.

HADR restore and recovery

This section describes how to perform DB2 HADR restores and recovery using the Avamar client for DB2 HADR.

Management Console-initiated restore or recovery can be performed in two ways:

- If the HADR client is active on the current node, use the **Restore to the original location** option.
- If the HADR client is active on another HADR node, perform a Redirected database restore to the base (physical) client.

CLP-initiated restore or recover of HADR database can be performed the same way as for the stand-alone database. The `--account` option must contain the path to the Avamar client for DB2 HADR, and the `--sysdir` option must contain the path to the `etc` directory of the Avamar client for DB2 HADR. For Microsoft Windows clients, the `--vardir` and `--logfile` options must also be set.

HADR disaster recovery

This section describes how to perform DB2 HADR disaster recovery using the Avamar client for DB2 HADR. This procedure must be performed on all HADR nodes.

Procedure

1. Install the same version and release of the operating system and the DB2 application on all servers. Refer to the vendor documentation for instructions.
2. Re-create the DB2 instance (UNIX) or DB2 copy (Windows) with the same name that was previously used. Refer to the vendor documentation for instructions.
3. Install and register the Avamar file system client. Installing the Avamar file system client on page 25 provides instructions.
4. Install the Avamar Plug-in for DB2. Installation on page 23 provides instructions.
5. Create the HADR client for Avamar configuration. Configuring the DB2 HADR client for Microsoft Windows on page 84 and Configuring the DB2 HADR client on UNIX and Linux on page 86 provide instructions.

6. Restore the latest good database backup and roll forward to the last good archive log. Restoring DB2 databases to the original location on page 51 provides instructions.
7. Perform a full backup of the database. Preparing the database for backup on page 39 provides further information.
8. Configure the second HADR node by repeating the previous steps.
9. Restore the backup that is taken in step 7 on page 90 to the second node. Keep the database in the Rollforward Pending state.
10. If applicable, repeat steps 8 on page 90 and 9 on page 90 on all other HADR nodes.
11. Start HADR on all Standby nodes, then on Primary node. Starting the Avamar client for DB2 HADR on page 87provides instructions.

Removing the DB2 HADR client from Microsoft Windows

This section describes how to remove the Avamar client for DB2 HADR from Microsoft Windows environments.

Procedure

1. Log in to one of the DB2 HADR nodes where the Avamar client for DB2 HADR should be removed.
2. Locate the `AvamarHADRConfiguration.exe` file that is found in the *`installpath`* `\bin\` directory. Right-click and select **Run as Administrator**.

   The **Setup Avamar for DB2 HADR Database** window opens.

   a. In the **Avamar Client Name** text box, enter the name of the HADR client and click **Lookup**.

      Information about the client is then populated in the window.

   b. Click **Reset**.

   A message indicates that the configuration was removed. Click **OK**. The client agent is also stopped and the client software is removed.
3. Repeat the previous steps on all DB2 HADR nodes.

Results

This procedure removes files and stops the Avamar Client Backup Agent for HADR, but retains logs and configuration files.

Removing the DB2 HADR client from UNIX and Linux

This section describes how to remove the Avamar client for DB2 HADR from UNIX and Linux environments.

Procedure

1. Log in as root to the HADR node that you used for the HADR client configuration.
2. Run the `hadr_deconfig` script from the Avamar `bin` directory:

   ```
   /avamar_install_dir/bin/hadr_deconfig [AccountName]
   ```

   where:

   - *avamar_install_dir* is the path of the Avamar client for DB2 HADR installation.

- *AccountName* is the name of the Avamar client for DB2 HADR. If this option is not specified, the script prompts you to enter it.

Results

The `hadr_deconfig` script automatically removes the Avamar client for DB2 HADR from all HADR nodes that were configured by using the `-n Nodes` option with the `hadr_config` script. If the `-n Nodes` option was not used to configure multiple nodes, then you will need to run the `hadr_deconfig` script on each node to remove the Avamar client for DB2 HADR. Configuring the DB2 HADR client on UNIX and Linux on page 86 contains more information about using the `-n Nodes` option with the `hadr_config` script.
The `hadr_deconfig` script removes files and stops the HADR `avagent` client process, but retains logs and configuration files.

CHAPTER 6

Backup and Restore with DB2 CLP

This chapter includes the following topics:

- Using DB2 CLP for backups and restores 94
- Backing up databases from the DB2 CLP 97
- Restoring databases and table spaces from the DB2 CLP 100
- Performing redirected restores from the DB2 CLP 101
- Rolling forward the database from the DB2 CLP 103
- Restoring backup images from Avamar versions before 7.0 103
- Recovering DB2 with the DB2 CLP 103
- Setting the expiration and retention for backups 104
- Monitoring CLP-initiated backups and restores 105
- Canceling CLP-initiated backups and restores 105
- DB2 CLP limitations 105

Using DB2 CLP for backups and restores

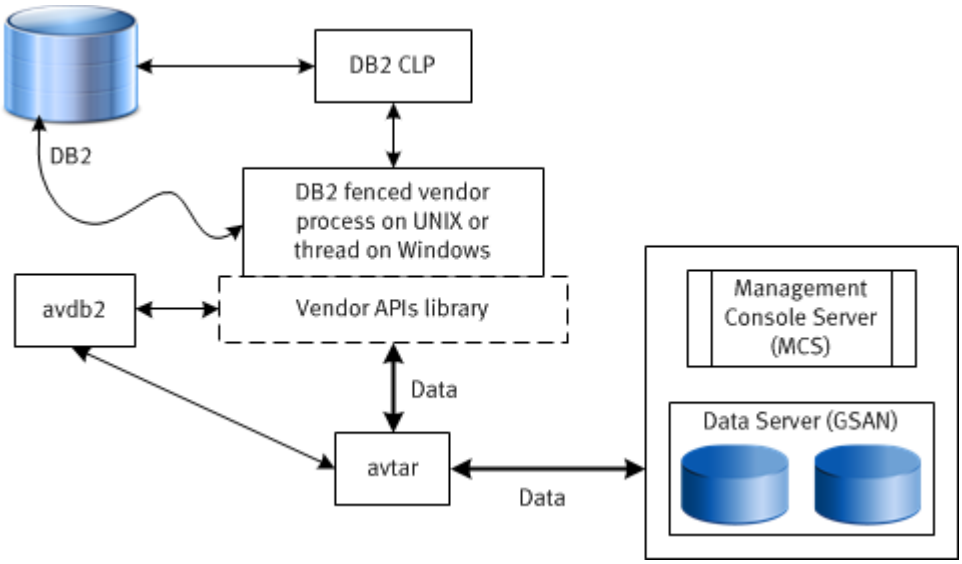
The DB2 CLP works with the Avamar Plug-in for DB2 to provide on-demand backups, restores, and database recoveries. You can perform these operations from the command line on the client system that hosts the DB2 server.

The Avamar Plug-in for DB2 supports the following DB2 CLP commands:

- `db2 backup database`
- `db2 restore database`
- `db2 recover database`
- `db2 rollforward database`
- `db2 archive log`
- `db2 load` with `copy yes` option

The following figure shows the process flow between the Avamar software and the DB2 software.

Figure 6 Avamar software and DB2 CLP process flow



The following steps describe the process flow that occurs when you use the DB2 CLP to perform on-demand backup or restore operations.

1. DB2 starts one or more fenced vendor processes on UNIX or one or more threads on Windows. The number of fenced vendor processes or threads depends on the number of sessions that are requested during the backup or restore operation.
2. Each of the processes or threads invokes the vendor APIs.
3. The vendor APIs start the `avdb2` process, which in turn starts `avtar` processes and other miscellaneous operations.

   Note: The `avdb2` process requires exclusive access to some of the system resources. After a backup or restore operation, the `avdb2` process requires approximately 1 to 2 minutes to release the system resources. Allow sufficient time before you start another CLP operation.
4. The vendor APIs start an `avtar` process for each stream that you specify in the Avamar Plug-in for DB2 flag file.

a. The DB2 data blocks pass from the vendor APIs to `avtar` during a backup operation.

b. Vendor APIs read data from `avtar` during a restore operation.

Note: To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.

All backup images that you create by specifying multiple sessions use a sequence number as an extension. The sequence number identifies the backup piece.

After a successful backup, the Avamar Plug-in for DB2 represents all backup pieces from all backup sessions as one backup image or label.

You can restore backups that you create with multiple session in a single restore session. The Avamar Plug-in for DB2 restores the entire backup image even when you select only one backup piece.

5. The `avtar` process stores the data to either the Avamar server or a Data Domain system depending on what back-end device you specify.
6. The vendor library communicates a success or failure status to the DB2 server.

Backup label and image names

Backup label names and image names identify the type of backup and whether the backup was created from Avamar Plug-in for DB2 or from the command line.

Backup label and image names use the same naming convention whether you create a backup from Avamar Plug-in for DB2 or from the DB2 CLP. Backup label names include the prefix “CLI” when you create a backup by using the `db2 backup` command. Backup naming conventions on page 50 provides more information.

Avamar Plug-in for DB2 flag file configuration

Before you use the DB2 CLP, create an Avamar Plug-in for DB2 flag file. The DB2 CLP requires you to configure the configuration parameter for a DB2 recovery operation and configure `LOGARCHOPT1` for a DB2 rollforward operation.

Specifying DB2 vendor parameters on page 95 provides information about parameters you can use with `db2` commands.

Specifying DB2 vendor parameters

Include only parameters in the Avamar Plug-in for DB2 flag file that are relevant to the backup or restore operation.

Remove all parameters from the flag file that are not relevant to the backup or restore operation. The DB2 CLP does not recognize comment symbols, such as the hash symbol (#), when you include them in a flag file. For example, the DB2 CLP uses the following parameter despite the # symbol:

```
#--logfile=/abc
```

DB2 vendor parameters on page 112 provides more information about parameters that you can specify in the flag file for DB2 CLP backups and restores.

Using the Load command with the Copy Yes option

You can use the `db2 load` utility to store a copy of data that is loaded with the `db2 load` utility to the Avamar server.

About this task

The `LOGARCHMETH1`, `LOGARCHOPT1`, and `VENDOROPT` parameters are required for backing up and recovering copy images that are created with the Load command.

Procedure

1. Create the Avamar Plug-in for DB2 flag file.
2. Configure the database for backup and recovery of copy images by typing the following commands:

   ```
   db2 update db cfg for database_name using logarchmeth1
   VENDOR:vendor_library
   ```

   ```
   db2 update db cfg for database_name using logarchopt1 pathname
   ```

   ```
   db2 update db cfg for database_name using vendoropt pathname
   ```

   where:

   - *database_name* is the name of the database to back up.
   - *vendor_library* is the full pathname to the shared library of the Avamar Plug-in for DB2.
   - *pathname* is the absolute pathname to the flag file that you created.

3. Copy the database being loaded by using the copy yes option and indicating that the copy should be loaded to the Avamar plug-in:

   ```
   db2 load from input_file of file_type insert into table_name copy yes load
   vendor_library
   ```

   where:

   - *input_file* is the file, pipe, or device that contains the data being loaded.
   - *file_type* is the format of the data in the input file.
   - *table_name* is the database table into which the data is to be loaded.
   - *vendor_library* is the full pathname to the shared library of the Avamar Plug-in for DB2.

Results

This operation produces archive logs and the copied image with type 4 in the image name. As a result, the Backup, Restore, and Manage window in the Avamar Administrator will show two new images: an archive log that contains details of the operation and the location of the image, and the image itself.

Restoring the LOAD_COPY image

The LOAD_COPY image cannot be restored alone. It can only be restored during a rollforward or recover operation. During the log retrieval, when a log contains a reference to a LOAD_COPY image, DB2 requests the image from the vendor. Then DB2 applies the change to the database and continues the rollforward.

Both recover and rollforward operations can be launched from DB2 CLP. The Avamar Administrator has **Recover** and **Restore and roll forward database** options for those operations.

Restore options on page 110 contains more information on the database recovery and rolling forward options.

Backing up databases from the DB2 CLP

The DB2 CLP enables you to perform on-demand backups to either the Avamar server or a Data Domain system. Use the DB2 CLP to back up an entire database in offline or online mode, or to back up a single table space from an online database. The IBM website provides more information about the DB2 CLP.

Procedure

1. Log in to the Avamar Plug-in for DB2 client with DB2 instance owner's credentials.
2. Create an Avamar Plug-in for DB2 flag file that includes all necessary parameters for the backup. Creating the Avamar Plug-in for DB2 flag file on page 40 provides more information.
3. To use a Data Domain system for the backup, add the following parameters to the flag file:

   --ddr=true
   --ddr-index=*index_number*

   where *index_number* is the identification number of the Data Domain system to use for the backup. Contact the Avamar administrator to determine the index number of the Data Domain system.

4. To back up data from a DPF node, add the following parameters to the flag file:

   --dbpartitionnums=*partition_numbers*
   --catnode=*catnode_number*

   where:

   - *partition_numbers* is a list of partitions for a single-system view backup. Separate each partition number by a comma.
   - *catnode_number* specifies the partition number of the catalog node.

5. (Optional) To back up data from an HADR node, ensure that the following parameters in the flag file are defined for the Avamar Client for DB2 HADR:

   ```
   --sysdir=/HADR-Client/etc
   --account=/clients/account
   ```

   where:

   - *HADR-Client* is the path to the Avamar client for DB2 HADR.
   - *clients* is the Avamar Domain of the HADR client.
   - *account* is the client name of the HADR configuration.

   Additionally, on Windows, add the following parameters to the flag file:

   ```
   --vardir=HADR-VarDir
   --logfile=HADR-VarDir\clientlogs\avdb2-log
   ```

   where *HADR-VarDir* is the path to the `var` directory of the HADR client.

> **Note:** The Avamar Client for DB2 HADR must be configured to backup and restore HADR database. Preparing for HADR backups on page 84 contains more information.

6. Type the `db2 backup` command with appropriate parameters. The following topics include the example backup commands:
   - Example command to back up a database in offline mode on page 98
   - Example command to back up a database in online mode on page 98
   - Example command to back up a table space in online mode on page 99

Example command to back up a database in offline mode

You can use the `db2 backup db` command to back up a database in offline mode.

The following table provides an example command to back up an entire database in offline mode.

Table 3 Command to back up a database in offline mode

Operating system	Command
Windows	**db2 backup db sample load *Avamar_client_installation_dir*\bin\libavdb2.dll options @*pathname*\avdb2.flg** where: • *Avamar_client_installation_dir* is the installation directory pathname of the Avamar client software. • *pathname* is the complete directory pathname of the Avamar Plug-in for DB2 flag file.
UNIX	**db2 backup db sample load *Avamar_client_installation_dir*/lib/libdb2_avamarloader.so options @*pathname*/avdb2.flg** where: • *Avamar_client_installation_dir* is the installation directory pathname of the Avamar client software. • *pathname* is the complete directory pathname of the Avamar Plug-in for DB2 flag file.

Example command to back up a database in online mode

You can use the `db2 backup db` command to back up a database in online mode.

The following table provides an example command to back up an entire database in online mode.

Table 4 Command to back up a database in online mode

Operating system	Command
Windows	**db2 backup db sample online load *Avamar_client_installation_dir* \bin\libavdb2.dll open 5 sessions options @*pathname*\avdb2.flg** where: • *Avamar_client_installation_dir* is the installation directory pathname of the Avamar client software. • *pathname* is the complete directory pathname of the Avamar Plug-in for DB2 flag file.
UNIX	**db2 backup db sample online load *Avamar_client_installation_dir*/lib/libdb2_avamarloader.so open 5 sessions options @*pathname*/avdb2.flg** where: • *Avamar_client_installation_dir* is the installation directory pathname of the Avamar client software. • *pathname* is the complete directory pathname of the Avamar Plug-in for DB2 flag file.

Note: The Avamar Plug-in for DB2 supports a maximum of 10 sessions.

Example command to back up a table space in online mode

You can use the `db2 backup db` command to back up a single table space in online mode.

The following table provides an example command to back up a single table space in online mode from the sample database. The example command also shows how to use the `dedup_device` option.

Table 5 Command to back up a table space in online mode

Operating system	Command
Windows	**db2 backup db sample tablespace(TBSPACE1) online load *Avamar_client_installation_dir* \bin\libavdb2.dll open 5 sessions options @*pathname*\avdb2.flg dedup_device** where:

Table 5 Command to back up a table space in online mode (continued)

Operating system	Command
	• *Avamar_client_installation_dir* is the installation directory pathname of the Avamar client software. • *pathname* is the complete directory pathname of the Avamar Plug-in for DB2 flag file.
UNIX	**db2 backup db sample tablespace(TBSPACE1) online load *Avamar_client_installation_dir*/lib/libdb2_avamarloader.so open 5 sessions options @*pathname*/avdb2.flg dedup_device** where: • *Avamar_client_installation_dir* is the installation directory pathname of the Avamar client software. • *pathname* is the complete directory pathname of the Avamar Plug-in for DB2 flag file.

Restoring databases and table spaces from the DB2 CLP

You can perform various restore operations from the DB2 CLP. For example, you can restore the most recent backup or you can specify a timestamp to restore a specific backup. You can restore the entire database or restore individual table spaces.

Note: After a successful restore from DB2 CLP, roll forward the database to bring the database to a certain point in time before you start another restore operation from CLP.

To restore DB2 databases in a DPF environment, use the DB2 documentation. This guide does not provide instructions for performing restores in a DPF environment from the DB2 CLP.

Specifying multiple sessions for a restore from the DB2 CLP

Add the `--timeout-new-connection` option to the Avamar Plug-in for DB2 flag file when you specify multiple sessions for a restore.

About this task

Procedure

- Before you specify multiple sessions for a restore you perform from the DB2 CLP, add `--timeout-new-connection=40` to the Avamar Plug-in for DB2 flag file.

  Creating the Avamar Plug-in for DB2 flag file on page 40 provides more information.

Note: A restore that specifies multiple session might fail if you do not include `--timeout-new-connection=40` in the Avamar Plug-in for DB2 flag file.

Performing redirected restores from the DB2 CLP

You can perform redirected restores from the DB2 CLP. A redirected restore enables you to restore a backup to a target other than the original one. You can restore backups to a different system, instance, or database.

To restore one instance to another instance, include the `--db2-source-instance` parameter in the Avamar Plug-in for DB2 flag file. The value of the `--db2-source-instance` parameter is the name of the source instance.

Example procedure to restore an instance to a different instance

You can redirect a restore of an instance to a different instance by using DB2 commands.

Procedure

1. Create the flag file and include the following parameters:

   ```
   --id=user-1@/clients/hostA.avamar.emc
   --password=obfuscated password
   --sysdir=/usr/local/avamar/etc
   --db2-source-instance=db2inst1
   --redirected_restore_target=db2inst2
   ```

   Creating the Avamar Plug-in for DB2 flag file on page 40 provides more information.

2. Attach to the target instance by typing the following command:

   ```
   db2 attach to db2inst2
   ```

3. Set the `DB2INSTANCE` environment variable to the target instance, db2inst2.
4. Type the appropriate restore command for the system type:
   - For Windows, type the following command:

     ```
     db2 restore db sample load Avamar_client_installation_dir\bin
     \libavdb2.dll options @pathname\avdb2.flg redirect
     ```

     where:

     - *Avamar_client_installation_dir* is the installation directory pathname of the Avamar client software.
     - *pathname* is the complete directory pathname of the Avamar Plug-in for DB2 flag file.
   - For UNIX, type the following command:

     ```
     db2 restore db sample load Avamar_client_installation_dir/lib/
     libdb2_avamarloader.so options @pathname/avdb2.flg redirect
     ```

     where:

     - *Avamar_client_installation_dir* is the installation directory pathname of the Avamar client software.
     - *pathname* is the complete directory pathname of the Avamar Plug-in for DB2 flag file.
5. Run the `set table space containers` command for each table space whose containers you want to redefine. The DB2 documentation provides more information.

6. After you successfully complete all previous steps, type the following `db2 restore db` command with the `continue` option:

   ```
   db2 restore db sample continue
   ```

Example restore that uses an automatically generated script

You can redirect a restore of an instance to a different instance by using an automatically generated script. The DB2 documentation provides complete details about performing redirected restore to a different DB2 instance.

Procedure

1. Log in as the target instance, db2inst1, and then generate a redirected restore script:
   - For Windows, type the following command:

     ```
     db2 restore db sample load Avamar_client_installation_dir\bin
     \libavdb2.dll options @pathname\avdb2.flg generate script script_path
     \my_redirect.clp
     ```

     where:

     - *Avamar_client_installation_dir* is the installation directory pathname of the Avamar client software.
     - *pathname* is the complete directory pathname of the Avamar Plug-in for DB2 flag file.
     - *script_path* is the complete pathname where the script is saved.
   - For UNIX, type the following command:

     ```
     db2 restore db sample load Avamar_client_installation_dir/lib/
     libdb2_avamarloader.so options @pathname/avdb2.flg generate script
     script_path/my_redirect.clp
     ```

     where:

     - *Avamar_client_installation_dir* is the installation directory pathname of the Avamar client software.
     - *pathname* is the complete directory pathname of the Avamar Plug-in for DB2 flag file.
     - *script_path* is the complete pathname where the script is saved.
2. Open the script in an editor and define the following parameters:
   - `ON`

     Note: For Windows operating systems, you must specify a drive letter as the first entry if the database does not exist and you do not specify the `DBPATH ON` parameter. If you specify a pathname, the script returns an error.
   - `DBPATH`
   - `NEWLOGPATH`
   - `INTO`
   - `TAKEN AT`
   - `REPLACE EXISTING REDIRECT`
   - `WITHOUT ROLLING FORWARD`

   For example:

   ```
   ON '/home/db2inst2'
   INTO sample1
   ```

where `/home/db2inst2` is the home directory of the new instance.

Note: If the backup created table spaces, set the `set tablespace containers` parameter to the appropriate value, if necessary.

3. Change the directory to the *script_path* directory, and then type the following command:

```
db2 -tvf my_redirect.clp
```

Rolling forward the database from the DB2 CLP

After restoring a tablespace or database, you can roll forward the database to apply the archived transaction logs, which bring the data to a certain point in time.

The DB2 software checks the database history to obtain all the information about available archived logs, including the storage and method to retrieve the log. Then it requests that the Avamar software checks for log availability. The `DB2 rollforward` operation does not require any additional configuration steps to retrieve the logs from the Avamar server.

Note: Due to a DB2 restriction, when the DB2 configuration parameter AUTO_DEL_REC_OBJ is turned on, LOGARCHOPTn should be configured with a value of less than 30 character long. This action allows the log pruning to work correctly. DB2 documentation provides more information.

Restoring backup images from Avamar versions before 7.0

Backups from the Avamar Plug-in for DB2 before release 7.0 do not include a timestamp in the backup image name. The naming convention for backup image names changes in release 7.0 to include a timestamp.

Backup naming conventions provide more information.

To restore a backup from a release of the Avamar Plug-in for DB2 before 7.0, provide the label number of the backup. Specify the label number by including the `--labelnum` parameter in the Avamar Plug-in for DB2 flag file.

The following flag file includes the `--labelnum` parameter, which enables you to restore DB2 from a previous version of the Avamar Plug-in for DB2:

```
--id=user-1@/clients/hostA.avamar.emc
--password=obfuscated password
--sysdir=/usr/local/avamar/etc
--labelnum=136
```

Recovering DB2 with the DB2 CLP

You can use the `db2 recover db` command to recover a database in a stand-alone DB2 installation.

About this task

The database name in the following commands is a sample.

To run the `db2 recover db` command by using the plug-in vendor library, set the `VENDOROPT` parameter to the flag file:

```
update db cfg for database_name using VENDOROPT @/pathname/avdb2.flg
```

where *database_name* is the name of the database and *pathname* is the directory that contains the Avamar Plug-in for DB2 flag file.

Procedure

- To recover the database, type the following command:

  ```
  db2 recover db sample
  ```

- To recover partition 1 of the database, type the following command:

  ```
  db2 recover db sample on dbpartitionnum(1)
  ```

  DB2 CLP limitations on page 105 provides more information.

  Note: In a DPF environment, the Avamar Plug-in for DB2 supports only single-partition recoveries.

- To roll forward the database to the end of backup, and then run a `complete` operation, type the following command:

  ```
  db2 rollforward db sample to end of backup and complete
  ```

- To roll forward the database to the end of logs, and then run a `complete` operation, type the following command:

  ```
  db2 rollforward db sample to end of logs and complete
  ```

- To roll forward the database on all nodes in a DPF environment, type the following command:

  ```
  db2 rollforward db sample to end of logs on all dbpartitionnums
  ```

- To roll forward the database on partitions 1 and 3 to the end of backup, type the following command:

  ```
  db2 rollforward db sample to end of backup on dbpartitionnums(1,3)
  ```

Setting the expiration and retention for backups

You can specify the `--expires` and `--retention` parameters to set an expiration time for a backup.

About this task

You can specify a timestamp value or a calendar day, month, or year for the `--expires` parameter. The *Avamar Administration Guide* provides more information about the `--expires` and `--retention` parameters.

You can manually adjust the expiration time and retention policy after a backup completes by using the `mccli backup edit` command. The *Avamar Management Console Command Line Interface (MCCLI) Programmer Guide* provides more information.

To ensure that all backup pieces are available for an incremental restore and rollforward operation, set the `--expires` parameter to the same timestamp for all related backups.

Procedure

- If you should change an expiration date, manually adjust the expiration date for all related backups.
- If you specify a count for the `--expires` parameter, ensure that all expiration dates for all backup pieces are synchronized.

Monitoring CLP-initiated backups and restores

You can monitor CLP-initiated backups and restores from the Avamar Administrator to ensure that the operations complete successfully and troubleshoot issues.

Monitoring backups on page 47 and Monitor restores on page 70 contain information about using the Avamar Administrator to monitor backups and restores.

Canceling CLP-initiated backups and restores

You can cancel CLP-initiated backups and restores from the Avamar Administrator.

Note: Cancelling CLP-initiated operations from the command line (for example, by using Ctrl + C) is not supported.

DB2 CLP limitations

The Avamar Plug-in for DB2 limits the use of some operations from the DB2 CLP:

- You cannot restore incremental or delta backups that you create from the DB2 CLP by using Avamar Administrator.

  Note: DB2 CLP incremental and delta backup images are not linked. If the base backup expires, Avamar removes it, which results in data loss. Subsequently, there is no snapview available for all the required pieces. Adjust the expiry so that all required full, incremental, and delta pieces are available for restore.

- The Avamar Plug-in for DB2 supports one restore operation of a partition at a time. This limitation applies to restores by using the `db2 restore` and `db2 recover` commands.
- The Avamar Plug-in for DB2 does not support the `db2 recover db` command for dropped databases.

  Note: To recover a dropped database, use the `db2 restore` command followed by the `db2 rollforward` command. Recovery of a dropped database fails with error code 30 on page 123 provides more information.

- You cannot use the Point-in-Time (PIT) recovery type in a DPF environment.
- You cannot recover multiple partitions from the DB2 CLP. A recovery operation can only be performed on one partition at a time.
- Archived logs must have an appropriate expiry date that corresponds to the backup image. Archived logs are not linked to a backup. Avamar purges backup logs that expire if you restore the most recent backup in which the archive logs have been deleted due to the expiry date.

APPENDIX A

Plug-in Options

This appendix includes the following topics:

- Plug-in options 108
- Performance options 108
- Backup options 108
- Restore options 110
- Table space restore option 111
- DB2 vendor parameters 112

Plug-in options

Plug-in options allow you to control specific actions for on-demand backups, restores, and scheduled backups. The plug-in options that are available depend on the operation type and client plug-in type.

You can specify plug-in options in Avamar Administrator for on-demand backup or restore operations, or when you create a dataset for a scheduled backup. Plug-in options are set using the graphical user interface (GUI) controls (text boxes, checkboxes, radio buttons, and so forth). In addition to using the GUI controls, you can type an option and its value in the **Enter Attribute** and **Enter Attribute Value** fields for special circumstances. Specifying backup and restore options as normal text on page 125 provides more information.

> **Note:** The Avamar software does not check or validate the information that you type in the **Enter Attribute** and **Enter Attribute Value** fields. In addition, the values in the **Enter Attribute** and **Enter Attribute Value** fields override settings that you specify with the GUI controls.

Detailed instructions on how to access and set plug-in options during a backup or restore are available in Chapter 3, Backup and Chapter 4, Restore and Recovery.

Performance options

DB2 includes options that affect backup and restore performance. You can specify these options with CLP operations or from Avamar Administrator.

The following table lists DB2 performance options.

Table 6 Performance options

Option name	Description
`buffersize`	DB2 backup/restore buffer size in page units.
`num-buffers`	The number of backup/restore buffers that are used by DB2.
`parallelism`	The number of table spaces read in parallel in a backup or the number of DB2 buffer manipulators that are used in a restore.

> **Note:** To set performance options with Avamar Administrator, use the instructions in Specifying backup and restore options as normal text on page 125. Precede the option name with the prefix, [avdb2].

The DB2 database system automatically uses optimal values for these options. Some system configurations, however, might require custom tuning, especially when you use the `dedup_device` option with a CLP operation or the **Optimize backup deduplication** option with Avamar Administrator. The DB2 documentation provides guidelines for the range of values that you can use for these options.

Backup options

Backup options enable you to control backup functionality that is specific to the Avamar Plug-in for DB2. You can specify plug-in options for on-demand and scheduled backups.

The following table lists options that are available for the Avamar Plug-in for DB2 when you perform an on-demand backup or when you configure a dataset for scheduled backups.

Table 7 Backup plug-in options

Option	Description
Create an online backup	Backs up the database while it is operational. This type of backup is a hot backup. **Note:** Enable DB2 Archive Logging to successfully perform online backups.
Exclude archive logs in online backup	Excludes the archive logs from the backup. If you exclude the archive logs from a database backup, ensure that you include the archive logs in file system backups. Failure to do so can result in loss of data.
Optimize backup deduplication	Enables the `DB2 dedup_device` option for the backup. **Note:** Only specific DB2 versions support the `dedup_device` option. Check the vendor documentation to determine if the DB2 version supports the `dedup_device` option. A backup fails if you select the **Optimized backup deduplication** option for a backup of a DB2 database that does not support the `dedup_device` option.
Instance Admin Username	Specifies the instance owner or system admin username.
Instance Admin Password	Specifies the password for the username.
Database Partition Numbers	Specifies database partition numbers to use for the backup: • To specify all database partitions, type **`ALL`** or **`all`**. • To specify a list of partitions, for example, partitions 1, 2, and 3, type `1,2,3`. • For a single partition setup, leave this field blank.
Number of sessions during backup	Specifies the number of sessions to use for the backup. You can back up database objects to the Avamar server or the Data Domain system in parallel by specifying 1 to 6 sessions. The use of multiple data streams for a backup can increase system performance when you back up a large database.
Enable debugging messages	Writes maximum information to log files. This option can create large log files.
Store backup on Data Domain system	Uses a Data Domain system that you select from the list to store the Avamar Plug-in for DB2 backup.

Table 7 Backup plug-in options (continued)

Option	Description
Encryption method to Data Domain system	Specifies the encryption method for data transfer between the client and the Data Domain system during the backup.

Restore options

Restore plug-in options enable you to control restore functionality that is specific to the Avamar Plug-in for DB2. Restore options are set from the **Restore Command Line Options** dialog box.

The following table lists options for restore operations with the Avamar Plug-in for DB2.

Table 8 Restore plug-in options

Option	Description
Encryption method from Data Domain system	Specifies the encryption method for data transfer between the Data Domain system and the client during the restore.
Recover	Performs a db2 recover operation for the database.
Restore and roll forward database	For online backups that include archive logs, restore both the database and the archive logs, then roll forward the database. If you select the **Restore and roll forward database** option, you must also complete the following steps: 1. Select an option from the **Type of Recovery** list other than the **End of backup** option. DB2 recover operations do not support the **End of backup** options. 2. Specify a value in the **Directory Path to Restore Archive Logs** field. **Note:** The **Restore and roll forward database** option is not supported for database partition restore operations.
Restore only	Performs only a restore of the backups. Select this option to restore a backup without recovery, offline backups, or online backups that do not have archive logs.
Restore only archive logs from an online backup	Restores only the archive logs from the backup.
Type of Recovery	When you select the **Restore and roll forward database** option, select a recovery option from the list: • **End of logs**—Rolls forward the database until the end of the archive logs. • **Point In Time**—Rolls forward the database until a certain point-in-time, which you specify in the **Date and Time** field.

Table 8 Restore plug-in options (continued)

Option	Description
	• **End of Backup**—Rolls forward the database until the end of the backup. This option is available only for DB2 version 9.5 and later. Do not specify this option with the **Recover** option.
Date and Time	When you select **Point In Time** from the **Type of Recovery** list, specify the recovery date and the time by using the following format: *yyyy-mm-dd hh:mm:ss* Specify the time that corresponds to the time zone of the client system.
Number of sessions during restore	Specifies the number of sessions to use for the restore. You can restore database objects in parallel by specifying one to ten sessions. The use of multiple data streams for a restore increases system performance when you back up a large amount a data. To obtain the best performance during a restore, use the same number of restore sessions that you used for the backup.
Instance Admin Username	Specifies the instance owner or system admin username.
Instance Admin Password	Specifies the instance owner's password.
Database Partition Numbers	Specifies a single-value database partition to use for the restore: • To specify a partition, type the database partition number. • To recover a single partition setup, leave this field blank.
Directory Path to Restore Archive Logs	Specifies the fully qualified pathname of an existing top-level directory. The restore operation creates a subdirectory below the directory pathname you specify and restores the archive logs to this subdirectory.
Database Name	Specifies the new name for the database when you perform a directed restore. DB2 supports database names that include up to eight characters.
Instance Name	Specifies the password for the username.
Replace existing database	Enables overwriting of the target database if it exists.
Enable debugging messages	Writes maximum information to log files. This option can create large log files.

Table space restore option

You can restore a table space in offline mode. By default, a table space restore uses online mode. You can, however, restore a table space in offline mode by using the `tbs-offline-restore-`

`mode` option. Set the `tbs-offline-restore-mode` option to **`true`** to perform a granular restore in offline mode.

DB2 vendor parameters

You can use DB2 vendor parameters with `db2` commands by including them in a flag file. Specifying DB2 vendor parameters on page 95 provides more information.

The following table lists parameters that you can specify in the flag file.

Table 9 DB2 vendor parameters

Parameter name	Description	Examples
`--account`	Optional for all operations. Specifies the Avamar domain of the client. This domain is usually */domain_name/client_hostname*.	**`--account=/clients/user_pc`**
`--avtar-before-after-days-search`	Optional for restore operations. Specifies a search range (in number of days) for a backup image which is based on DB2 timestamp. The option is used to construct the time range in `avtar` history search for db2 backup image availability: Begin on (timestamp - days) end at (timestamp + days)	**`--avtar-before-after-days-search=3`**
`--catnode`	Mandatory for all operations in a DPF environment. Specifies the partition number of the catalog node.	**`--catnode=0`**
`--db2-source-instance`	Mandatory for a redirected restore to a different instance. Specifies the name of the source instance.	**`--db2-source-instance=db2inst1`**
`--dbpartitionnums`	Mandatory for all operations in a DPF environment. Specifies the list of partitions for a single-system view. This parameter's setting must match the value of the on `dbpartitionnums list` option that you use with the `db2` command.	**`--dbpartitionnums=0, 1, 2, 3`** **`--dbpartitionnums=all`**
`--ddr`	Optional. Specifies that an Avamar backup is to be saved to a Data Domain system.	**`--ddr=true`**
`--ddr-index`	Mandatory when `--ddr` is set. Index number (1, 2, 3, or so forth) of the Data Domain system on which the backup is to be saved. An index number is assigned to the Data Domain system when it is added to the Avamar server configuration. Contact the Avamar Administrator to determine the required index number. If you do not set this option when the `--ddr` parameter is set, then the backup is not reported correctly.	**`--ddr-index=1`**

Table 9 DB2 vendor parameters (continued)

Parameter name	Description	Examples
`--debug`	Optional. Turns on debugging messages. Do not set this option for normal operations because this setting can create large log files.	**`--debug=true`**
`--encrypt`	Optional. Specifies the type of encryption to be used by `avtar` for a backup. The values that are supported for this parameter are `proprietary`, `ssl`, `sslverify`, `tcp`, `tls`, and `tls-sa`. The default value for all backups is `tls`. The *Avamar Product Security Guide* provides more details about encryption.	**`--encrypt=ssl`**
`--encrypt-strength`	Optional. Specifies the level of encryption to be used by `avtar` for a backup. The values that are supported for this parameter are `high`, `medium`, and `cleartext`. The default value for all backups is `high`.	**`--encrypt-strength=high`**
`--expires`	Optional. Specifies the backup expiration time in number of days. A backup with Avamar Administrator ignores this parameter if it is set in the flag file. The End User On Demand Retention policy defines the default value of 60 days. The *Avamar Administration Guide* provides more details about expiration.	**`--expires=120`**
`--id`	Mandatory for all operations. Specifies an Avamar server username that has Avamar Administrator privileges.	**`--id=user-1@/clients/hostA.avamar.emc`**
`--labelnum`	Mandatory for restore operations only, when you restore backups from Avamar releases before 7.0. Specifies backup label number. Not supported by Avamar 7.0 and later releases.	**`--labelnum=100`**
`--logdest-account`	Optional parameter for rollforward operations following a redirected restore to a new host and for log backups on the new host. Specifies the account on the destination host that was used for a log backup.	**`--logdest-account=/clients/hostA.avamar.emc.com`**
`--logdest-ap`	Mandatory for rollforward operations following a redirected restore to a new host and for log backups on the new host. Specifies the password on the destination host for the user id that was used for a log backup. You can run the following `avtar` command on the command line to encode a password:	**`--logdest-ap=`*`encoded_password`*** The 80-character encoded value is the value returned by the `avtar --encodepassword=`*`password`* command.

Table 9 DB2 vendor parameters (continued)

Parameter name	Description	Examples
	avtar --encodepassword=*password* where *password* is the password that you type in clear text on the command line. The `avtar` command returns an encoded password that you can then use with the `--logdest-ap`parameter in the flag file.	
`--logdest-id`	Mandatory for rollforward operations following a redirected restore to a new host and for log backups on the new host. Specifies the user id on the destination host that was used for a log backup.	**--logdest-id=MCUser**
`--logfile`	Optional parameter for all operations. Specifies the log file's location and prefix. If you do not specify the `--logile` parameter, the log file's default location is *install_path*/var/clientlogs.	**--logfile=/usr/avamar/var/clientlogs/avdb2.log**
`--password`, `pswd`, or `--ap`	Mandatory for all operations. Specifies the password for the username you specify with the `--id` parameter. You can run the following `avtar` command on the command line to encode a password: **avtar --encodepassword=*password*** where *password* is the password that you type in clear text on the command line. The `avtar` command returns an encoded password that you can then use with the `--password` parameter in the flag file.	**--password=*encoded_ password*** The 80-character encoded value is the value returned by the `avtar --encodepassword=`*password* command.
`--retention-type`	Optional. Specifies the backup retention type for a backup. This parameter defines the retention type only and does not override the expiration. A backup with Avamar Administrator ignores this parameter if it is set in the flag file. The default value is none. The *Avamar Administration Guide* provides more information.	**--retention-type=daily, weekly, monthly**
`--server` or `--hfsaddr`	Optional for all operations. Specifies the DNS hostname or IP address of the Avamar server.	**--server=server_name.example.com**
`--sysdir`	Mandatory for all operations. Specifies the location of the Avamar `etc` directory.	On AIX and Linux: **--sysdir=/usr/local/avamar/etc**

Table 9 DB2 vendor parameters (continued)

Parameter name	Description	Examples

		On HP-UX and Solaris:
		`--sysdir=/opt/AVMRClnt/etc`
		
		On Windows:
		`--sysdir="C:\Program Files\avs\etc"`

APPENDIX B

Troubleshooting

This appendix includes the following topics:

- Troubleshooting installation and configuration problems 118
- Troubleshooting backup problems 118
- Troubleshooting restore problems 119
- Troubleshooting DB2 CLP backup and restore problems 121
- Specifying backup and restore options as normal text 125

Troubleshooting installation and configuration problems

You can resolve some installation and configuration problems with the troubleshooting information in this appendix.

Installing the Avamar Plug-in for DB2 in the default directory fails

The Avamar Plug-in for DB2 must be installed in the same directory as the Avamar client software. Otherwise, the installation fails.

If you install the Avamar Plug-in for DB2 in the default directory on an AIX system, which has the Avamar client software that is installed in a nondefault directory, the installation fails with the following error:

```
The Avamar Client is located in '/usr/local/INSTALLPATH'.
Please re-run the DB2 plugin installer with the '-R /usr/local/
INSTALLPATH' flag
install: Failed while executing the AvamarDB2-aix6-ppc64.pre_i script.
```

To resolve this problem, install the Avamar Plug-in for DB2 in the same directory as the Avamar Client for AIX:

`installp -R /`*`install_path`*` -d AvamarDB2-aix6-ppc64-`*`version`*`.bff all`

where:

- *install_path* is the directory for the installation files.
- *version* is the Avamar software version.

Resolving a network hostname might result in a time-out error

You might receive a time-out error while the system tries to resolve the hostname of the client system that runs the DB2 server and Avamar Plug-in for DB2. The Avamar Plug-in for DB2 requires an unimpeded network connection to the Avamar server.

To establish a communication resource, it is required to have a hostname resolution either through DNS or by using the `/etc/hosts` file. A system's network configuration determines what method to use for hostname resolution. For example, a system might resolve a hostname by using the `/etc/hosts` file as the last method. In this case, the communication process might appear to be slow.

Ensure that the hostname resolution configuration is optimal on the host that runs the DB2 server and Avamar Plug-in for DB2. The documentation for the operation system provides more information about configuring hostname resolution.

Troubleshooting backup problems

You can resolve some backup problems with the troubleshooting information in this appendix.

Backup fails with error SQL1776N

IBM DB2 does not support the backup of Standby databases in an HADR environment. During the backup operation, the Avamar Plug-in for DB2 may fail with the following error message:

```
SQL1776N. The command cannot be issued on
an HADR database. Reason code = 1.
```

To avoid such failures, configure the HADR Client for Avamar on all HADR nodes. Details of the configuration are provided in the section Preparing for HADR Backups.

Backup fails at snapview creation stage

When a backup operation fails with the following message, perform the following steps:

```
  avdb2 Error <0000>: Failed to create the snapview. However, the database
data has been successfully backed up and is marked as a hidden backup.
Restore is available through CLI only. See the plug-in documentation for
information about restoring hidden backups.
```

1. Run a FULL backup.
2. Verify that the backup was successful by using DB2 CLP command:

   ```
   DB2 LIST HISTORY BACKUP SINCE <DATE> FOR DB <DBNAME>
   ```

   The message might mean that although you cannot see the backup label in the Avamar Administrator window, the database data has backed up, but does not display as normal.
3. Record the last and largest sequence number of the timestamp, which is the backup start time. For one backup operation, you might see multiple entries in the result with `timestamp +sequence` format. For example, `timestamp+001, timestamp+00`2
4. To restore the backup with that specific timestamp, follow the CLP restore procedure.
5. Add the following flag to the restore command:`—num-hidden-piecies=X`
   Where X is the number that you record from the result of DB2 LIST HISTORY for that specific timestamp.

Troubleshooting restore problems

You can resolve some restore problems with the troubleshooting information in this appendix.

Adjusting the base timeline for a log restore

During a rollforward operation, the Avamar Plug-in for DB2 uses the DB2 history backup time with a fallback of 10 minutes as the default base timeline when searching for the available logs. A 10-minute period might not allow enough search time for archived logs.

If there be an online backup, the default fallback time includes the logs that were archived and saved before the database image is saved. The amount of fallback time that the search requires can vary depending on the size of the logs.

The `--fallback-mins-search` flag impacts the search time for a restore operation of archived logs. A database rollforward operation uses this flag when retrieving the archived logs to apply to the database after the restore and recovery of a database backup image completes.

Use the `--fallback-mins-search` flag to add more fallback time to the default fallback time of 10 minutes. You can specify a negative value to fall forward from the default base timeline.

Recover fails if LOGARCHOPT1 is more than 30 characters

A database recovery operation records an entry for the archived log backup in the COMMENT field of db2 recovery history. This entry is the value of the `LOGARCHOPT1` parameter.

The COMMENT field can contain 30 characters. If the value of the `LOGARCHOPT1` parameter is greater than 30 characters, the rollforward operation might fail with an error similar to the following error:

```
SQL1268N Roll-forward recovery stopped due to error "SQL1042" while
retrieving log file "S0000001.LOG" for database "TEST" on node "0"
```

To work around this issue, ensure that the `LOGARCHOPT1` parameter does not exceed 30 characters:

1. Configure the `LOGARCHOPT1` parameter by using the following command:

   db2 update db cfg for *database_name* using logarchopt1 @*pathname*

   where *database_name* is the name of the database and *pathname* is the absolute pathname, which comprises no more than 30 characters.

   This step reconfigures the `LOGARCHOPT1` parameter.

2. Recover the database. For example:

   db2 recover db *database_name*

3. Back up the database after the recover successfully completes. For example:

   db2 backup db *pathname* load /usr/local/avamar/lib/libdb2_avamarloader.so options @*pathname*

   The step ensures that future recovery operations use the new setting for the `LOGARCHOPT1` parameter.

Restore fails with a “Failed to initiate the restore operation” error

The default setting of 30 s for the `--subprocesstimeoutsecs` option might not allow enough time for a restore to complete.

A restore operation fails and writes the following error to the log file:

```
Failed to initiate the restore operation
```

Complete the following steps to resolve this problem:

1. Set the `--subprocesstimeoutsecs` option and value for the restore operation. Specifying backup and restore options as normal text on page 125 provides instructions.
2. Type **`--[avdb2]subprocesstimeoutsecs`** in the **Enter Attribute** field.
3. Type a value from `40` to `60` in the **Enter Attribute Value** field.

   The default value is 30 s.

4. Retry the restore operation.

Restore fails while retrieving snapview and metadata

A restore operation from Avamar Administrator might fail when the Avamar Plug-in for DB2 retrieves snapview and metadata.

Adjusting the snapupbrowsetimeoutsecs flag

During a restore operation from Avamar Administrator, the Avamar Plug-in for DB2 retrieves the snapview of the backup. Because the performance and connection speed of the client and the Avamar server vary from system to system, this retrieval process might require a shorter or longer period to complete. For a busy system, the retrieval process might require up to 90 s. The `--snapupbrowsetimeoutsecs` flag, which is set to 30 s by default, determines the time-out value for the retrieval of the snapview. If the retrieval of the snapview does not have enough time to complete, the restore fails with the following error messages:

```
2013-01-30 19:28:43 avdb2 Info <6686>: Process 31757
(/usr/local/avamar/bin/avtar) for workorder
```

```
MOD-1359537051265#11#browse_avtar0 started
2013-01-30 19:28:52 avdb2 Info <10684>: Setting ctl message
version to 3 (from 1)
2013-01-30 19:28:52 avdb2 Info <16136>: Setting ctl max message
size to 268435456
2013-01-30 19:29:15 avdb2 Info <7932>: Processing db2inst1
/NODE0000/AVAMAR1
2013-01-30 19:29:21 avdb2 Error <9006>: DB2 returned database
alias parameter error -2040
2013-01-30 19:29:21 avdb2 Error <8965>: Restore of
db2inst1/NODE0000/AVAMAR1 aborted
...
2013-01-30 19:30:45 avdb2 Info <6688>: Process 31757
(/usr/local/avamar/bin/avtar) finished (code 158: cannot
establish connection with server (possible network or
DNS failure))
```

Adjust the `--snapupbrowsetimeoutsecs` flag, as necessary, to allow enough time for the retrieval of the snapview to complete.

Adjusting the subprocesstimeoutsecs flag

During a restore operation from Avamar Administrator, the Avamar Plug-in for DB2 retrieves the metadata for the backup. For a busy system, this retrieval process might require up to 90 s. The `--subprocesstimeoutsecs` flag, which is set to 30 s by default, determines the time-out value for the retrieval of the metadata. If the retrieval of the metadata does not have enough time to complete, the restore fails with the following error messages:

```
2013-01-30 19:41:05 avdb2 Info <6686>: Process 31845
(/usr/local/avamar/bin/avtar) for workorder
MOD-1359537708751#meta_avtar1 started
2013-01-30 19:41:13 avdb2 Info <10684>: Setting ctl message
version to 3 (from 1)
2013-01-30 19:41:13 avdb2 Info <16136>: Setting ctl max message
size to 268435456
2013-01-30 19:41:35 avdb2 Error <12714>: Failed to initiate the
restore operation
```

Restore fails when search for backup images takes too long

A restore operation from either Avamar Administrator or command line might fail if Avamar queries looking for backup images are taking too long because the search is based on the image name only. To optimize the search, you can specify the search time range.

To resolve this problem, complete the following steps:

1. Set the `--avtar-before-after-days-search` option and value (in days) for the restore operation.
   Specifying backup and restore options as normal text provides instructions.
2. Retry the restore operation.

Troubleshooting DB2 CLP backup and restore problems

You can resolve some CLP backup and restore problems with the troubleshooting information in this appendix.

Adjusting the time gap between DB2 CLP operations

Set `--timeout-new-connection` option to allow enough time for CLP operations to complete.

After all data is successfully read, written, and processed for a CLP operation, the vendor call sequence completes. After the vendor call completes and the control of the CLP interface returns to the user, the `avdb2` process requires time to shut down and clean up resources before another CLP operation can begin. The time gap between CLP operations is approximately 1 to 2 minutes. This time gap can vary, but it must be large enough for the `--timeout-new-connection` option to include the time value.

Backup does not complete in DPF configuration

In a DPF configuration, which uses a SLES system as the Avamar Plug-in for DB2 client system, insufficient RAM on the client system might prevent backups from completing.

A backup in a DPF configuration fails to complete on a SUSE Linux Enterprise Server 11 64-bit system.

To work around this issue, use the following command from the DB2 CLP:

db2 backup db *dbname* on all DBPARTITIONNUMS TO /*path*

If the backup command from the CLP does not complete, IBM recommends increasing RAM on the SLES system to 6 GB or more.

Cleaning up processes and resources after a DB2 CLP operation

The 1 to 2 minute period in which the `avdb2` process has to terminate and clean up resources might not be enough time before a subsequent CLP operation begins.

The components that a DB2 CLP operation uses typically includes one `avdb2` process, allocated resources such as global named semaphores, and a semaphore-key port file for communication control management. Regardless of whether the CLP operation completes successfully or fails, the `avdb2` process must terminate and the operation must release allocated resources. Otherwise, the vendor plug-in communication and workflow are not synchronized for subsequent CLP operations.

After each CLP operation completes, there is a 1 to 2 minute period to terminate processes and clean up resources. In some instances, you might need to manually clean up the processes and allocated resources.

DB2 CLP fails due to time-out in communication response

An operation from the DB2 CLP might fail if the communication response between the Avamar Plug-in for DB2 and the vendor times out. The connection and performance speed, or heavy task loads on the system might cause the timeout.

Adjusting the avdb2-response-time-for-library flag

The `--avdb2-response-time-for-library` flag, which is set to 200 by default, determines the amount of time the vendor library waits for a response from the Avamar Plug-in for DB2. When the amount of time exceeds the time set by the `--avdb2-response-time-for-library` flag, a timeout occurs. The `--avdb2-response-time-for-library` flag also determines the amount of time the Avamar Plug-in for DB2 takes to start a DB2 CLP operation.

When the timeout setting is insufficient, vendor-plug-in communication errors might occur. The following error messages occur while waiting for the Avamar Plug-in for DB2 to start in response to a backup call:

```
2012-11-04 22:09:40 Error :File open failed
/usr/local/avamar/var/clientlogs/db2inst1-AVAMAR3-backup-sem
2012-11-04 22:09:40 Error :Could not get port number
```

Adjust the `--avdb2-response-time-for-library` flag, as necessary, to accommodate the performance and connection speed of the system and the task load on the system.

Adjusting the timeout-new-connection flag

The `--timeout-new-connection` flag is useful for DB2 CLP database-image and log restore operations. By default, the `--timeout-new-connection` flag is set to 5 seconds for database image operations and 60 seconds for log operations.

The Avamar Plug-in for DB2 terminates when it assumes that there are no more requests or queries from the vendor library. For a DB2 backup or restore operation, there are multiple queries and requests from the vendor to the Avamar Plug-in for DB2 process. During a rollforward operation, for example, the DB2 software requires some time after it retrieves an archive log to apply the log. After the log is applied, the DB2 software can query for another log. The rollforward process, including the query and retrieval of logs, then continues.

The `--timeout-new-connection` flag controls the length of time the Avamar Plug-in for DB2 waits for new requests or queries from the vendor library until the operation is complete.

During an ongoing operation, when the time gap between the requests or queries exceeds the `--time-new-connection` value, the following error messages appear:

```
2013-02-21 10:23:01 Debug :AvLibCommThread::initComm()
2013-02-21 10:23:01 Error : Socket connection failed to host
[localhost] to port [53275] Error [239]
2013-02-21 10:23:01 Debug :initComm thows exception
2013-02-21 10:23:01 Debug :AvCommunicator failed with
[exception in AvLibCommThread::AvLibCommThread ]
```

Adjust the `--timeout-new-connection` flag, as necessary, to allow the connection between the Avamar Plug-in for DB2 and vendor library to have enough time to complete the CLP operation.

Recovery of a dropped database fails with error code 30

You cannot use the `recover db` command to recover a dropped database.

The following `recover db` command fails to recover a dropped database:

`recover db avamar1 to end of logs using history file (/tmp/)`

The recovery failure returns the following error message:

```
SQL2079N An error was reported by the shared library
"/opt/AVMRclnt/lib/libdb2_avamarloader.so". Return code: "30".
```

The Avamar Plug-in for DB2 does not support the `recover db` command for dropped databases.

To recover a dropped database, use the `restore` command, followed by the `rollforward` command:

1. Set the `VENDOROPT` parameter to the flag file:
   `update db cfg for database_name using VENDOROPT @/pathname/avdb2.flg`

   where:

   - *database_name* is the name of the database.

- *pathname* is the directory that contains the Avamar Plug-in for DB2 flag file.

2. Restore the database by using the `restore` command.
3. Perform a rollforward operation.

Using an invalid Avamar Plug-in for DB2 flag file returns an error

An invalid or missing Avamar Plug-in for DB2 flag file causes backup operations to fail.

A DB2 CLP operation fails with a SQL2062N error message when the Avamar Plug-in for DB2 flag file is invalid or missing. For example, the following backup operation fails:

```
db2 backup db cover01 load
/usr/local/avamar/lib/libdb2_avamarloader.so options
@/tmp/cli_test/wrong_file.cfg
```

This `db2 backup db` command returns the following error message:

```
SQL2062N An error occurred while accessing media
"/usr/local/avamar/lib/libdb2_avamarloader.so". Reason code: "115".
```

You can obtain the description of the SQL message ID (SQL2062N) from the DB2 documentation or by using the following command:

```
db2 ? SQL2062N
```

Use of signal handles does not cleanly stop DB2 CLP operations

The Avamar Plug-in for DB2 and vendor do not implement signal handlers. When a CLP operation receives an interrupt signal from a user or from a DB2 exception, the termination of the operation is not clean.

The `avdb2` process can stop responding and resources such as the global named semaphores and the semaphore-key port file might still be allocated to the CLP operation.

To resolve this issue, you must manually stop the `avdb2` process and clean up the allocated resources. You might also need to restart the database manager.

- The semaphore-key port file is in the *Avamar_ install_dir*`/var/clientlogs` directory.
- The semaphore-key-name file name is *instance_name-DB_name-operation-sem*, where operation is backup, restore, or log-restore.

On Linux, global named semaphores are created in a virtual file system and are normally mounted under `/dev/shm` with the name format: `sem.`*semaphore-key-name*. To avoid such issues, cancel the operation from the Avamar Administrator. Canceling CLP-initiated backups and restores on page 105 provides details.

Database configuration for the DB2 load command

The `db2 load` command with `copy yes` option might fail with the following messages:

```
SQL2062N An error occurred while
accessing media"/usr/local/avamar/lib/libdb2_avamarloader.so". Reason
code: "115".
```

An improperly configured DB2 parameter `VENDOROPT` can cause the error messages. Resolve this problem with the following command:

```
db2 update db cfg for database_name using VENDOROPT pathname
```

Where *database_name* is the name of the database to back up and *pathname* is the absolute pathname to the Avamar Plug-in for DB2 flag file.

Specifying backup and restore options as normal text

Resolving certain backup or restore problems can require the use of special options that you must type in the **Enter Attribute** and **Enter Attribute Value** fields. These fields are available by clicking the **More** button in the **Backup Command Line Options** or the **Restore Command Line Options** dialog box.

About this task

You can specify options from either the **Backup Command Line Options** dialog box or the **Restore Command Line Options** dialog box. Precede an option name that you specify in the **Enter Attribute** field with the prefix, `[avdb2]`.

Note: The Avamar software does not validate the text that you type in the **Enter Attribute** and **Enter Attribute Value** fields. Ensure that you type the options and values correctly.

Procedure

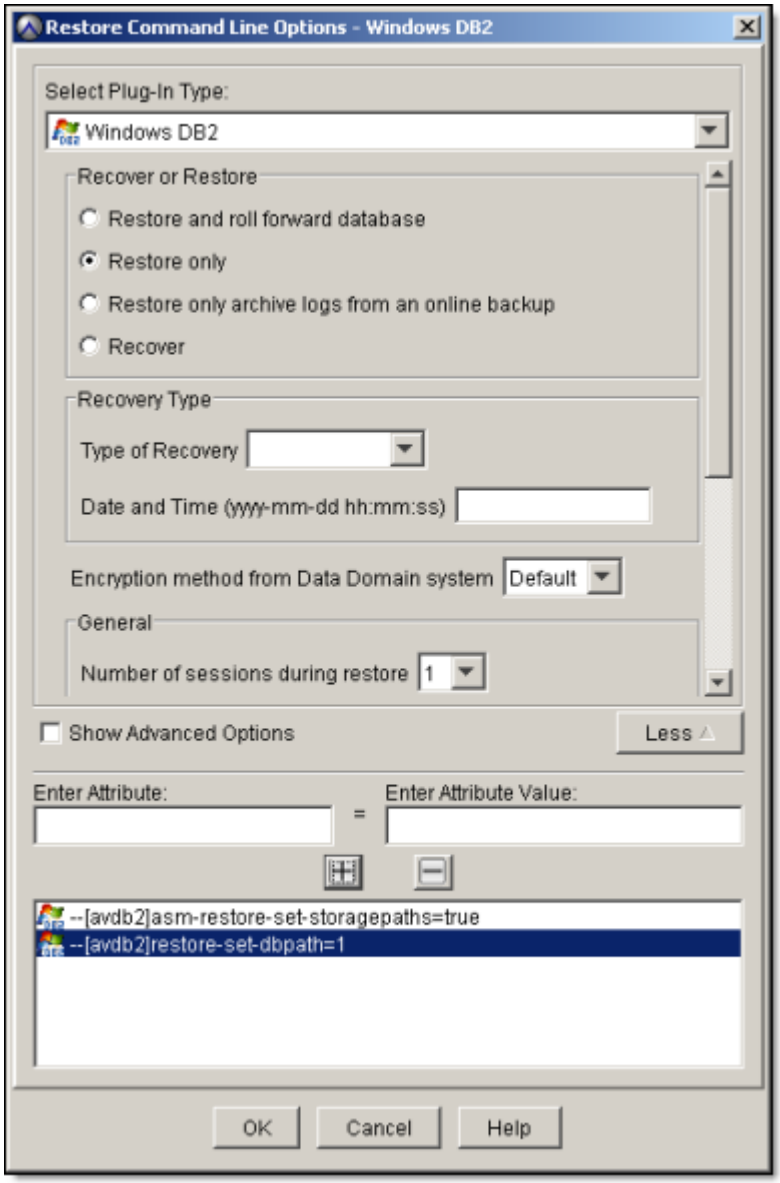
1. From the **Backup Command Line Options** or the **Restore Command Line Options** dialog box, click the **More** button.

   The dialog box expands to display the **Enter Attribute** and **Enter Attribute Value** fields.
2. Type the option name in the **Enter Attribute** field and the value for the option in the **Enter Attribute Value** field.
3. Click **+**.

   The option and value appear in the area below the **Enter Attribute** and **Enter Attribute Value** fields.
4. To add more options for the backup or restore operation, repeat steps 2 and 3.

   The following figure shows the dialog box after adding two options.

Figure 7 Restore Command Line Options



GLOSSARY

A

activation The process of passing the client ID (CID) back to the client, where it is stored in an encrypted file on the client file system.

See also client activation

administrator Person who normally installs, configures, and maintains software on network computers, and who adds users and defines user privileges.

archive logs Files that DB2 uses for rollforward recovery.

Automatic storage management A DB2 storage feature that enables storage management at the database level. The database manager is responsible for creating, extending, and adding containers as needed. The user specifies a group of storage devices for the database manager to control.

avagent The name of the *client agent* process.

Avamar Administrator A graphical management console software application that is used to remotely administer an Avamar system from a supported Windows or Linux client computer.

Avamar client A computer or workstation that runs Avamar software and accesses the Avamar server over a network connection. Avamar client software comprises a *client agent* and one or more *plug-ins*.

Avamar server The server component of the Avamar client/server system. Avamar server is a fault-tolerant, high-availability system that efficiently stores the backups from all protected clients. It also provides essential processes and services required for data restores, client access, and remote system administration. Avamar server runs as a distributed application across multiple networked storage nodes.

avtar The Avamar process that performs backups and restores.

B

backup A point-in-time copy of client data that can be restored as individual files, selected data, or as an entire backup.

backup policy In the AUI, a backup policy specifies a dataset, schedule, and retention settings that are applied to a client or a group of clients. A backup policy must contain at least one Avamar client. If the backup policy contains two or more clients, the clients must belong to the same Avamar domain. You can override backup policy settings at the client level.

browse The process of viewing data that is available for backup on a client computer or restore from the Avamar server.

C

client activation The process of passing the client ID (CID) back to the client, where it is stored in an encrypted file on the client file system.

See also activation

client agent A platform-specific software process that runs on the client and communicates with the Management Console Server (MCS) and with any plug-ins installed on that client.

client registration The process of establishing an identity with the Avamar server. When Avamar recognizes the client, it assigns a unique client ID (CID), which it passes back to the client during *client activation*.

See also registration

cold backup A backup performed while the database is offline.

D

database A collection of data arranged for ease and speed of update, search, and retrieval by computer software.

database partition An independent part of a partitioned database with its own data, configuration files, indexes, and transaction logs.

Data Domain system Disk-based deduplication appliances and gateways that provide data protection and disaster recovery (DR) in the enterprise environment.

Data Partition Feature (DPF) A feature that enables the distribution of a DB2 UDB database across multiple servers in a cluster or on multiple nodes on massively parallel processors (MPP). You can distribute a DB2 database across several database partitions.

dataset A policy that defines a set of files, directories, and file systems for each supported platform that are included or excluded in backups across a group of clients. A dataset is a persistent and reusable Avamar policy that can be named and attached to multiple groups.

DB2 instance An independent environment where you create database objects and run applications run against the database objects.

DD Boost The API that Avamar clients use to access a Data Domain system. The Avamar client installation automatically installs the DD Boost API on the client computer. The Avamar server installation automatically installs the DD Boost API on the Avamar server.

disaster recovery Recovery from any disruptive situation, such as hardware failure or software corruption, in which ordinary data recovery procedures are not sufficient to restore a system and its data to normal day-to-day operations. A disaster recovery can be a *bare metal recovery*.

DNS Domain Name Server. A dynamic and distributed directory service for assigning domain names to specific IP addresses.

domain A feature in Avamar Administrator that is used to organize large numbers of clients into named areas of control and management.

F

file system Software interface used to save, retrieve, and manage files on storage media by providing directory structures, data transfer methods, and file association.

G

granular recovery An Avamar feature that enables you to restore a part of a backup rather than the entire backup. The Avamar Plug-in for DB2 enables you to restore table spaces from a backup.

group A level of organization in Avamar Administrator for one or more Avamar clients. All clients in an Avamar group use the same group policies, which include the *dataset*, *schedule*, and *retention policy*.

group policy In Avamar Administration, a group policy is defined as a *dataset*, *schedule*, and *retention policy* for all clients in an Avamar group.

H

High Availability Disaster Recovery (HADR) A high availability DB2 server that can be backed up and recovered using the DB2 HADR client for Avamar.

hot backup A backup that you run while users are online and have access to the data that is being backed up.

L

LAN Local Area Network.

M

MCS Management console server. The server subsystem that provides centralized administration (scheduling, monitoring, and management) for the Avamar server. The MCS also runs the server-side processes used by *Avamar Administrator*.

metadata Data about the backup, including information about the original database files, the backup types, the date and time of the backup, and other information necessary for restore.

P

plug-in Avamar client software that recognizes a particular kind of data resident on that client.

plug-in options Options that you specify during backup or restore to control backup or restore functionality.

policy A set of rules for client backups that can be named and applied to multiple groups. Groups have dataset, schedule, and retention policies.

R

recover To restore data from a backup to a client disk and apply transaction logs to the data to make it consistent with a specific point-in-time.

redirected restore The process of restoring a backup to a different location than the original location where the backup occurred.

registration The process of establishing an identity with the Avamar server. When Avamar recognizes the client, it assigns a unique client ID (CID), which it passes back to the client during *client activation*.

See also client registration

restore An operation that retrieves one or more file systems, directories, files, or data objects from a backup and writes the data to a designated location.

retention The time setting to automatically delete backups on an Avamar server. Retention can be set to permanent for backups that should not be deleted from an Avamar server. Retention is a persistent and reusable Avamar policy that can be named and attached to multiple groups.

rollforward The process of updating a database or a table space by applying changes recorded in the database log files. You perform a rollforward operation after you restore a database backup.

S

schedule The ability to control the frequency and the start and end time each day for backups of clients in a group. A schedule is a persistent and reusable Avamar policy that can be named and attached to multiple groups.

snapview A list of table spaces that are available for a granular restore. To view a snapview from Avamar Administrator, select the **Browse for Granular Restore** button.

T

table spaces Containers within a database that store specific data. DB2 includes five table spaces, which DB2 names according to their usage: catalog, regular, large, system temporary, and user temporary. IBM DB2 documentation provides more information.

transaction logs Files that provide a history of updates that you make to a database. You use transaction logs to roll back a database to a previous state.

U

User Account Control (UAC)

A Windows feature available in Windows Server 2008 R2 and Windows Vista. UAC helps prevent unauthorized changes to the computer. When functions that could potentially affect a computer's operation are made, UAC prompts the user for permission or for an administrator's password before continuing with the task.