Dell EMC Avamar for SAP with Oracle

Version 19.2

User Guide

302-005-836
REV 01
November 2019

DELL EMC

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Preface

As part of an effort to improve the product lines, revisions of the software and hardware are periodically released. 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 the 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://support.EMC.com).

Purpose

This guide describes how to install Avamar in a SAP environment with Oracle, and how to back up and restore SAP servers with Oracle databases.

Audience

This document is intended for the following users:

- System administrators who are responsible for installing software and maintaining servers and clients on a network
- Oracle database administrators (DBAs) who are responsible for backing up and maintaining Oracle databases in SAP systems

Readers of this document must be familiar with the following topics:

- SAP terminology and concepts, especially those related to Oracle database backup and recovery through SAP BR*Tools
- Backup and recovery procedures
- Disaster recovery procedures

Revision history

The following table presents the revision history of this document.

Revision history

Table 1 Revision history

Revision	Date	Description
01	November 15, 2019	GA release of Avamar 19.2

Related documentation

The following publications provide additional information:

- *E-LAB Navigator* at https://elabnavigator.emc.com/eln/elnhome
- *Avamar Administration Guide*
- *Avamar and Data Domain System Integration Guide*
- *Avamar Backup Clients User Guide*
- *Avamar for Windows Server User Guide*
- *Avamar Operational Best Practices Guide*

- *Avamar Product Security Guide*
- *Avamar Release Notes*

The following additional documentation may be useful:

- SAP with Oracle backup and recovery documentation

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/home/us/en/19.
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/home/us/en/19.
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 http://community.EMC.com 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:

- Architecture 16
- Backup 18
- Restore and recovery 20
- Concurrent backups and restores 21
- Internationalization (I18N) 22
- Multi-streaming 22
- Software processes 23

Architecture

The Avamar Plug-in for SAP with Oracle (SAP plug-in) is a software that works with the Avamar server software and client software. The SAP plug-in provides deduplication backup and recovery for SAP with Oracle data by using an Avamar server or Data Domain system as a backup storage device.

The SAP plug-in uses the BR*Tools `backint` interface to back up and restore the Oracle data.

Deploy the SAP plug-in in an Avamar client/server system in a network environment. The Avamar server stores and manages client backups in a deduplicated format. The SAP with Oracle server host is an Avamar client that accesses the Avamar server for backup and restore services.

An Avamar server can optionally use a Data Domain system as a storage device for backup and restore operations. Data Domain system support on page 17 provides details.

You can use the Avamar Administrator or the AUI to remotely administer an Avamar system from a supported Windows or Linux computer.

Note: The Avamar AUI is supported on stand-alone Windows and Linux only.

The Glossary provides details about terms that are used in this guide.

Stand-alone configuration

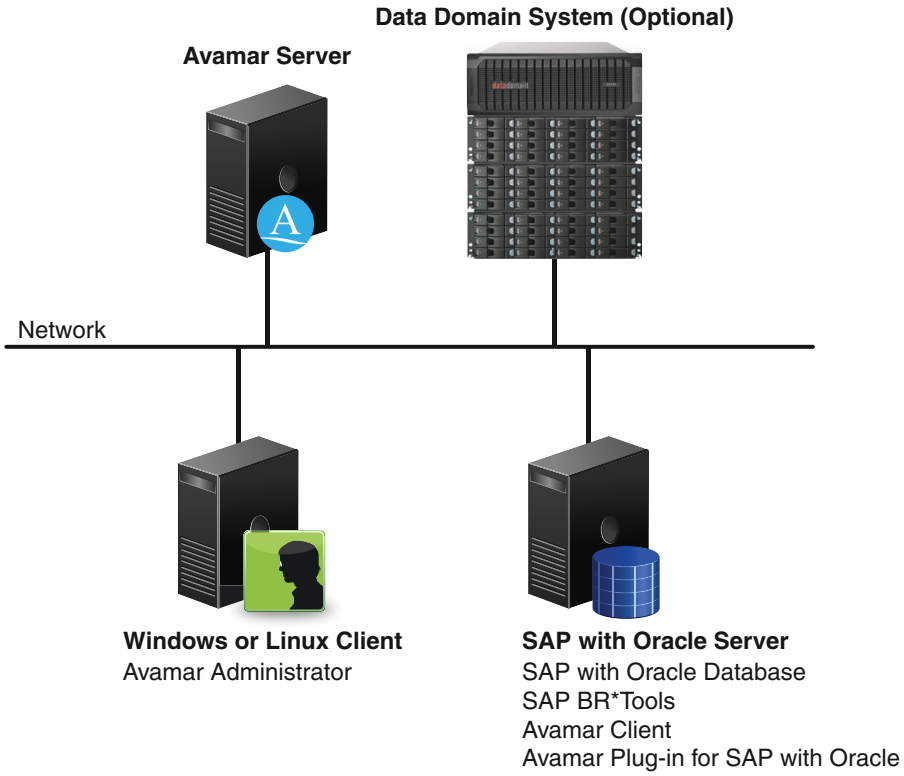
You can deploy the SAP plug-in a stand-alone configuration on one of the supported operating systems.

You must install the following software on the SAP with Oracle host:

- Oracle database supported by the SAP system.
- SAP BR*Tools, which consist of `brbackup`, `brarchive`, `brrecover`, `brrestore`, and other utilities that the SAP plug-in supports. The *E-LAB Navigator* at https://elabnavigator.emc.com/eln/modernHomeDataProtection provides details.
- Platform-specific Avamar client.
- Avamar Plug-in for SAP with Oracle.

The following figure shows a stand-alone configuration that uses the SAP plug-in to back up or restore an Oracle database to or from an Avamar server or a Data Domain system.

Figure 1 Avamar Plug-in for SAP with Oracle in a stand-alone configuration



High-availability cluster configuration

You can also deploy the SAP plug-in in a high-availability active/passive cluster configuration on a Solaris or Windows operating system. This type of cluster comprises multiple hosts (nodes) connected by a SCSI bus that is attached to a shared storage system. If a failure occurs on the primary node, the cluster software can automatically switch the failed application service to a surviving host in the cluster.

Configure the backup or restore operations for the virtual cluster host. The operations run on the active node in an active/passive cluster environment.

The SAP plug-in does not support Oracle Real Application Cluster (RAC) environments.

NOTICE If a backup or restore operation is running during a failover, the operation fails. You must restart a failed backup or restore manually on the new active node.

The *E-LAB Navigator* at https://elabnavigator.emc.com/eln/modernHomeDataProtection provides details about the supported cluster versions.

Data Domain system support

The SAP plug-in supports backups to and restores from a Data Domain system. The SAP plug-in stores the backup data on the Data Domain system, and stores backup metadata on the Avamar server. The Avamar server manages the backups.

Before you can store backups on a Data Domain system, you must add the Data Domain system to the Avamar configuration by using the Avamar Administrator or the AUI. Then you select the Data Domain system in the plug-in options when you perform an on-demand backup or when you create a dataset for a scheduled backup. You can also use the command line interface (CLI) to perform backups to a Data Domain system.

If you specify a Data Domain system as the backup destination, the SAP plug-in backs up all the Oracle data to that destination. You cannot back up part of the data to a Data Domain system and another part of the data to an Avamar server during a single backup.

A single `brrestore` command can restore files from multiple backups, which can be on the Avamar server or on a Data Domain system. The steps to restore backups are the same whether you restore from the Avamar server or a Data Domain system. The restore process determines the location of the backup and restores the backup.

The *Avamar and Data Domain System Integration Guide* provides more information about Data Domain systems in an Avamar environment, including detailed steps to add a Data Domain system to the Avamar configuration.

Multiple BR*Tools and Oracle versions on the same host

The SAP plug-in supports multiple BR*Tools versions and multiple Oracle versions on the same SAP server host. The SAP plug-in also supports multiple instances of a SAP Oracle database.

Note: You cannot have 32-bit and 64-bit versions of the SAP plug-in on the same SAP server host.

Solaris zones

The SAP plug-in supports Solaris global zones, whole root zones, and sparse root zones. You must install the Avamar client and SAP plug-in in the same zone as the SAP Oracle database to be protected.

Oracle Automatic Storage Management

The SAP plug-in does not support Oracle Automatic Storage Management (ASM) as the storage option for the SAP Oracle database.

Backup

The SAP plug-in supports specific features for SAP Oracle backups.

Backup processes with the Avamar Administrator or the AUI on page 23 and Backup processes with the CLI on page 25 describe the processes in SAP plug-in backups to an Avamar server.

The SAP plug-in also supports backups to a Data Domain system as described in Data Domain system support on page 17.

Multi-streaming on page 22 describes how to use multiple sessions to improve the backup performance.

Complete backup protection

To complete data protection, a viable backup strategy must include frequent backups of the SAP Oracle database data, transaction logs, and the database configuration files and control files.

You require these backups for the following reasons:

- Without data backups, you cannot restore a database at all.
- Without transaction logs, you can restore a database only to the time of the last consistent backup, but you cannot recover the database to an arbitrary point-in-time after that backup.
- Without the configuration files and control files, you cannot recover the database setup.

To prepare a SAP Oracle environment for disaster recovery, perform frequent scheduled backups of the SAP Oracle databases, archive logs, and other critical files. Disaster recovery on page 64 provides details about preparing for disaster recovery.

Ensure that you set the required backup expiration. A data file backup (created with the `brbackup` command) and an archive log backup (created with the `brarchive` command) are independent backups. If the data file backup expires before the log backup, the log backup becomes unusable.

For example, if a database backup runs daily and an archive log backup runs every three hours, you must set the database backup expiration at least one day longer than the log backup expiration.

Basic backup features

The SAP plug-in supports backups of Oracle database files and archive log files, online and offline backups, full backups, scheduled backups, and on-demand backups.

The details of the supported backup types are as follows:

- Backups of Oracle database files and archive log files—The SAP plug-in can back up the following types of files:
  - Entire database (all data files in a database)
  - Tablespaces (set of data files)
  - Database control file
    Note: The SAP plug-in always backs up the control file with a database file.
  - Archive redo logs

  Note: Each backup also automatically backs up the BR*Tools profile and backup catalog.
- Online and offline backups—The SAP plug-in can back up SAP Oracle data while the database is running or after the database is shut down.
- Full backups—The SAP plug-in backs up a database file regardless of whether the data has changed since the last backup or not.
- Scheduled and on-demand backups—The SAP plug-in supports both scheduled backups that run automatically and on-demand backups that you start.

On UNIX and Linux systems, the SAP plug-in supports symbolic links to database file locations to the extent supported by BR*Tools. For example, BR*Tools does not support chained symbolic links. The SAP Note 27428 provides details.

The SAP plug-in does not support backups of the following data:

- Data on a raw partition
- Directories (`brbackup -m sap_dir|ora_dir|all_dir|`*specific_directory*)

Scheduled backups compared to on-demand backups

The SAP plug-in supports scheduled backups and on-demand (manual) backups.

The Avamar server automatically runs a scheduled backup according to Avamar policy settings that you configure.

You can run an on-demand backup by using one of the following methods:

- You can use the Avamar Administrator or the AUI to specify the required backup options and to start the backup.
- You can manually run BR*Tools commands with the required options from the operating system CLI on the SAP Oracle database host.

Restore and recovery

The SAP plug-in supports specific features for SAP Oracle restore and recovery.

Restore processes on page 26 describes the processes in SAP plug-in restores from an Avamar server.

The SAP plug-in also supports restores from a Data Domain system as described in Data Domain system support on page 17.

Multi-streaming on page 22 describes how to use multiple sessions to improve the restore performance.

Basic restore and recovery features

The terms restore and recovery have specific meanings in this guide:

- Restore is the process of retrieving data from a backup server and copying the data to disk.
- Recovery is the process of applying transaction logs to the restored data to bring the data to a specified point-in-time.

The SAP plug-in restores data through the CLI only. You must start a restore on the Oracle database host by running a BR*Tools command, such as `brrestore`, `brrecover`, or `brtools` from the operating system CLI.

NOTICE The SAP plug-in does not support restores through the Avamar Administrator or the AUI.

Restore and recovery operations

The SAP plug-in supports complete database recovery, database point-in-time recovery, archive log restores, relocation restores, and disaster recovery.

The details of the supported restore and recovery operations are as follows:

- A complete database recovery restores the lost or damaged data files from a backup and brings the data to the current time by applying redo log files. Missing archive logs are restored and used for recovery.
- A database point-in-time recovery is a database restore followed by the restore and application of the required redo log files to bring the database to a specific point-in-time. The database is opened with the `RESETLOG` option.
- An archive log restore retrieves only the archive log files that are required for recovery.
- A relocation restore is a restore to a different specified location on the original host or an alternate host.
- A disaster recovery is the restore of BR*Tools catalog and configuration files, performed when an entire Oracle database system is lost. Disaster recovery on page 64 provides details.

The SAP plug-in does not support restores of the following data:

- Data on a raw partition
- Directories (`brrestore -m sap_dir|ora_dir|all_dir|`*specific_directory*)

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 SAP enables common restore scenarios by using the plugin restore operations with DD 6.1 and above. When the user perform restores of backups in the ECS, Avamar plug-in for SAP 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.

Year 2038

The Avamar subsystem supports backup retention until February 2106. However, for older releases, the Avamar subsystem does not start after January 2038 due to the signed 32-bit integer time format of UNIX and Linux operating systems, and therefore cannot restore backup data after this date.

Newer Avamar releases offer support for longer retention periods:

- For Avamar 19.1 and later, the Avamar server subsystem uses an unsigned 32-bit integer and continues to start until 2106.
- For Avamar 19.1 and earlier, the Avamar client and plug-ins subsystem uses a signed 32-bit integer and retains data until 2038.
- For Avamar 19.2 and later, the Avamar client and plug-ins subsystem uses an unsigned 32-bit integer and retains data until 2106.
- Backup retention after 2038 is successful when all Avamar subsystems use unsigned 32-bit integers.

Therefore, with both Avamar 19.2 and later, and an Avamar 19.2 or later client, backup retention succeeds after 2038.

Avamar 19.2 and later clients also support restoring backups where the retention time is after 2038, and where the local (server and client) time is after 2038. Earlier client releases do not support this.

For backups of Windows or Linux clients, do not assign a retention period for a date after February 7, 2106.

Concurrent backups and restores

The SAP plug-in supports a maximum of six concurrent backups or restores. You can start each backup by using the Avamar Administrator or the AUI. You can restore a backup by using the BR*Tools commands from the CLI.

You can run concurrent backups or restores for the following configurations:

- Multiple SAP Oracle database instances on the same SAP server host
- Multiple BR*Tools versions on the same SAP server host
- Multiple Oracle versions on the same SAP server host

BR*Tools does not support the concurrent backup of different data files or control files from the same database. For example, you cannot perform concurrent backups of two tablespaces from the same database. However, you can perform concurrent backups of data files and archive logs through the concurrent use of the `brbackup` and `brarchive` programs.

Each backup or restore can run multiple data sessions to or from the Avamar server or the Data Domain system.

Note: The recommended maximum number of concurrent data sessions is 10.

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

Internationalization (I18N)

Internationalization (I18N) support enables the browsing, backup, monitoring, and restore of non-English data from Avamar clients when the software itself is not localized.

NOTICE Do not confuse I18N support with localization (L10N) support, in which the software user interface and operational messages are translated into localized languages. This SAP plug-in release does not provide L10N support.

The extent of I18N support by the SAP plug-in depends on the following support:

- Internationalized operating system
- Unicode version of BR*Tools
- Oracle globalization support (NLS_LANG)
- Avamar server and client I18N support

The SAP plug-in support for non-ASCII environments is limited by the I18N support that is provided by Oracle, BR*Tools, the Avamar client and server, and the underlying operating system. For example (the following list is not exhaustive):

- Oracle requires ASCII characters for the following items:
  - ORACLE_HOME environment variable.
  - Oracle instance name, *DBSID*.
- BR*Tools requires ASCII characters for the following items:
  - Connection strings (database username and password) to the SAP Oracle database.
  - Oracle data files, log files, control files, and parameter file names.
  - Oracle tablespace names.
- Avamar software includes the following limitations:
  - Supports only UTF8 encoding on Linux and UNIX systems.
  - Supports only ASCII characters in parameter names and parameter values set inside the Avamar parameter files, including the `.utl` and `.cmd` files.
  - Might not render non-English characters correctly in the logs, the Avamar Administrator, and the AUI.

The *Avamar Release Notes* provides details about these limitations.

Support of non-English characters

The SAP plug-in supports non-English characters for the following pathnames:

- Full pathname of BR*Tools location
- Full pathnames of SAP initialization file, `init`*`DBSID`*`.sap`, and SAP plug-in parameter file, `init`*`DBSID`*`.utl`

Multi-streaming

Multi-streaming is a feature that enables a single backup or restore to use multiple sessions (data streams) to the Avamar server or Data Domain system to improve the backup or restore performance.

The multi-streaming setting specifies the maximum number of backup or restore sessions to run concurrently for an operation. The default value is 1. The maximum value is 128.

The software always tries to use the specified number of data streams for backups and restores.

> **NOTICE** The recommended maximum number of concurrent sessions on a host is 10. For example, you can run two concurrent backups with a multi-streaming setting of 5 for each backup. A warning message appears if the multi-streaming setting is greater than 10 for an operation.
> If you set the multi-streaming value too high, the system might not have sufficient resources to perform the backup or restore.

The SAP plug-in starts an `avtar` process for each stream. Each `avtar` process creates one file cache and one hash cache for each session. The cache name format differs for data file operations and archive log operations.

For example, a database backup session with the `brbackup` program creates the following cache files:

- *instance_session _number*_p_cache.dat
- *instance_session_number*_f_cache2.dat

An archive log backup session with the `brarchive` program creates the following cache files:

- a_*instance_session_number*_p_cache.dat
- a_*instance_session_number*_f_cache2.dat

Software processes

The SAP plug-in uses specific processes during the supported backup and restore operations.

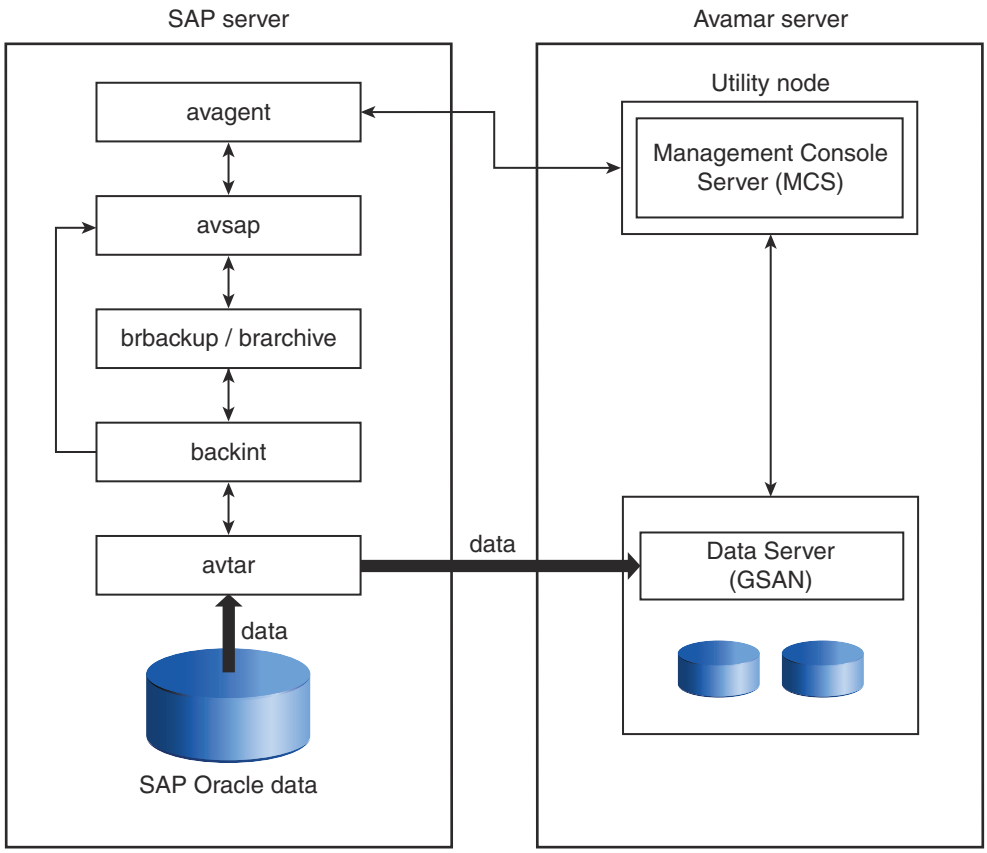
Backup processes with the Avamar Administrator or the AUI

About this task

The following figure and steps describe the process interactions in a scheduled backup or on-demand backup that is initiated from the Avamar Administrator or the AUI.

> **Note:** The Avamar AUI is supported in stand-alone Windows and Linux environments only.

Figure 2 Backup processes initiated from the Avamar Administrator or the AUI



Procedure

1. The `avagent` process on the SAP plug-in host performs the following actions:
   a. Polls the Management Console Server (MCS) for a backup workorder.

      A backup workorder is an XML message with details about the backup to perform.

   b. Starts the `avsap` process and passes the workorder to the process.
2. The `avsap` binary runs the required BR*Tools command, either `brbackup` for a database backup or `brarchive` for a backup of archive redo logs.
3. The `brbackup` or `brarchive` process communicates with the Oracle database to gather information for the backup, shuts down, or starts up the database instance if needed, and starts the SAP plug-in `backint` process.
4. The `backint` process starts one or more `avtar` processes, depending on the multi-streaming configuration, and passes a list of database files or archive transaction log files to be backed up.
5. Depending on the specified data storage destination, the `avtar` process stores the backup data to the Avamar server or a Data Domain system.
6. The `backint` process sends backup progress updates to the `avsap` process, which sends the updates to MCS through the `avagent` process.
7. The `backint` process communicates the success or failure of the backup to the `brbackup` process, which sends the return status to the `avsap` process.
8. The `avsap` process sends the return status to MCS through the `avagent` process.

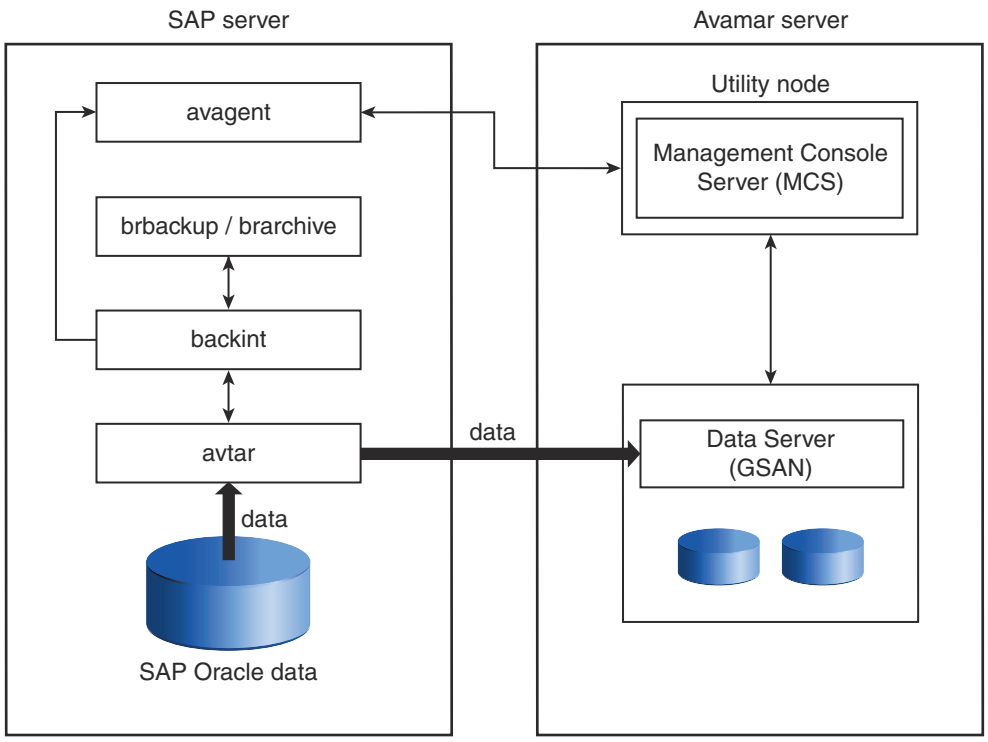
> **NOTICE** If you perform a backup with the verification option, the Avamar Administrator or the AUI does not display the progress of the verification operation. However, the success or failure of verification operation is communicated to BR*Tools.

Backup processes with the CLI

About this task

When you start an on-demand backup from the CLI with the BR*Tools `brbackup` or `brarchive` command, the backup does not include the `avsap` process. The following figure and process steps describe the backup process interactions.

Figure 3 Backup processes initiated from the CLI



Procedure

1. You can perform a backup by running a BR*Tools command, such as `brbackup` or `brarchive`, from the CLI.
2. The `brbackup` or `brarchive` process communicates with the Oracle database to gather information for the backup, shuts down, or starts up the database instance if needed, and starts the SAP plug-in `backint` process.
3. The `backint` process starts an activity monitor operation in MCS through the `avagent` process.
4. The `backint` process starts one or more `avtar` processes, depending on the multi-streaming setting in the SAP plug-in parameter file (flagfile). The `backint` process also passes a list of database files or archive transaction log files to be backed up.
5. Depending on the specified data storage destination, the `avtar` process stores the backup data to the Avamar server or a Data Domain system.
6. The `backint` process sends backup progress updates to the MCS activity monitor operation through the `avagent` process.

7. The `backint` process communicates the success or failure of the backup to the MCS activity monitor operation and BR*Tools.

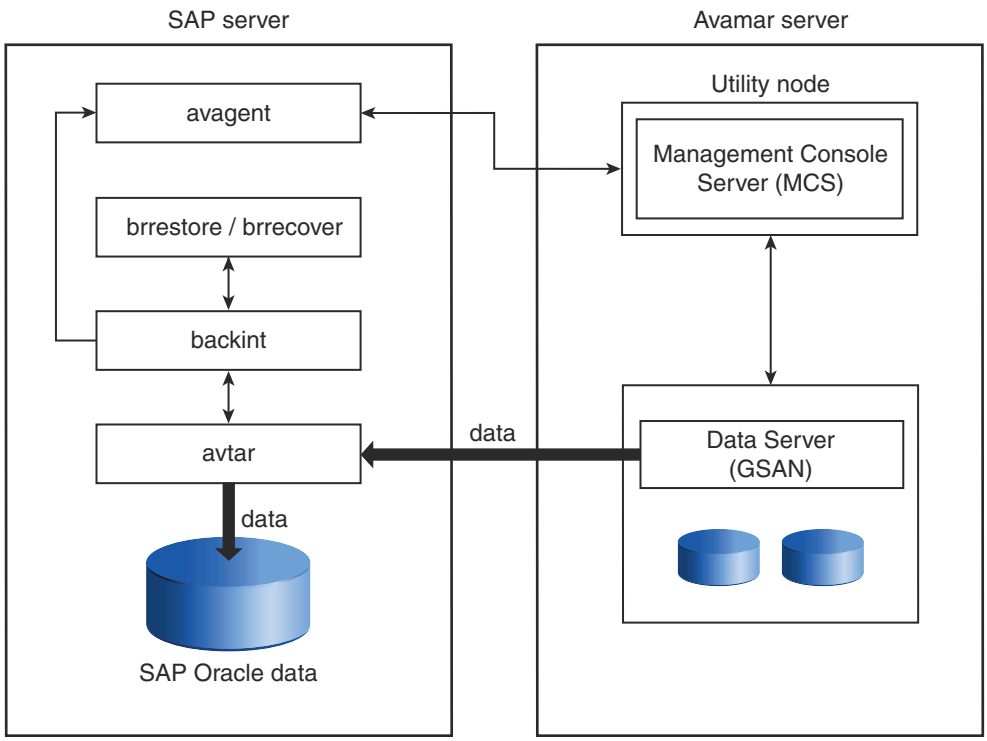
Restore processes

You must restore a backup from the CLI on the SAP Oracle database server with the required BR*Tools command, for example, `brrestore` or `brrecover`.

About this task

The following figure and process steps describe how the BR*Tools, Avamar server, and SAP plug-in processes interact during a restore.

Figure 4 Restore processes



Procedure

1. The `brrestore` command starts the `backint` process.
2. The `backint` process starts an activity monitor operation in MCS through the `avagent` process.
3. The `backint` process queries the Avamar server for the requested backup files.
4. The `backint` process starts one or more `avtar` processes, depending on the multi-streaming setting in the SAP plug-in parameter file (flagfile), which restore the specified files.
5. The `backint` process communicates the success or failure of the restore to BR*Tools.
6. You run `brrecover` or Oracle SQLPlus to recover the database.
7. The `backint` process sends restore progress updates to the MCS activity monitor operation through the `avagent` process.
8. The `backint` process communicates the success or failure of the restore to the MCS activity monitor operation and BR*Tools.

CHAPTER 2

Installation and Configuration

This chapter includes the following topics:

- Preparing to install the Avamar Plug-in for SAP with Oracle 28
- Installing, upgrading, and uninstalling the software on HP-UX 30
- Installing, upgrading, and uninstalling the software on IBM AIX 31
- Installing, upgrading, and uninstalling the software on Linux 33
- Installing, upgrading, and uninstalling the software on Solaris 35
- Installing, upgrading, and uninstalling the software on Windows 37
- Performing post-installation tasks 41

Preparing to install the Avamar Plug-in for SAP with Oracle

Review the system requirements for the Avamar Plug-in for SAP with Oracle, and ensure that the environment meets the requirements before you install the plug-in. You also must download the Avamar file system client and plug-in installation package from the Avamar server, install the file system client, and register the client with the Avamar server.

System requirements

The environment must meet client compatibility requirements before you install Avamar client software.

See the *E-LAB Navigator* at https://elabnavigator.emc.com/eln/modernHomeDataProtection for information about client compatibility requirements and supported operating systems and application versions.

The Avamar file system client and the SAP plug-in that you install on the host must have the same version number. The Avamar client and SAP plug-in must work with your version of BR*Tools. The SAP plug-in must be installed in the same directory as the Avamar client.

SAP server requirements

Ensure that you meet the following requirements on the SAP server host:

- You have operating system root privileges on the SAP server host.
- Oracle software is installed and is functioning correctly.
- The Avamar server is operational and present on the same network as the SAP server.

To verify the network connectivity, you can open a command shell and type the following command:

```
ping Avamar_server
```

where *Avamar_server* is the network hostname (as defined in DNS) or IP address of the Avamar server.

Cluster system requirements

In a cluster system on Solaris, ensure that you meet the pre-installation requirements for a Solaris Cluster or Veritas Cluster Server (VCS) as described in the *Avamar Backup Clients User Guide*.

In a Windows cluster system, ensure that the Microsoft .NET Framework 4 software has been downloaded and installed from the Microsoft Download Center.

User Account Control setting on Microsoft Windows

The User Account Control (UAC) feature limits application software to standard user privileges. You must provide administrator privileges for certain tasks, such as installing software. UAC is enabled by default.

If you start an Avamar client or plug-in installer without administrator privileges on a Windows computer with UAC enabled, then the software does not install correctly.

You can disable or bypass UAC. The installation procedures in this chapter provide one method to bypass UAC. The Microsoft documentation provides other methods and additional information.

Downloading the software

In a supported cluster, you must download the Avamar Plug-in for SAP with Oracle installation package to each node that requires the software to be installed.

Procedure

1. Log in to the SAP server host with the necessary privileges to perform an installation.
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 SAP server.
5. Click **+** next to the operating system heading for the SAP server.
6. Click the link for the SAP plug-in installation package as listed in the following table.

   Table 3 SAP plug-in installation packages

Operating system	Package name
HP-UX	`AvamarSAP-hpux11iv3-itan-`*`version`*`.depot` For example: `AvamarSAP-hpux11iv3-itan-7.2.100-218.depot`
IBM AIX	`AvamarSAP-aix6-ppc64-`*`version`*`.bff` For example: `AvamarSAP-aix6-ppc64-7.2.100-218.bff`
Linux	`AvamarSAP-linux-`*`package-version`*`.rpm` For example: `AvamarSAP-linux-rhel4-x86_64-7.2.100-218.rpm`
Solaris	`AvamarSAP-solaris`*`version-package-version`*`.pkg` For example: `AvamarSAP-solaris10-sparc64-7.2.100-218.pkg`
Microsoft Windows	`AvamarSAP-windows-`*`package-version`*`.msi` For example: `AvamarSAP-windows-x86_64-7.2.100-218.msi`

7. Save the SAP plug-in installation package to a temporary directory.

Installing the Avamar file system client

Avamar file system clients include the Avamar agent and an Avamar file system plug-in. The Avamar agent is required for backups and restores with the SAP plug-in. You can use the file system plug-in to back up operating system and application binary files, which are required for disaster recovery.

Install and register the Avamar file system client on each SAP host computer:

- 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*.
- In a cluster environment, install the client software in the same directory on each node in the cluster, and register each node in the cluster with the Avamar server.

Installing, upgrading, and uninstalling the software on HP-UX

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

Installing the Avamar Plug-in for SAP with Oracle on HP-UX

You can install the Avamar Client for HP-UX in either the default installation directory or an alternate directory. You must install the Avamar Plug-in for SAP with Oracle in the same directory as the Avamar Client for HP-UX.

About this task

Note: If the `setuid` or `setgid` bits are set on the `brbackup` or `brarchive` executables, you must install the file system client and SAP plug-in in the default installation directory.

You can specify an alternate location for the `var` directory during the Avamar Client for HP-UX installation by using the `-x ask=true` option with the `swinstall` command as described in the *Avamar Backup Clients User Guide*. When you install the SAP plug-in after you install the Avamar Client for HP-UX, the plug-in installation automatically uses the same location for the `var` directory that you specified during the Avamar Client for HP-UX installation.

Procedure

1. Log in to the SAP server host as root.
2. Type the following command to change to the temporary directory that contains the SAP plug-in installation package:

   ```
   cd tmp
   ```

   where *tmp* is the pathname of the temporary directory.

3. Install the SAP plug-in in the default directory or an alternate directory:
   - To install the SAP plug-in in the default directory, type the following command:

     ```
     swinstall -s /tmp/AvamarSAP-hpux11iv3-itan-version.depot \*
     ```

     where *version* is the Avamar software version.
   - To install the SAP plug-in in an alternate directory, type the following command:

     ```
     swinstall -s /tmp/AvamarSAP-hpux11iv3-itan-version.depot hpuxsap,l=/
     alternate_path
     ```

     where:
     - *version* is the Avamar software version.
     - *alternate_path* is the pathname of the alternate directory where you installed the Avamar Client for HP-UX.

Upgrading the Avamar Plug-in for SAP with Oracle on HP-UX

You must complete the required steps to upgrade the Avamar Plug-in for SAP with Oracle on HP-UX.

Procedure

1. Uninstall the SAP plug-in. Uninstalling the Avamar Plug-in for SAP with Oracle on HP-UX on page 31 provides instructions.

2. Uninstall the Avamar file system client. The *Avamar Backup Clients User Guide* provides instructions.
3. Download and install the new version of the Avamar file system client. The *Avamar Backup Clients User Guide* provides instructions.

   Note: The versions of the Avamar file system client and SAP plug-in must be the same.

4. Download the SAP plug-in installation package. Downloading the software on page 29 provides instructions.
5. Install the new version of the SAP plug-in. Installing the Avamar Plug-in for SAP with Oracle on HP-UX on page 30 provides instructions.

Uninstalling the Avamar Plug-in for SAP with Oracle on HP-UX

You can uninstall the Avamar Plug-in for SAP with Oracle on HP-UX by using the `swremove` command.

Procedure

1. Log in to the SAP server host as root.
2. Type the following command to uninstall the SAP plug-in:

   ```
   swremove hpuxsap
   ```

Installing, upgrading, and uninstalling the software on IBM AIX

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

Installing the Avamar Plug-in for SAP with Oracle on IBM AIX

You can install the Avamar Client for AIX in either the default installation directory or an alternate directory. You must install the Avamar Plug-in for SAP with Oracle in the same directory as the Avamar Client for AIX.

About this task

Note: If the `setuid` or `setgid` bits are set on the `brbackup` or `brarchive` executables, you must install the file system client and SAP plug-in in the default installation directory.

You can specify an alternate location for the `var` directory during the Avamar Client for AIX installation by setting the VARDIR environment variable as described in the *Avamar Backup Clients User Guide*. When you install the SAP plug-in after you install the Avamar Client for AIX, the plug-in installation automatically uses the same location for the `var` directory that you specified during the Avamar Client for AIX installation.

Procedure

1. Log in to the SAP server host as root.
2. Type the following command to change to the temporary directory that contains the SAP plug-in installation package:

   ```
   cd tmp
   ```

   where *tmp* is the pathname of the temporary directory.

3. Install the SAP plug-in in the default directory or an alternate directory:

- To install the SAP plug-in in the default directory, type the following command:

  ```
  installp -d /tmp/AvamarSAP-aix6-ppc64-version.bff all
  ```

  where *version* is the Avamar software version.
- To install the SAP plug-in in an alternate directory, type the following command:

  ```
  installp -R alternate_path -d /tmp/AvamarSAP-aix6-ppc64-version.bff all
  ```

  where:
  - *alternate_path* is the pathname of the alternate directory where you installed the Avamar Client for AIX.
  - *version* is the Avamar software version.

Upgrading the Avamar Plug-in for SAP with Oracle on IBM AIX

You must complete the required steps to upgrade the Avamar Plug-in for SAP with Oracle on IBM AIX.

About this task

You must upgrade the SAP plug-in before you upgrade the Avamar file system client.

Note: The versions of the Avamar file system client and SAP plug-in must be the same.

Procedure

1. Log in to the SAP server host as root.
2. Download the SAP plug-in installation package. Downloading the software on page 29 provides instructions.
3. Type the following command to change to the temporary directory that contains the SAP plug-in installation package:

   ```
   cd tmp
   ```

   where *tmp* is the pathname of the temporary directory.
4. Upgrade the SAP plug-in in the default directory or an alternate directory:
   - To upgrade the SAP plug-in in the default directory, type the following command:

     ```
     installp -d /tmp/AvamarSAP-aix6-ppc64-version.bff all
     ```

     where *version* is the Avamar software version.
   - To upgrade the SAP plug-in in an alternate directory, type the following command:

     ```
     installp -R alternate_path -d /tmp/AvamarSAP-aix6-ppc64-version.bff all
     ```

     where:
     - *alternate_path* is the pathname of the alternate directory.
     - *version* is the Avamar software version.
5. Download the Avamar file system client. The *Avamar Backup Clients User Guide* provides instructions.
6. Upgrade the Avamar file system client in the default directory or an alternate directory:
   - To upgrade the Avamar file system client in the default directory, type the following command:

     ```
     installp -d /tmp/AvamarClient-platform-version.bff all
     ```

     where:

- *platform* is the AIX system type.
- *version* is the Avamar software version.

- To upgrade the Avamar file system client in an alternate directory, type the following command:

  installp -R *alternate_path* -d /*tmp*/AvamarClient-*platform*-*version*.bff all

  where:

  - *alternate_path* is the pathname of the alternate directory.
  - *platform* is the AIX system type.
  - *version* is the Avamar software version.

Uninstalling the Avamar Plug-in for SAP with Oracle on IBM AIX

You can uninstall the Avamar Plug-in for SAP with Oracle on IBM AIX by using the `installp` command.

Procedure

1. Log in to the SAP server host as root.
2. View all the Avamar packages installed on the system:
   - To view the Avamar packages installed in the default directory, type the following command:

     lslpp -la | grep Avamar

   - To view the Avamar packages installed in an alternate directory, type the following command:

     lslpp -R *alternate_path* -la | grep Avamar

     where *alternate_path* is the pathname of the alternate directory.
3. Uninstall the SAP plug-in from the default directory or an alternate directory:
   - To uninstall the SAP plug-in from the default directory, type the following command:

     installp -u AvamarSAP-aix6-ppc64

   - To uninstall the SAP plug-in from an alternate directory, type the following command:

     installp -R *alternate_path* -u AvamarSAP-aix6-ppc64

     where *alternate_path* is the pathname of the alternate directory.

Installing, upgrading, and uninstalling the software on Linux

You can uninstall the Avamar Plug-in for SAP with Oracle on Linux.

Installing the Avamar Plug-in for SAP with Oracle on Linux

About this task

You can install the Avamar Client for Linux in either the default installation directory or an alternate directory. You must install the Avamar Plug-in for SAP with Oracle in the same directory as the Avamar Client for Linux.

Note: If the `setuid` or `setgid` bits are set on the `brbackup` or `brarchive` executables, you must install the file system client and SAP plug-in in the default installation directory.

You can specify an alternate location for the `var` directory during the Avamar Client for Linux installation as described in the *Avamar Backup Clients User Guide*. When you install the SAP plug-in

after you install the Avamar Client for Linux, the plug-in installation automatically uses the same location for the `var` directory that you specified during the Avamar Client for Linux installation.

Procedure

1. Log in to the SAP server host as root.
2. Type the following command to change to the temporary directory that contains the SAP plug-in installation package:

   cd *tmp*

   where *tmp* is the pathname to the temporary directory.

3. Install the SAP plug-in in the default directory or an alternate directory:
   - To install the SAP plug-in in the default directory, type the following command:

     rpm -ivh AvamarSAP-linux-*package-version*.rpm

     where *package-version* is the package type and Avamar software version.
   - To install the SAP plug-in in an alternate directory, type the following command:

     rpm -ivh --relocate /usr/local/avamar=/*alternate_path* AvamarSAP-linux-*package-version*.rpm

     where:
     - *alternate_path* is the pathname of the alternate directory where you installed the Avamar Client for Linux.
     - *package-version* is the package type and Avamar software version.

Upgrading the Avamar Plug-in for SAP with Oracle on Linux

About this task

You can upgrade the Avamar Plug-in for SAP with Oracle on Linux by using the `rpm -Uvh` command.

Note: The versions of the Avamar file system client and SAP plug-in must be the same. You cannot relocate the SAP plug-in or `var` directory to a different directory during the upgrade.

Procedure

1. Log in to the SAP server host as root.
2. Upgrade the Avamar Client for Linux. The *Avamar Backup Clients User Guide* provides instructions.
3. Type the following command to change to the temporary directory that contains the SAP plug-in installation package:

   cd *tmp*

   where *tmp* is the pathname of the temporary directory.

4. Type the following command to upgrade the SAP plug-in in the default directory:

   rpm -Uvh AvamarSAP-linux-*package-version*.rpm

   where *package-version* is the package type and Avamar software version.

   The `rpm -Uvh` command automatically uninstalls the earlier version of the SAP plug-in and then installs the new version.

Uninstalling the Avamar Plug-in for SAP with Oracle on Linux

You can uninstall the Avamar Plug-in for SAP with Oracle on Linux by using the `rpm -e` command.

Procedure

1. Log in to the SAP server host as root.
2. Type the following command to view all the Avamar packages that are installed on the system:

   `rpm -qa | grep Av`

   For example, the following output appears in the command shell:

   ```
   AvamarSAP-version
   AvamarClient-version
   ```

   where *version* is the Avamar software version.

3. Type the following command to uninstall the SAP plug-in:

   `rpm -e AvamarSAP-version`

Installing, upgrading, and uninstalling the software on Solaris

You can install, upgrade, and install the Avamar Plug-in for SAP with Oracle on Solaris.

Installing the Avamar Plug-in for SAP with Oracle on Solaris

About this task

You can install the Avamar Client for Solaris in either the default installation directory or an alternate directory. The SAP plug-in installation process automatically installs the Avamar Plug-in for SAP with Oracle in the same directory as the Avamar Client for Solaris.

Note: If the `setuid` or `setgid` bits are set on the `brbackup` or `brarchive` executables, you must install the file system client and SAP plug-in in the default installation directory.

You can use the following instructions to install the Avamar Plug-in for SAP with Oracle on a stand-alone Solaris system or on each node in a cluster.

Procedure

1. Log in to the SAP server host as root.
2. Type the following command to change to the temporary directory that contains the SAP plug-in installation package:

   `cd tmp`

   where *tmp* is the pathname of the temporary directory.

3. Type the following command to install the SAP plug-in:

   `pkgadd -d AvamarSAP-solarisversion-package-version.pkg`

   where `AvamarSAP-solarisversion-package-version.pkg` is the file name of the SAP plug-in installation package that you downloaded.

   The command displays installation activity.

4. Perform the following additional procedures in a cluster system on Solaris:
   - In a Solaris Cluster system, configure the resource groups on each node according to instructions in the Solaris Cluster chapter of the *Avamar Backup Clients User Guide*.
   - In a VCS system, install the Avamar Cluster Client for Solaris on each node, starting with the active VCS node first, according to instructions in the VCS chapter of the *Avamar Backup Clients User Guide*. Depending on the Solaris operating system, use the correct installation package.

Upgrading the Avamar Plug-in for SAP with Oracle on Solaris

You must complete the required steps to upgrade the Avamar Plug-in for SAP with Oracle on a stand-alone Solaris system or on each node in a cluster.

Procedure

1. Uninstall the SAP plug-in. Uninstalling the Avamar Plug-in for SAP with Oracle on Solaris on page 36 provides instructions.
2. Uninstall the Avamar file system client. The *Avamar Backup Clients User Guide* provides instructions.

   Note: The versions of the Avamar file system client and SAP plug-in must be the same.

3. Download the Avamar file system client and the SAP plug-in installation packages. Downloading the software on page 29 provides instructions.
4. Install the new version of the Avamar file system client. The *Avamar Backup Clients User Guide* provides instructions.
5. Install the new version of the SAP plug-in. Installing the Avamar Plug-in for SAP with Oracle on Solaris on page 35 provides instructions.

Uninstalling the Avamar Plug-in for SAP with Oracle on Solaris

You must complete the required steps to uninstall the Avamar Plug-in for SAP with Oracle on a stand-alone Solaris system or on each node in a cluster.

Procedure

1. Log in to the SAP server host as root.
2. If you are uninstalling in a cluster configuration, run the correct cluster configuration script:
   - For a Solaris Cluster configuration, run the `suncluster-configure.sh` script to remove the Avamar agent resource from the Solaris Cluster resource group.
   - For a VCS configuration, run the `avclusuninstall` script.

   The *Avamar Backup Clients User Guide* provides details.
3. Type the following command to view all the Avamar packages installed on the system:

   ```
   pkginfo | grep AVMR
   ```

   A list of all the Avamar packages installed on the system appears, including the `AVMRsap` package that is the SAP plug-in package.
4. Note the package names.
5. Type the following command to uninstall a software package:

   ```
   pkgrm package_name
   ```

   where *package_name* is one of the Avamar software packages displayed in step 3.

6. Type `y` and press **Enter** when prompted to remove the package.
7. Repeat previous 2 steps as required to remove the Avamar software packages.
8. In a VCS system, uninstall the Avamar Cluster Client for Solaris according to instructions in the VCS chapter of the *Avamar Backup Clients User Guide*.

Installing, upgrading, and uninstalling the software on Windows

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

Installing the Avamar Plug-in for SAP with Oracle on Windows

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

About this task

You can use the following instructions to install the Avamar Client for Windows on a stand-alone Windows system or on each node in a cluster.

Procedure

1. Log in to the SAP server host as an administrator.
2. Go to the temporary directory that contains the SAP plug-in installation package that you downloaded in Downloading the software on page 29.
3. Start the SAP plug-in installation by using the correct procedure:
   - If UAC is disabled, double-click the installation package.
   - If UAC is enabled, perform the following steps:
     a. Right-click the **Command Prompt** icon, and select **Run as administrator**.
     b. In the **Command Prompt** window, type the following command to change the working directory to the location of the installation package:

        ```
        cd tmp
        ```

        where *tmp* is the pathname of the directory that contains the installation package.
     c. Type the following command on a single command line to start the installation:

        ```
        msiexec /i AvamarSAP-windows-package-version.msi
        ```

        where *package-version* is the package type and Avamar software version.

   User Account Control setting on Microsoft Windows on page 28 provides details about UAC.
4. Follow the instructions in the wizard to install the SAP plug-in.
5. Click **Finish** when the installation completes.

Configuring the cluster client on Windows

The Avamar cluster client enables you to back up and restore SAP Oracle data on shared storage in a cluster, regardless of which node is managing the data at the time of the backup or restore.

The Cluster Configuration Tool walks you through the steps to configure the Avamar cluster client for the Avamar Plug-in for SAP with Oracle.

Before you begin

Before you run the Cluster Configuration Tool, ensure that the Avamar Client for Windows and the Avamar Plug-in for SAP with Oracle are installed on each node in the cluster.

Procedure

1. Log in to the active node in the cluster as a domain administrator. The account must be a member of the local Administrators group on each cluster node.
2. Start the Cluster Configuration Tool. On Windows Server 2008, open the **Start** menu and select **Program Files** > **EMC Avamar** > **Cluster Configuration Tool**.

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

   The **Plug-ins** page appears.
4. Select **SAP with Oracle** in the **Avamar Backup Plug-ins** list, and click **Next**.

   The **Cluster Nodes** page appears with a list of nodes and each node's status.
5. Ensure that the environment meets the following requirements:
   - The status for each node is Up.
   - The installation status of the Windows client on each node is Installed.
   - The installation status of the plug-in on each node is Installed.
6. Click **Next**.

   The **Operations** page appears.
7. Select **Configure a new cluster client for all nodes**, and click **Next**.

   The **Prerequisites** page appears. A check mark next to a prerequisite indicates that the prerequisite is met.
8. Ensure that the environment meets all the prerequisites on the **Prerequisites** page.

   If a prerequisite is not met, then exit the wizard, resolve the issue, and restart the wizard.
9. Select the IP version that the environment uses, and click **Next**.

   The **Attach to Service** page appears.
10. Select the cluster service to use for the new cluster client, and click **Next.**

    The **Server Settings** page appears.
11. Specify the settings for the Avamar server:
    a. Type either the DNS name of the Avamar server in the **Name** box or the IP address in the **IPv4/IPv6 address** box.
    b. Type the name of the Avamar domain in the Avamar client domain for the cluster client box.

       To specify a domain at the root level, type `/domain`, where *domain* is the domain name. To specify a subdomain, type `/domain/subdomain`, where *domain* is the domain name and *subdomain* is the subdomain name.
    c. Type the data port for Avamar client/server communication in the **Port number** box.

       Note: Port 28001 is the default port that the Avamar client uses to communicate with the administrator server.

d. Type the name of the shared network directory or volume in the **Cluster client's var directory** box, or click **Browse** to select a shared network directory or volume.

The shared network directory or volume stores the cluster client configuration and log files. All nodes in the cluster must have write access to this directory or volume.

Note: Select a volume that the cluster owns instead of a remote pathname on the network.

e. Click **Next**.

The **Summary** page appears.

12. Review the configuration settings that you specified in the wizard, and click **Configure**.

The **Progress** page provides the status of the configuration. When the configuration process completes, the **Results** page appears.

13. Click **Close.**

Upgrading the Avamar Plug-in for SAP with Oracle on Windows

The steps to upgrade the Avamar Plug-in for SAP with Oracle on Windows depend on whether the installation is on a stand-alone server or in a cluster.

Note: The versions of the Avamar file system client and SAP plug-in must be the same.

Upgrading on a stand-alone Windows server

You must complete the required steps to upgrade the Avamar Plug-in for SAP with Oracle on a stand-alone Windows server.

Procedure

1. Ensure that the environment meets all the system requirements for the new version. Preparing to install the Avamar Plug-in for SAP with Oracle on page 28 provides details.
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 SAP plug-in by running the plug-in installation wizard for the new version on the client computer. Installing the Avamar Plug-in for SAP with Oracle on Windows on page 37 provides instructions.

Upgrading in a Windows cluster

You must complete the required steps to upgrade the Avamar Plug-in for SAP with Oracle in a Windows cluster.

Procedure

1. Uninstall the earlier version of the Avamar Client for Windows and SAP plug-in:
   a. Use the Avamar Cluster Configuration utility to uninstall the Avamar cluster client.
   b. Uninstall the earlier version of the SAP plug-in on each node in the cluster.
   c. Uninstall the earlier version of the Avamar Client for Windows on each node in the cluster.

   The plug-in guide for the earlier version provides instructions for each of these steps.

2. Install the new version of the Avamar Client for Windows and SAP plug-in:

a. Install the Avamar Client for Windows in the same directory on each node in the cluster. The *Avamar for Windows Server User Guide* provides instructions.

b. Install the SAP plug-in in the same directory on each node in the cluster. Installing the Avamar Plug-in for SAP with Oracle on Windows on page 37 provides instructions.

c. Register each node in the cluster with the Avamar server. The *Avamar for Windows Server User Guide* provides instructions.

d. Run the Cluster Configuration Tool on an active node to install the Avamar cluster client. Configuring the cluster client on Windows on page 37 provides instructions.

Uninstalling the Avamar Plug-in for SAP with Oracle on Windows

The steps to uninstall the Avamar Plug-in for SAP with Oracle on Windows depend on whether the installation is on a stand-alone server or in a cluster.

Uninstalling the software on a stand-alone Windows server

You must use the Windows uninstall feature to uninstall the Avamar Plug-in for SAP with Oracle and Avamar Client for Windows software on a stand-alone Windows server.

Procedure

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

Uninstalling the software in a Windows cluster

In a Windows cluster, use the Cluster Configuration Tool to uninstall the Avamar cluster client. Then use the Windows uninstall feature to uninstall the Avamar Plug-in for SAP with Oracle and Avamar Client for Windows software on each node.

Procedure

1. Run the Cluster Configuration Tool on the active node to uninstall the Avamar cluster client:

   a. Log in to the active node in the cluster as a domain administrator. The account must be a member of the local Administrators group on each cluster node.

   b. Start the Cluster Configuration Tool. On Windows Server 2008, open the **Start** menu and select **Program Files** > **Avamar** > **Cluster Configuration Tool**.

      The welcome page appears.

   c. Click **Next**.

      The **Plug-ins** page appears.

   d. Select **SAP with Oracle** in the **Avamar Backup Plug-ins** list, and click **Next**.

      The **Cluster Nodes** page appears with a list of nodes and each node's status.

   e. Ensure that the status of each node is Up, and click **Next**.

      The **Operations** page appears.

   f. Select **Remove the cluster client from all nodes**, and click **Next**.

      The **Prerequisites** page appears. A check mark next to a prerequisite indicates that the prerequisite has been met.

   g. Ensure that the environment meets all the prerequisites on the page, and click **Next**.

      The **Summary** page appears.

h. Review the summary information, and click **Uninstall**.

The **Progress** page provides the status of the uninstall operation. When the uninstall completes, the **Results** page appears.

i. Click **Close**.

2. Uninstall the Avamar Plug-in for SAP with Oracle on each node by using **Programs and Features**.
3. Uninstall the Avamar Client for Windows on each node by using **Programs and Features**.

Performing post-installation tasks

You must perform the required configuration procedures after a successful installation of the Avamar Plug-in for SAP with Oracle.

Linking the SAP plug-in backint program with BR*Tools

Perform one of the following tasks to link the `backint` program with the SAP BR*Tools:

- For BR*Tools 7.10 or later, open the BR*Tools configuration file, `init`*`DBSID`*`.sap`, with a text editor and set **`util_path=`***`path`* where *path* is the full pathname of the directory that contains the `backint` program.

  Note: Do not include any spaces in the *path* value of the `util_path` parameter. For example, if you set **`util_path="C:\Program Files\avs\bin"`**, the SAP plug-in backup fails.

  The `init`*`DBSID`*`.sap` file is typically located in the following directory:

  - On UNIX: `$ORACLE_HOME/dbs`
  - On Microsoft Windows: `%ORACLE_HOME%\DATABASE`

- Copy the `backint` program from the SAP plug-in installation directory to the directory that contains the SAP BR*Tools. The default SAP plug-in installation directory is as follows:

  - On AIX or Linux: `/usr/local/avamar/bin`
  - On HP-UX or Solaris: `/opt/AVMRclnt/bin`
  - On Microsoft Windows: `C:\Program Files\avs\bin`

  Note: If you use this method to link `backint` with BR*Tools, you must remove the copied `backint` program from the BR*Tools directory during the uninstall procedure.

- On Linux or UNIX, create a symbolic link in the BR*Tools installation directory to the `backint` location in the Avamar directory. For example:

  ```
  # ln -s /usr/local/avamar/bin/backint
  /usr/sap/SAPSID/SYS/exe/run/backint
  ```

  where *SAPSID* is the Oracle system ID of your database.

Setting the backup device type parameter

You must perform the following steps to specify the SAP plug-in as the default program for backup, restore, and verification operations.

Procedure

1. Open the BR*Tools initialization profile, `init`*`DBSID`*`.sap`, in a text editor.

2. Set the backup device type parameter to use the `backint` program by specifying one of the following settings in the BR*Tools configuration profile, `init`*`DBSID`*`.sap`*:

   `backup_dev_type = util_file`
   or
   `backup_dev_type = util_file_online`

   Set **`backup_dev_type = util_file_online`** for online backups to decrease the amount of time each tablespace remains in hot backup mode, resulting in a smaller number of generated transaction logs.

   Note: The SAP plug-in does not support the `rman_util` value setting for the `backup_dev_type` parameter.

   You can override the default value of the backup device type parameter in the file by using the BR*Tools command line option, for example, **`brbackup -d util_file_online`**. The BR*Tools documentation provides details. SAP plug-in backups through Avamar Administrator specify the `-d` option which is based on user-selected options in Avamar Administrator.

Enabling administrator privileges for the SAP plug-in on Windows

On specific type of Microsoft Windows systems, User Account Control (UAC) is designed to provide additional operating system security by preventing software from being installed or run with administrator privileges unless an administrator authorizes the elevated privileges.

About this task

On Windows systems with UAC enabled, ensure that the administrator privileges are enabled for the SAP plug-in before you start a SAP plug-in backup or restore from the CLI. Otherwise, the SAP plug-in operation from the CLI might fail.

You can enable administrator privileges for a SAP plug-in backup or restore from the CLI.

Procedure

1. Right-click the **Command Prompt** icon.
2. Select **Run as administrator** from the list.

   Note: The operating system user that performs a SAP plug-in backup with Avamar Administrator does not require operating system administrator privileges.

Excluding database files and logs from file system backups

On the SAP plug-in host, perform file system backups separately from SAP plug-in backups. To optimize the performance of file system backups, exclude the SAP database data and logs in the dataset for the file system backups.

About this task

NOTICE To provide full protection of SAP Oracle, use the file system backup interface to back up Oracle configuration files, such as the password file, listener, and `tnsnames.ora` files and the SAP application files. This list of files is not exhaustive.

You can create a dataset that excludes the SAP Oracle database and log files from the file system backups.

Procedure

1. In Avamar Administrator, select **Tools** > **Manage Datasets**.

The **Manage All Datasets** window appears.

2. Click **New**.

   The **New Dataset** dialog box appears.

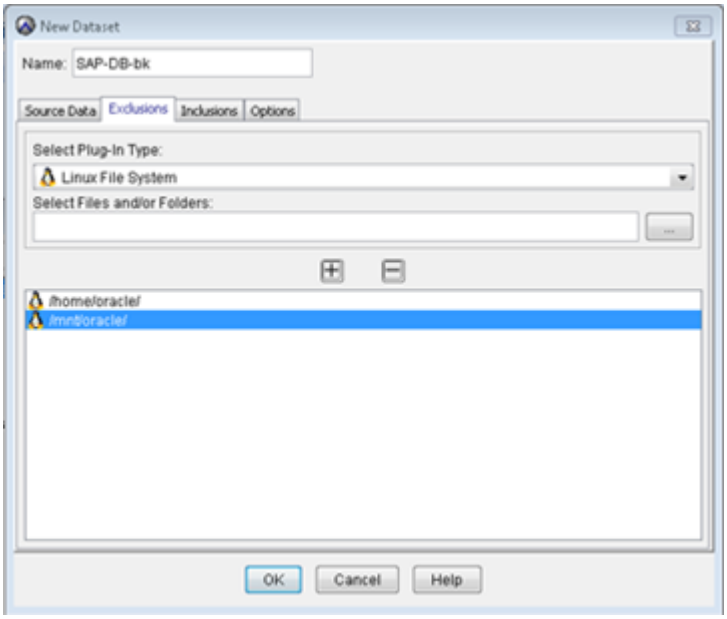
3. In the **Name** field, type a name for the new dataset for the file system backup.

   The name can include alphanumeric characters (A-Z, a-z, 0-9) and the following special characters: period (.), hyphen (-), underscore (_). Do not use Unicode characters or any of the following characters:

   ` ~ ! @ # $ % ^ & * ( ) = + [ ] { } | \ / ; : ' " < > , ?

4. Click the **Exclusions** tab.
5. Select the correct file system from the **Select Plug-In Type** list.
6. In the **Select Files and/or Folders** field, add the location of the SAP Oracle database.

   Figure 5 Location of the SAP Oracle database



7. Click **OK.**

   The **New Dataset** dialog box closes.

8. Switch to the **Manage All Datasets** window and click **OK**.

   The **Manage All Datasets** window closes.

9. Assign the new dataset to the correct client or group. The *Avamar Administration Guide* provides instructions.

CHAPTER 3

Backup

This chapter includes the following topics:

- Backup feature support 46
- Performing on-demand backups 46
- Scheduling backups 51
- Monitoring backups 56
- Cancel backups 57
- Reviewing backups 57
- Enforcement of backups to Data Domain 60

Backup feature support

Backup on page 18 describes the Avamar Plug-in for SAP with Oracle (SAP plug-in) backup features, including the supported data types and backup limitations. You can perform on-demand backups and scheduled backups with the SAP plug-in.

You can use the Avamar Administrator or the AUI to perform on-demand backups and configure scheduled backups:

- Performing on-demand backups on page 46
- Scheduling backups on page 51

You can also perform on-demand backups from the CLI by using the BR*Tools commands as described in Performing on-demand backups from the CLI on page 74.

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 SAP server host.

   A list of Avamar clients is displayed in the pane under the domains list.
3. Select the SAP server host. If the SAP server is installed in a cluster, select the virtual server host.

   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 Sybase server are displayed.
5. In the **Plugins** pane, perform the following steps:

   a. Select the *SAP* plug-in for the platform.

   b. Browse to and select one or more databases for the backup.

   c. Click **NEXT**.

   The **Basic Configuration** pane is displayed.
6. In the **Plugin** pane, perform the following steps:

   a. In the **Oracle home (ORACLE_HOME)** field, type the full pathname of the Oracle installation directory that contains the database to be backed up.

   Note: Do not include a final slash, /, at the end of the ORACLE_HOME pathname.

   b. In the **Oracle locale (NLS_LANG)** field, type (in Oracle format) the language locale to use for the database selection. The default value is AMERICAN_AMERICA.US7ASCII. The value for the Oracle globalization parameter has the following format:

   NLS_LANG=*language_territory.character_set*

c. Select to use either Oracle database authentication or operating system authentication for the database connection during the browse operation:

> **Note:** If you select the operating system authentication, the operating system user must be configured according to the Oracle documentation. If you select both types of authentication, the database authentication takes precedence.

- If you select **Use Oracle Database Authentication**, complete the required fields:
  - In the **Database username** field, type the Oracle database username. The user must have SYSDBA privileges.
  - In the **Database user password** field, type the password of the Oracle database username.
  - In the **Oracle Net Service name** field, type the Oracle Net service name of the database to be backed up.
- If you select **Use Operating System Authentication**, complete the required fields:
  - In the **Operating system username** field, type the operating system login name of the SAP user who performs the backup.
  - In the **Operating system user password** field, type the operating system user password of the SAP user who performs the backup. This field is mandatory on Windows and optional on UNIX or Linux.
  - In the **Oracle instance SID (ORACLE_SID)** field, type the system identifier (SID) of the Oracle database to be backed up.

d. Browse to and select one or more databases for the backup.

- To backup of a whole database, select the database instance node or all of the tablespaces in the database. For example, you would select the CID database in the preceding figure.
- To backup of one or more tablespaces, select only the individual tablespaces that you want to back up.
- To configure an archive log backup, complete the settings in step 8.g on page 50.

  > **Note:** When you choose to back up archive logs only, the backup settings that are made here are ignored. However, at least one tablespace must be selected to advance to the next screen.

e. Click **NEXT**.

The **Basic Configuration** window is displayed.

7. 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**.

> **NOTICE** Ensure that the retention policies are set according to the rules described in Complete backup protection on page 18.

b. In 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 details.

c. In 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.

8. Complete the settings in the **More Options** window.

Plug-in Options on page 67 provides more information about the advanced backup options.

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

NOTICE The software does not validate these options until the backup runs. You can find any errors that result from these settings in the `avsap` or `backint` log files.

b. To store the backup data on an attached Data Domain system that you specify, select the **Store backup on Data Domain system** check box. The metadata for the backup is stored on the Avamar server.

NOTICE If you specify a Data Domain system as the backup destination, all the data is backed up to the Data Domain system. You cannot back up part of the data to a Data Domain system and another part to an Avamar server.

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

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

d. Complete the settings in the **Oracle Database and BR*Tools Information** group box.

Enter all the mandatory values in this section, although the values were already entered earlier:

- In the **Oracle home (ORACLE_HOME)** field, type the full pathname of the directory where the Oracle software is installed.
  Note: Do not include a final slash, /, at the end of the ORACLE_HOME pathname.
- In the **Oracle instance SID (ORACLE_SID)** field, type the system identifier (SID) of the Oracle database instance to back up.
- In the **Oracle locale (NLS_LANG)** field, type (in Oracle format) the language locale to use for the database selection. The default value is AMERICAN_AMERICA.US7ASCII.
- In the **Database file location (SAPDATA_HOME)** field, type the full pathname of the directory that contains the SAP database files.
- In the **BR*Tools location** field, type the full pathname of the directory that contains the BR*Tools executable files.
- (Optional) In the **BR*Tools initialization file (initDBSID.sap)** field: , type the full pathname of the BR*Tools initialization profile if the profile is not in the SAP default

location (`$ORACLE_HOME/dbs` or `%ORACLE_HOME%\database`) or if the profile does not have the default name format (`init`*`DBSID`*`.sap`).

e. Complete the settings in the **Operating System and Database Credentials** group box:

- In the **Operating system username** field, type the operating system login name of the SAP user who performs the backup.

  Note: To back up on Windows with the domain user, use the user principal name (UPN) format, for example, *username*@*DNS_domain_name*. The Microsoft documentation provides more details about using the UPN format.

- In the **Operating system user password** field, type the operating system user password of the SAP user who performs the backup. This field is mandatory on Windows and optional on UNIX or Linux.
- (Optional) If database authentication is used for the database connection, type in the **Database username field** the username of the Oracle database user (with SYSDBA privileges) configured to use BR*Tools.
- (Optional) In the **Database user password** field, type the password for the database username.

Setting the database username and password corresponds to running the `brbackup -u` *db_username*/*password* command. When you do not set the database username and password, the backup uses operating system authentication to connect to the Oracle database, which corresponds to running the `brbackup -u /` command.

The SAP BR*Tools documentation provides details about the configuration of operating system and database users.

f. Complete the settings in the **General Backup Options** group box:

- In the **Maximum number of streams** menu, select the maximum number of simultaneous `avtar` streams to use per backup operation. The default value is 1, and the recommended maximum value is 10. Multi-streaming on page 22 provides details.
- (Optional) In the **Additional brbackup options** field, specify any additional `brbackup` command line options to use with the backup that cannot be set through other fields in this dialog box, for example, `-verify use_dbv`. You cannot specify the following options because these options are set based on your field selections: `-device`, `-mode`, `-profile`, `-type`, `-user`, `-archive`.

  If you set the `-verify` option in this field, `brbackup` restores the backup to a temporary location and checks the backup for validity. For the verify operation to succeed, you must perform the following tasks:

  a. Create an SAP plug-in parameter file (flagfile) on the SAP plug-in host.

  b. Specify the location of the parameter file either in this field through `-r` *full_path_of_flagfile* or by setting the `util_par_file` parameter in the BR*Tools `init`*`DBSID`*`.sap` file on the SAP plug-in host.

  The parameter file must contain at least the following parameters: `--id`, `--password`, `--server`, and `--account`. SAP plug-in parameter file on page 79 provides details.

  NOTICE A file pathname that is used in the options cannot include spaces. If you want to specify a file pathname that contains spaces, create a soft link to the file or copy the file to a pathname without spaces.

- (Optional) Select **Enable debugging messages** for debugging purposes. This option enables logging for the `avtar`, `avsap`, and `backint` processes. Use this option with

caution because the messages can create very large log files. Troubleshooting on page 85 provides details about the generated logs.

g. Complete the settings in the **Archive Log Options** group box:

- (Optional) Select **Back up only archive redo logs** to back up only the archive redo logs for the instance without backing up any database object. The database selection on the **Backup** tab is ignored. This option corresponds to the SAP `brarchive` command.
- (Optional) Select **Include archive logs** to include archive redo logs after the database backup. This option corresponds to the SAP `brbackup` command, followed by a separate `brarchive` command. This setting is ignored if you select **Back up only archive redo logs**.
- (Optional) In the **Number of logs to back up** field, type the number of logs to back up. This option corresponds to the `brarchive -n` command. If you set the value to 0, the default BR*Tools value is used.
- (Optional) Select **Delete logs after backup completes** to delete the logs after the logs are backed up. This option corresponds to the `brarchive -sd` command.
- (Optional) In the **Additional brarchive options** field, specify any additional `brarchive` command line options to use with the backup of archive redo logs, for example, `-verify`. You cannot specify the following options: `-number`, `-save_delete`, `-profile`, `-user`. If you select **Delete logs after backup completes**, you cannot specify the `-delete_saved` option.

  Note: A file pathname that is used in the options cannot include spaces.

NOTICE Do not specify the `brarchive` option `-f` *number* because the operation might take a long time and block other backup operations.

h. Complete the settings in the **Backup Type** group box:

- To specify that the database remains open during the backup, select **Online**. This option corresponds to the `brbackup -t online -d util_file_online` command. This setting is ignored during archive log backups.
- To specify that the logs that are generated during the backup are archived and then backed up at the end of the backup, select **Online consistent - Archive the logs generated during the backup, then back up these logs**. This option corresponds to the `brbackup -t online_cons -d util_file_online` command.
- To specify that the database is shut down for the backup, provided the SAP system has also been shut down, select **Offline**. Otherwise, the database is not shut down and the backup terminates with an error message. This option corresponds to the `brbackup -t offline -d util_file` command.
- To specify that the database is shut down for the backup even if there are SAP users who are connected to the database, select **Offline force - Shut down the database, even if there are SAP users connected**. This option corresponds to the `brbackup -t offline_force -d util_file` command.

i. (Optional) Complete the settings in the **BR*Tools Log File Locations** group box:

- In the **SAPARCH** field, type the full directory pathname of the BRARCHIVE log files if the files are not located in the SAP default location. For example, `$SAPDATA_HOME/saparch` or `%SAPDATA_HOME%\saparch`.
- In the **SAPBACKUP** field, type the full directory pathname of the BRBACKUP, BRRESTORE, and BRRECOVER log files if the files are not located in the SAP default

location. For example, `$SAPDATA_HOME/sapbackup` or `%SAPDATA_HOME%\sapbackup`.

- In the **SAPCHECK** field, type the full directory pathname of the BRCONNECT log files if the files are not located in the SAP default location. For example, `$SAPDATA_HOME/sapcheck` or `%SAPDATA_HOME%\sapcheck`.
- In the **SAPREORG** field, type the full directory pathname of the BRSPACE log files if the files are not located in the SAP default location. For example, `$SAPDATA_HOME/spareorg` or `%SAPDATA_HOME%\spareorg`.
- In the **SAPTRACE** field, type the full directory pathname of the SAPTRACE log files if the files are not located in the SAP default location. For example, `$SAPDATA_HOME/saptrace` or `%SAPDATA_HOME%\saptrace`.

9. To manually enter additional plug-in options as free text, perform the following steps:
   a. Toggle the **Show Free Form** field to **ON**.
   b. Click **+**.
   c. In the **Key** field, type the plug-in option name.

      For example, **`[avsybase]syb-language`**.
   d. In the **Value** field, type a value.
   e. To remove an option from the list, click **Delete**.

   NOTICE The Avamar software does not validate the option information that you type in the **Key** and **Value** fields.

   NOTICE For concurrent online backups of two or more databases on the same client, set the SAPSWITCH environment variable in the **Enter Attribute** and **Enter Attribute Value** fields. Set SAPSWITCH to a separate non-default directory for each concurrent backup so that the `.switch` file directory is different for each backup. Directory for the .switch files on page 89 provides details.

10. Click **FINISH**.

    The following status message is displayed:

    `Backup initiated.`

11. To view status details for the backup, select **Actions** > **View Activity**.

Scheduling backups

Scheduled backups run automatically to ensure that backups 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 groups, group policy, 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 Avamar Administrator, select **Tools** > **Manage Datasets**.

   The **Manage All Datasets** window appears.

2. Click **New**.

   The **New Dataset** dialog box appears, listing all the default datasets for all file systems in the box below the **+** (add to list) and **-** (remove from list) buttons.

3. In the **New Dataset** dialog box:

   a. In the **Name** box, 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 (-), underscore (_). Do not use Unicode characters or any of the following characters:

      ` ~ ! @ # $ % ^ & * ( ) = + [ ] { } | \ / ; : ' " < > , ?

   b. Click the **Source Data** tab.

   c. Select **Enter Explicitly**.

   d. Delete all the default datasets that are listed in the box below the **+** and **-** buttons by selecting each dataset in turn and clicking the **-** button to delete the dataset.

   e. Select the appropriate SAP plug-in from the **Select Plug-In Type** list.

      NOTICE All Avamar plug-ins are listed in the **Select Plug-In Type** list, but only plug-ins that are installed on the client are available to add to the dataset.

   f. Click the **...** button (**Browse for files and/or folders**) next to the **Select Files and/or Folders** text box.

      The **Select Files and/or Folders** dialog box appears.

4. In the **Select Files and/or Folders** dialog box:

   a. Select the SAP server host from the **Clients** tree in the left pane. If the SAP server is installed in a cluster, select the virtual server host.

   b. Select the SAP plug-in in the middle pane.

      The **Browse Command Line Options** dialog box appears.

c. Complete the settings in the **Browse Command Line Options** dialog box as described in Performing on-demand backups on page 46, and click **OK**.

d. In the **Select Files and/or Folders** dialog box, select the items to be backed up:

- For a backup of a whole database, select the database instance node or all of the tablespaces in the database.
- For a backup of one or more tablespaces, select only the individual tablespaces that you want to back up.
- To configure an archive log backup, complete the settings in step 8.g on page 50.

  Note: When you choose to back up archive logs only, then the backup settings which are made here are ignored. However, at least one tablespace must be selected to advance to the next screen.

e. Click **OK**.

The **Select Files and/or Folders** dialog box closes.

Note: Do not use the **Exclusions** tab or **Inclusions** tab in the **New Dataset** dialog box to exclude or include SAP Oracle data in a scheduled backup.

5. Click the **Options** tab in the **New Dataset** dialog box.
6. Complete the settings on the **Options** tab:

   a. Select the SAP plug-in from the **Select Plug-In Type** list.

   The SAP plug-in options appear on the **Options** tab.

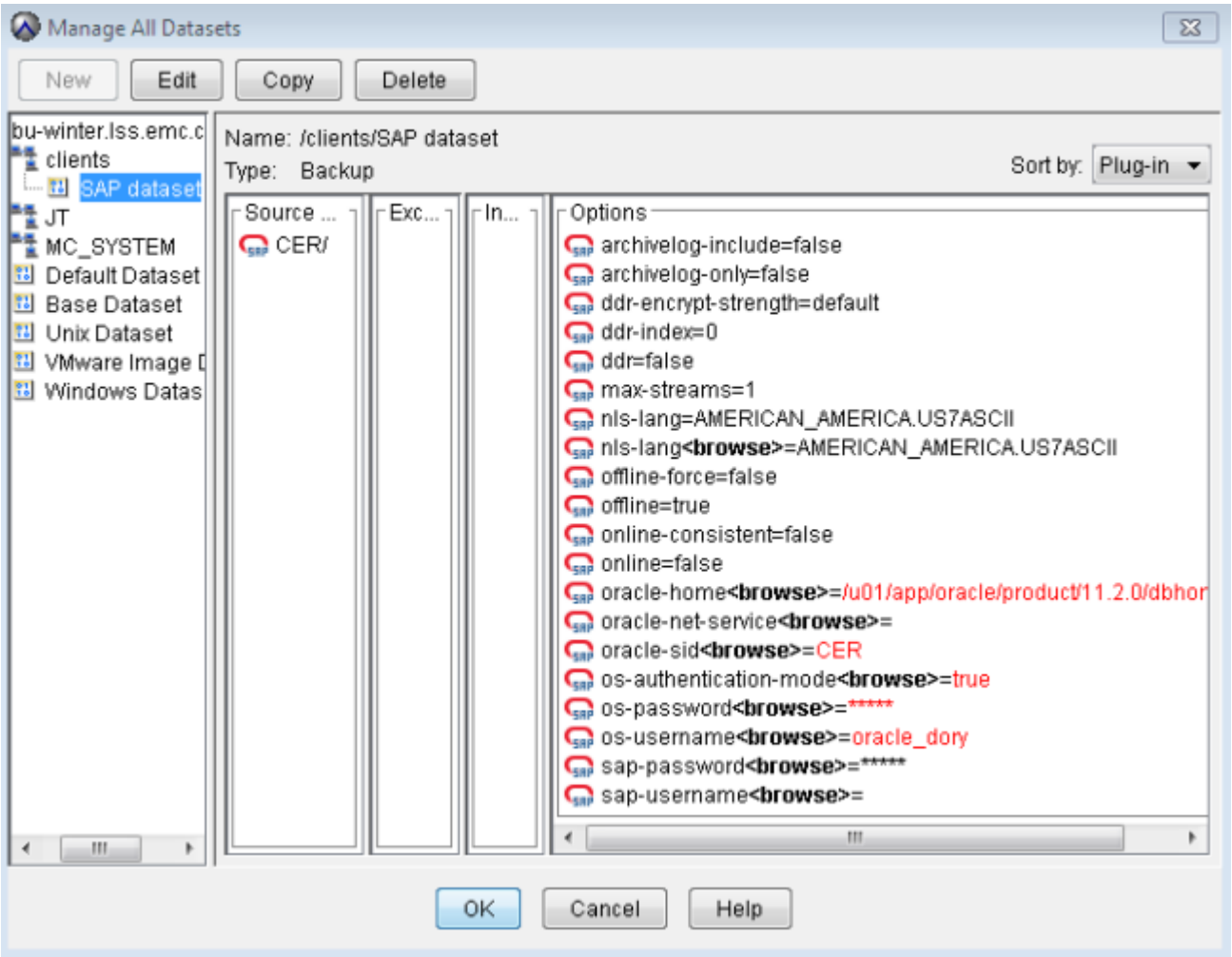
   b. Specify all the required options for the SAP plug-in backup as described in Performing on-demand backups on page 46.

   You must set values for all the mandatory fields. If you should specify advanced backup options, select the **Show Advanced Options** checkbox and complete the settings in the optional red fields.

7. Click **OK** to close the **New Dataset** dialog box.

   The new dataset appears in the list of datasets.

Figure 6 Manage All Datasets window



The <browse> flags that appear under **Options** in the **Manage All Datasets** dialog box also appear in the output of the corresponding `mccli dataset show --domain --name` command.

For example:

```
mccli dataset show --domain=/clients --name=sap_dataset1

0,23000,CLI command completed successfully.
Attribute                       Value
------------------------------- -----------------------------------------------------
Name                            sap_dataset1
ID                              1362064453449
Domain                          /clients
Built-in                        false
ALLDATA                         false
Num Targets                     1
Linux SAP with Oracle Target    CID/
Linux SAP with Oracle Target ID 1030
Num Includes                    0
Num Excludes                    0
Num Flags                       23
Linux SAP with Oracle Flag      type=checkbox:name=archivelog-delete:value=false
Linux SAP with Oracle Flag      type=checkbox:name=archivelog-include:value=true
Linux SAP with Oracle Flag      type=integer:name=archivelog-no:value=0
Linux SAP with Oracle Flag      type=checkbox:name=archivelog-only:value=false
```

```
Linux SAP with Oracle Flag      type=string:name=brtools-path:value=/usr/sap/CID/SYS/exe/
run
Linux SAP with Oracle Flag      type=pulldown:name=ddr-index:value=0
Linux SAP with Oracle Flag      type=checkbox:name=debug:value=false
Linux SAP with Oracle Flag      type=pulldown:name=max-streams:value=1
Linux SAP with Oracle Flag      type=string:name=nls-lang:value=AMERICAN_AMERICA.US7ASCII
Linux SAP with Oracle Flag      type=string:name<browse>=nls-
lang:value=AMERICAN_AMERICA.US7ASCII
Linux SAP with Oracle Flag      type=checkbox:name=offline:value=false
Linux SAP with Oracle Flag      type=checkbox:name=offline-force:value=false
Linux SAP with Oracle Flag      type=checkbox:name=online:value=true
Linux SAP with Oracle Flag      type=checkbox:name=online-consistent:value=false
Linux SAP with Oracle Flag      type=string:name=oracle-home:value=/home/oracer11/app/
oracer11/product/11.2.0/dbhome_1
Linux SAP with Oracle Flag      type=string:name<browse>=oracle-home:value=/home/
oracer11/app/oracer11/product/11.2.0/dbhome_1
Linux SAP with Oracle Flag      type=string:name<browse>=oracle-net-
service:value=CID.world
Linux SAP with Oracle Flag      type=string:name=oracle-sid:value=CID
Linux SAP with Oracle Flag      type=password:name=os-password:value=*****
Linux SAP with Oracle Flag      type=string:name=os-username:value=oracle
Linux SAP with Oracle Flag      type=string:name=sap-datahome:value=/mnt/oracle/CID
Linux SAP with Oracle Flag      type=password:name<browse>=sap-password:value=*****
Linux SAP with Oracle Flag      type=string:name<browse>=sap-username:value=sys
Is Link                         false
```

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**.

Enabling scheduled backups

About this task

Scheduled backups occur only for enabled groups. Groups are disabled by default unless you select the **Enabled** checkbox on the first page of the **New Group** wizard. If you did not enable the group when you created it, use the menu options in the **Policy** window to enable backups.

Procedure

1. In Avamar Administrator, click the **Policy** launcher link button.

   The **Policy** window appears.
2. Click the **Policy Management** tab.
3. Click the **Groups** tab.
4. Select the group that you created.
5. Enable the group by selecting **Actions** > **Group** > **Disable Group**.

   Perform this step only if a check mark appears next to the **Disable Group** menu option.
6. Click **Yes** to enable this group.

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:
  - Completed
  - 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**.

Reviewing backups

The SAP plug-in backs up files, such as data files, archive redo logs, Oracle control files, BR*Tools catalogs, and other files. The resultant backup file names contain the full path of the file.

Directory level symbolic links are backed up by using their symbolic name, not the destination name. For example, data files are created in the directory that is named `/tmp/sapdata5`, which is a symbolic link with `/tmp/sapdata5` linked to `/oracle_data/SCE/sapdata5`. The files are backed up under `tmp/sapdata5/*datafiles`.

At the end of each backup, the SAP plug-in groups all the files backed up by a particular `backint` process.

List the backups for a client

To list all of the backups for a client, type the `avtar --backups` command. You can use the same parameter file (flagfile) that would be used for a backup or restore from the CLI, as long as those parameters that are not applicable to `avtar` are commented out.

For example:

```
avtar --backups --flagfile=parameter_file

Date       Time     Seq Label            Size    Plugin  Working directory      Targets
---------- -------- --- ---------------  ------- ------- -----------------      --------
2013-03-18 15:30:35 188 behrsbji233ab72b 118K    SAP     /var/avamar/clientlogs
2013-03-18 15:30:04 186 behrsbji233a00dd 981771K SAP     /var/avamar/clientlogs
2013-03-18 15:27:04 184 behrsbar23377e2c 118K    SAP     /var/avamar/clientlogs
2013-03-18 15:26:33 182 behrsbar2336a709 981771K SAP     /var/avamar/clientlogs
```

where the columns are as follows:

- Date—Date of the backup.
- Time—Time of the backup.
- Seq—Sequence number of the backup, which is an integer that is assigned by the Avamar server that uniquely identifies the backup.

- Label—Optional string that describes the backup.
- Size—Amount of data that was backed up.
- Plugin—Type of Avamar plug-in that created the backup.
- Working directory—Directory where the backup binary performed the backups.
- Targets—Backup path, only set for Avamar file system backups.

List the content of the most recent backup

To list the content of the most recent backup, use the `avtar --list` command.

avtar --list --account=*domain/client* --id=*Avamar_server_username* --password=*Avamar_server_password* --server=*Avamar_server_hostname_or_IP_address*

The output of this command would be similar to the following example for a database named CID:

```
/
/home/
/home/db/
/home/db/oracle/
/home/db/oracle/product/
/home/db/oracle/product/11.2/
/home/db/oracle/product/11.2/db_1/
/home/db/oracle/product/11.2/db_1/dbs/
/home/db/oracle/product/11.2/db_1/dbs/initCID.ora
/home/db/oracle/product/11.2/db_1/dbs/initCID.sap
/mnt/
/mnt/oracle/
/mnt/oracle/CID/
/mnt/oracle/CID/sapreorg/
/mnt/oracle/CID/sapreorg/spaceCID.log
/mnt/oracle/CID/saparch/
/mnt/oracle/CID/saparch/aehpbbps.svd
/mnt/oracle/CID/saparch/archCID.log
```

List the content of a specific backup

To list the backups in a specific backup label, use the `avtar --list` command with the `--label` option. For example:

avtar --label=*specific_label* --list --account=*domain/client* --id=*Avamar_server_username* --password=*Avamar_server_password* --server=*Avamar_server_hostname_or_IP_address*

The `--list` output from the database files would be similar to the following example for a database named CID:

```
/
/mnt/
/mnt/oracle/
/mnt/oracle/CID/
/mnt/oracle/CID/sapdata2/
/mnt/oracle/CID/sapdata2/cer_1/
/mnt/oracle/CID/sapdata2/cer_1/cer.data1
/mnt/oracle/CID/sapdata3/
/mnt/oracle/CID/sapdata3/cerusr_1/
/mnt/oracle/CID/sapdata3/cerusr_1/cerusr.data1
```

```
/mnt/oracle/CID/sapdata1/
/mnt/oracle/CID/sapdata1/temp_1/
/mnt/oracle/CID/sapdata1/temp_1/temp.data1
/mnt/oracle/CID/sapdata1/undo_1/
/mnt/oracle/CID/sapdata1/undo_1/undo.data1
/mnt/oracle/CID/sapdata1/system_1/
/mnt/oracle/CID/sapdata1/system_1/sysaux.dbf
/mnt/oracle/CID/sapdata1/system_1/system.data1
/mnt/oracle/CID/sapdata1/cntrl/
/mnt/oracle/CID/sapdata1/cntrl/ctrlCID.ctl
/mnt/oracle/CID/dwdata/
/mnt/oracle/CID/dwdata/data1.dat
/mnt/oracle/CID/dwdata/data2.dat
/mnt/oracle/CID/dwdata/data3.dat
/mnt/oracle/CID/dwdata/data4.dat
/mnt/oracle/CID/origlogA/
/mnt/oracle/CID/origlogA/log1_m1.dbf
/mnt/oracle/CID/origlogA/log3_m1.dbf
/mnt/oracle/CID/origlogB/
/mnt/oracle/CID/origlogB/log2_m1.dbf
/mnt/oracle/CID/origlogB/log4_m1.dbf
```

List the history of a backup

To list the history of a backup for a particular file, use the `avtar --history` command. The `avtar` documentation provides more details about the `--history` option. For example:

avtar --flagfile=*parameter_file* --history /bigspace/oracle/redhat/64bit/product/11.2.0.1.0/db_1/dbs/initSAP.ora

```
avtar Info <5551>: Command Line: /usr/local/avamar/bin/avtar.bin
--vardir=/usr/local/avamar/var --bindir=/usr/local/avamar/bin
--sysdir=/usr/local/avamar/etc
--flagfile=/bigspace/oracle/redhat/64bit/product/11.2.0.1.0/db_1/
dbs/initSAP.utl --sysdir=/usr/local/avamar/etc
--vardir=/usr/local/avamar/var --bindir=/usr/local/avamar/bin
--ddr=true --ddr-index=1 --max-streams=2
--server=avamar-server.lss.emc.com
--account=/clients/avamar.lss.emc.com --id=User1
--password=**************** --history
/bigspace/oracle/redhat/64bit/product/11.2.0.1.0/db_1/dbs/
initSAP.ora
avtar Info <7977>: Starting at 2012-02-21 17:41:59 EST [avtar Feb 8
2012 21:34:29 6.1.100-280 Linux-x86_64]
avtar Info <8475>: ADE for multicore architectures enabled (Avamar
Deduplication Engine v2.0.0)
avtar Info <5552>: Connecting to Avamar Server
(avamar-server.lss.emc.com)
avtar Info <5554>: Connecting to one node in each datacenter
avtar Info <5583>: Login User: "User1", Domain: "default", Account:
"/clients/avamar.lss.emc.com"
avtar Info <5580>: Logging in on connection 0 (server 0)
avtar Info <5582>: Avamar Server login successful
avtar Info <5550>: Successfully logged into Avamar Server [6.1.0-276]
avtar Info <5922>: History of
/bigspace/oracle/redhat/64bit/product/11.2.0.1.0/db_1/dbs/
initSAP.ora for /clients/avamar.lss.emc.com as of 2012-02-21
17:42:00 EST
Seq Label            Date       Time     Size   Plugin Create
--- ---------------- ---------- -------- ------ ------ ---------
635 behydpyvd2c76e1e 2012-02-21 17:35:34   1695   1030 1329863921
629 aehyagmzcf3e6c79 2012-02-21 01:09:30   1695   1030 1329804590
```

```
615 behyaftgcf3d4d27 2012-02-21 01:02:20   1695   1030 1329804517
599 aehxvirdca18e1a8 2012-02-20 01:10:07   1695   1030 1329718245
585 behxvhytca167366 2012-02-20 01:03:13   1695   1030 1329718093
569 aehxqkqfc4f03eb3 2012-02-19 01:06:48   1695   1030 1329631695
555 behxqkcvc4edcbbd 2012-02-19 01:01:28   1695   1030 1329631544
539 aehxlncdbfcc4d22 2012-02-18 01:09:51   1695   1030 1329545455
525 behxlmimbfca3f15 2012-02-18 01:03:39   1695   1030 1329545322
509 aehxgpmkbaa73835 2012-02-17 01:11:59   1695   1030 1329459138
495 behxgonbbaa627b0 2012-02-17 01:02:58   1695   1030 1329459069
479 aehxbrlkb57f6b32 2012-02-16 01:09:35   1695   1030 1329372645
465 behxbqrmb57d46e9 2012-02-16 01:03:00   1695   1030 1329372510
```

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:

- Performing restores from the CLI 62
- Monitoring restores 63
- Canceling restores 64
- Disaster recovery 64

Performing restores from the CLI

You can configure and perform SAP Oracle data restores with the Avamar Plug-in for SAP with Oracle (SAP plug-in). You can use the SAP plug-in to redirect a restore to a different host, recover a database to a consistent state, and perform disaster recovery.

About this task

The SAP plug-in enables you to perform restore and recovery operations from the command line interface (CLI) by using the BR*Tools interfaces. For example, the `brtools`, `brrestore`, and `brrecover` commands, on the SAP Oracle host (destination host) to which the data is restored. The SAP documentation provides details about the BR*Tools interfaces.

The SAP plug-in can restore only data that was backed up with the SAP plug-in.

Note: The SAP plug-in does not support a restore with the AUI or the Avamar Administrator GUI.

You can use the following steps to recover an entire database or a subset of database objects, such as one or more tablespaces or data files.

Procedure

1. (Optional) To restore the data to a different SAP Oracle host (destination host) than the one that was backed up, follow the disaster recovery steps to re-create the environment and restore the configuration files and BR*Tools logs.
2. Log in to the SAP Oracle host (destination host) as the SAP Oracle user configured for BR*Tools operations. The SAP BR*Tools documentation provides details.
3. Ensure that the Oracle and SAP BR*Tools environment is configured properly for SAP plug-in restores.

   Ensure that the BR*Tools initialization file, `init`*`DBSID`*`.sap`, is configured for `util_file` as the backup device type, or use the proper `brrestore` or `brrecover` options to set this parameter, for example, `brrestore -d util_file`. The SAP BR*Tools documentation provides details.
4. Ensure that the Avamar client and SAP plug-in are installed and registered.
5. If you installed the SAP plug-in in an alternate directory, then ensure that the LD_LIBRARY_PATH or LIBPATH environment variable includes the library location. For example, if you use a csh shell on UNIX, type the appropriate command to set the variable on the particular system:
   - On AIX:
     `setenv LIBPATH` ***`alternate_path`***`/usr/local/avamar/lib64:$LIBPATH`
   - On HP-UX or Solaris x86_64:
     `setenv LD_LIBRARY_PATH` ***`alternate_path`***`/lib:$LD_LIBRARY_PATH`
   - On Solaris SPARC:
     `setenv LD_LIBRARY_PATH` ***`alternate_path`***`/lib64:$LD_LIBRARY_PATH`
6. Configure the SAP plug-in parameter file (flagfile). The file must contain at least the following mandatory parameters: `--account`, `--bindir`, `--id`, `--password`, `--server`, `--sysdir`, `--vardir`. SAP plug-in parameters on page 81 provides details about the parameters.
7. Ensure that the BR*Tools initialization file, `init`*`DBSID`*`.sap`, specifies the SAP plug-in parameter file, `util_par_file` = *parameter_file_location*, or use the proper `brrestore` or `brrecover` options to set this parameter, for example, `brrestore -r` *parameter_file_location*.

8. On a Windows system that has User Account Control (UAC), ensure that the SAP plug-in has administrator privileges as described in Enabling administrator privileges for the SAP plug-in on Windows on page 42.
9. (Optional) Before performing a restore operation, ensure that the backup to be restored exists by using a verification function. For example, to verify the latest backup, type the following command:

   ```
   brrestore -verify [only_conf]
   ```

   To verify a specific backup, type the following command:

   ```
   brrestore -verify [only_conf] -b BR*Tools_catalog_file
   ```

10. Perform the restore and recovery by using the BR*Tools interfaces. Use the `brtools` and `brrecover` commands in the interactive mode because these features guide you through the restore and recovery process and prepare the database objects for restore.

    A recovery (`brrecover`) operation automatically shuts down the database and restarts it after the recovery operation completes.

    If you run the `brrestore` command directly, then perform the following actions:

    - Shut down the Oracle database instance when restoring the whole database.
    - Take the database object offline when restoring a specific tablespace or data file.
    - Use the Oracle SQLPlus interface to apply redo logs to recover the database. The SAP BR*Tools documentation provides details.

    BR*Tools restore and recovery commands on page 76 provide details about the BR*Tools restore and recovery interfaces.

    Note: When the `brrestore` program is used for a restore operation, whether invoked directly from the command line or indirectly from the `brrecover` command or the brtools interface, it deletes all the original files to be restored before it invokes `backint` to restore the backed-up files. If `brrestore` or `backint` fails, then the original files are lost. To prevent these issues, perform one of the following actions:

    - Restore the files to a different location that does not include any files by using the `-m` option and specifying the restore destination, for example:
      brrestore -m *tablespace_name=restore_directory*

      or
    - Use the `brrestore -NFD` option to prevent deletion of the original files by `brrestore`.

Monitoring restores

The CLI displays operational messages on the output terminal when you run a restore.

The **Activity Monitor** displays status information for SAP plug-in restores. Each restore that you run from the CLI displays a separate row on the screen for each `backint` operation that is involved in the restore.

To access the **Activity Monitor**, open the navigation pane, and then click **Activity**. The **Activity Monitor** is displayed 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 is displayed:

- 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:
  - Completed
  - 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 .

Canceling restores

To cancel a running restore operation, use one of the following methods:

- Press **Ctrl-C** in the command shell or window where the restore operation is running.
- Type the following command in a different command shell or window on the same host:

  ```
  brrestore -g -stop
  ```

  > **Note:** The `-g` option is supported only in BR*Tools 7.10 and later. The SAP Note 1129197 provides details.

Disaster recovery

For a comprehensive disaster recovery, it is necessary to fully reconstruct the computing environment and all the Oracle and SAP BR*Tools configuration files that are associated with maintaining data.

> **Note:** Complete backup protection on page 18 describes the impacts of incomplete protection.

Protecting the computing environment

Maintain accurate and complete records of the network and system configurations, and keep all the original software media in a safe location. Include the following features:

- Operating system media and patches

- Avamar media
- File system configuration
- IP addresses and hostnames
- User credentials required to restore from the Avamar server

Use the Avamar client to back up Oracle configuration files, for example, `listener.ora`, `tnsnames.ora`, and the password file, which are not backed up by SAP plug-in.

Recovering from a disaster

To recover from a disaster, first restore lost Oracle and SAP configuration files and lost BR*Tools backup log files. The following procedures are concise versions of the disaster recovery steps that are described in the SAP documentation, which is modified for the specific requirements of the SAP plug-in environment.

Restoring the required Oracle and SAP BR*Tools files

About this task

You can restore the required Oracle and SAP BR*Tools files on the original host or a new host, either of which is called the destination host.

The SAP documentation provides more details about disaster recovery.

Procedure

1. Ensure that the original or new destination host is a client of the Avamar server that you want to restore from.
2. If the entire SAP Oracle system has been lost:
   a. Reinstall all the required software components that are described in Architecture on page 16.
   b. Reconfigure the SAP data layout, such as the `SAPDATA_HOME` directory and its subdirectories, to the same state as before the disaster.
3. Configure the BR*Tools profile file, `init`*`DBSID`*`-dr.sap`, and parameter file, `init`*`DBSID`*`-dr.utl`, for recovery on the destination host. The parameter file must contain all the parameters that are required for the restore operation. SAP plug-in parameter file on page 79 provides details.
4. On the destination host, start BR*Tools or BrGui and follow the onscreen instructions to perform a disaster recovery of profiles and logs. Example: Using BR*Tools for disaster recovery of profiles and logs on page 65 describes how to use BR*Tools for the disaster recovery.

Example: Using BR*Tools for disaster recovery of profiles and logs

About this task

You can recover profiles and logs by using the `brtools` command.

Procedure

1. In the `brtools` menu, select **Restore and Recovery** and then **Disaster recovery**.
2. On the page **BRRECOVER options for disaster recovery**, set the location of the BR*Tools profile file and the parameter file to be used by `brrecover`.

> **Note:** If you are restoring the original BR*Tools profile or parameter file, ensure that the files used for the disaster recovery have different names or are stored in a different location than the original files to be restored.

3. On the page **Device type for restoring profiles and log files from BRBACKUP | BRARCHIVE backup**, select **Backup utility**.
4. On the page **Parameters for restoring profiles and log files from BRBACKUP backup utility**, specify the files to be restored.
5. On the page **Restore of profiles and log files from BRBACKUP backup**, select the components that you want to restore.

Recovering a SAP Oracle database after disaster

After the correct SAP BR*Tools profiles and logs are restored on the SAP Oracle host, follow the regular BR*Tools recovery procedure to perform database point-in-time recovery or database reset.

Performing restores from the CLI on page 62 provides the procedure to recover a SAP Oracle database.

The SAP documentation provides more details about database recovery.

APPENDIX A

Plug-in Options

This appendix includes the following topics:

- How to set plug-in options 68
- Plug-in options in Avamar Administrator 68

How to set plug-in options

You can specify plug-in options to control specific actions of an SAP on-demand backup or scheduled backup with the Avamar Administrator or the AUI.

NOTICE The Avamar software does not check or validate the information that is typed in the **Show Free Form** section of the **More Options** pane. The values in the **Key** and **Value** fields override settings that are specified with the GUI controls for the options.

Additional plug-in options on page 71 describes the additional plug-in options that the SAP plug-in supports.

Plug-in options in Avamar Administrator

You can set plug-in options in Avamar Administrator for browse and backup operations with the SAP plug-in.

Browse options in Avamar Administrator

The following table describes the plug-in options that you can set in the **Browse Command Line Options** dialog box in Avamar Administrator, as required to prepare for SAP plug-in backups.

Table 4 SAP browse options in Avamar Administrator

Browse option	How to set the option value
Database username	Mandatory only if database authentication is selected. Type the Oracle database username. The user must have SYSDBA privileges.
Database user password	Mandatory only if database authentication is selected. Type the password of the Oracle database username.
Operating system username	Mandatory only if operating system authentication is selected. Type the operating system login name of the SAP user who performs the backup.
Operating system user password	Mandatory only if operating system authentication is selected on Windows. Type the operating system user password of the SAP user who performs the backup.
Oracle home (ORACLE_HOME)	Type the full pathname of the Oracle installation directory that contains the database to be backed up. **Note:** Do not include a final slash, /, at the end of the ORACLE_HOME pathname.
Oracle instance SID (ORACLE_SID)	Mandatory only if operating system authentication is selected. Type the system identifier (SID) of the Oracle database to be backed up.
Oracle locale (NLS_LANG)	Type (in Oracle format) the language locale to use for the database selection. The default value is AMERICAN_AMERICA.US7ASCII. The value for the Oracle globalization parameter has the following format: NLS_LANG=*language_territory.character_set*
Oracle Net Service name	Mandatory only if database authentication is selected. Type the Oracle Net service name of the database to be backed up.
Use Operating System Authentication	(Optional) Select to use Oracle operating system authentication for the database connection during the browse operation.

Table 4 SAP browse options in Avamar Administrator (continued)

Browse option	How to set the option value
Use Oracle Database Authentication	(Optional) Select to use Oracle database authentication for the database connection during the browse operation.

Backup options in Avamar Administrator

The following table describes the plug-in options that you can set in either the **Backup Command Line Options** dialog box or the **New Dataset** dialog box in Avamar Administrator for the SAP plug-in backups.

Note: You can view an option marked "(Advanced option)" in the following table only by selecting the **Show Advanced Options** checkbox in the **Backup Command Line Options** dialog box or the **Options** tab of the **New Dataset** dialog box.

Table 5 SAP backup options in Avamar Administrator

Backup option	How to set the option value
Additional brarchive options	(Optional) Specify any additional `brarchive` command line options to use with the backup of archive redo logs, for example, `-verify`. You cannot specify the following options: `-number`, `-save_delete`, `-profile`, `-user`. If you select `Delete logs after backup completes`, then you cannot specify the `-delete_saved` option.
Additional brbackup options	(Optional) Specify any additional `brbackup` command line options to use with the backup that cannot be set through other fields in this dialog box, for example, `-verify use_dbv`. You cannot specify the following options because these options are set based on your field selections: `-device`, `-mode`, `-profile`, `-type`, `-user`, `-archive`.
Back up only archive redo logs	(Optional) Select this option to back up only the archive redo logs for the instance without backing up any database object. The database selection on the **Backup** tab is ignored. This option corresponds to the SAP `brarchive` command.
BR*Tools initialization file (`initDBSID.sap`)	(Optional) Type the full pathname of the BR*Tools initialization profile if the profile is not in the SAP default location (`$ORACLE_HOME/dbs` or `%ORACLE_HOME%\database`) or if the profile does not have the default name format (`init`*`DBSID`*`.sap`).
BR*Tools location	Type the full pathname of the directory that contains the BR*Tools executable files.
Database file location (SAPDATA_HOME)	Type the full pathname of the directory that contains the SAP database files.
Database username	(Optional) If database authentication is used for the database connection, type the username of the Oracle database user (with SYSDBA privileges) configured to use BR*Tools.
Database user password	(Optional) Type the password for the database username.
Delete logs after backup completes	(Optional) Select this option to delete the logs after the logs are backed up. This option corresponds to the `brarchive -sd` command.
Enable debugging messages	(Optional) Select this option for debugging purposes. This option enables logging for the `avtar`, `avsap`, and `backint` processes. Use this option with caution because the messages can create very large log files.
Encryption method to Data Domain system	(Optional) If you store the backup on a Data Domain system, select the encryption method for data transfer between the client and the Data Domain system during the backup.

Table 5 SAP backup options in Avamar Administrator (continued)

Backup option	How to set the option value
Include archive logs	(Optional) Select this option to include archive redo logs after the database backup. This option corresponds to the SAP `brbackup` command, followed by a separate `brarchive` command. This setting is ignored if you select **Back up only archive redo logs**.
Maximum number of streams	Select the maximum number of simultaneous `avtar` streams to use per backup operation. The default value is 1, and the recommended maximum value is 10.
Number of logs to back up	(Optional) Type the number of logs to back up. This option corresponds to the `brarchive -n` command. If you set the value to 0, then the default BR*Tools value is used.
Offline	Select this option to specify that the database is shut down for the backup, provided the SAP system has also been shut down. Otherwise, the database is not shut down and the backup terminates with an error message. This option corresponds to the `brbackup -t offline -d util_file` command.
Offline force - Shut down the database, even if there are SAP users connected	Select this option to specify that the database is shut down for the backup even if there are SAP users connected to the database. This option corresponds to the `brbackup -t offline_force -d util_file` command.
Online	Select this option to specify that the database remains open during the backup. This option corresponds to the `brbackup -t online -d util_file_online` command. This setting is ignored during archive log backups.
Online consistent - Archive the logs generated during the backup, then back up these logs	Select this option to specify that the logs generated during the backup are archived and then backed up at the end of the backup. This option corresponds to the `brbackup -t online_cons -d util_file_online` command.
Operating system username	Type the operating system login name of the SAP user who performs the backup. **Note:** To back up on Windows with the domain user, use the user principal name (UPN) format, for example, *username@DNS_domain_name*. The Microsoft documentation provides more details about using the UPN format.
Operating system user password	Mandatory on Windows only. Type the operating system user password of the SAP user who performs the backup.
Oracle home (ORACLE_HOME)	Type the full pathname of the directory where the Oracle software is installed. **Note:** Do not include a final slash, /, at the end of the ORACLE_HOME pathname.
Oracle instance SID (ORACLE_SID)	Type the system identifier (SID) of the Oracle database instance to be backed up.
Oracle locale (NLS_LANG)	Type (in Oracle format) the language locale to use for the database selection. The default value is AMERICAN_AMERICA.US7ASCII.
SAPARCH	(Optional) Type the full directory pathname of the BRARCHIVE log files if the files are not located in the SAP default location, `$SAPDATA_HOME/saparch` or `%SAPDATA_HOME%\saparch`.
SAPBACKUP	(Optional) Type the full directory pathname of the BRBACKUP, BRRESTORE, and BRRECOVER log files if the files are not located in the SAP default location, `$SAPDATA_HOME/sapbackup` or `%SAPDATA_HOME%\sapbackup`.

Table 5 SAP backup options in Avamar Administrator (continued)

Backup option	How to set the option value
SAPCHECK	(Optional) Type the full directory pathname of the BRCONNECT log files if the files are not located in the SAP default location, `$SAPDATA_HOME/sapcheck` or `%SAPDATA_HOME%\sapcheck`.
SAPREORG	(Optional) Type the full directory pathname of the BRSPACE log files if the files are not located in the SAP default location, `$SAPDATA_HOME/spareorg` or `%SAPDATA_HOME%\spareorg`.
SAPTRACE	(Optional) Type the full directory pathname of the SAPTRACE log files if the files are not located in the SAP default location, `$SAPDATA_HOME/saptrace` or `%SAPDATA_HOME%\saptrace`.
Store backup on Data Domain system	Select this option if you want to store the backup data on an attached Data Domain system that you specify. The metadata for the backup is stored on the Avamar server. **Note:** If you specify a Data Domain system as the backup destination, then all the data is backed up to the Data Domain system. You cannot back up part of the data to a Data Domain system and another part to an Avamar server.

Additional plug-in options

Use the **More** button in the **Backup Command Line Options** dialog box in Avamar Administrator to set the additional plug-in options that you cannot specify with the GUI controls.

Additional options for SAP plug-in backups

You can set the following additional plug-in options for SAP plug-in backups:

- `brtools-secure-password`
- `brtools-secure-role`
- `SAPSWITCH`

The following sections describe the `brtools-secure-password` and `brtools-secure-role` options. Directory for the .switch files on page 89 describes the `SAPSWITCH` option.

NOTICE When you set one of these additional plug-in options by using the **More** button in the **Backup Command Line Options** dialog box, the Avamar software does not validate the option information that you type in the **Enter Attribute** and **Enter Attribute Value** fields.

The SAP plug-in also supports running the BR*Tools binaries `brbackup` and `brarchive` with the `-u //` or `-u //`*OS_group_name* option in the CLI. The SAP Note 1764043 provides details about how to configure and use the storage of the BR*Tools user or password in secure storage.

Enabling a secure storage password

SAP Kernel 7.20 Patch Level 100 introduced a new method for the secure storage of the SAP database user or password. With BR*Tools Kernel 7.20 Patch 27 or later, you can avoid using the OPS$ database users by storing the BR*Tools connection data for the database in a BR*Tools-specific Secure Storage in File System (SSFS). The SAP Note 1764043 provides details about how to configure the storage of the BR*Tools user or password in secure storage.

You can specify the plug-in option setting, `brtools-secure-password=true`, to enable the secure storage password for SAP plug-in backups. This setting causes the BR*Tools binaries `brbackup` and `brarchive` to run with the `-u //` option. The default value of the plug-in option `brtools-secure-password` is `false`.

Note: If you specify both plug-in options, `brtools-secure-password` and `brtools-secure-role`, then the `brtools-secure-password` option setting takes precedence.

To enable the secure storage password with the plug-in option, complete the following steps in the **Backup Command Line Options** dialog box:

1. Click **More.**
2. Type **`[avsap]brtools-secure-password`** in the **Enter Attribute** field.
3. Type **`true`** in the **Enter Attribute Value** field.
4. Click **+**.

Enabling role-based secure storage

With BR*Tools Kernel 7.20 Patch 30 or later, you can use role-based storage of the BR*Tools user and password in the secure storage, which assigns the DBA and OPER roles to OS users without the OS users having to belong to the Oracle OS groups dba and oper.

OS users who are configured for role-based storage must run the DBA action only with the BR*Tools. Typically, OS users can call all the BR*Tools programs with the DBA role. OS users with the OPER role can call only `brarchive`, `brbackup`, and `brconnect`. The SAP Note 1764043 provides details about how to configure the role-based storage of the BR*Tools user and password in secure storage.

You can specify the plug-in option setting, `brtools-secure-role=`*OS_group_name*, to enable role-based secure storage for SAP plug-in backups, where *OS_group_name* is the OS group that is configured for secure storage. This setting causes the BR*Tools binaries `brbackup` and `brarchive` to run with the `-u //`*OS_group_name* option.

Note: If you specify both options, `brtools-secure-password` and `brtools-secure-role`, then the `brtools-secure-password` option setting takes precedence.

To enable role-based secure storage with the plug-in option, complete the following steps in the **Backup Command Line Options** dialog box:

1. Click **More.**
2. Type **`[avsap]brtools-secure-role`** in the **Enter Attribute** field.
3. Type ***`OS_group_name`*** in the **Enter Attribute Value** field.
4. Click **+**.

APPENDIX B

Command Line Interface

This appendix includes the following topics:

- Performing on-demand backups from the CLI 74
- Examples of BR*Tools command syntax 75
- SAP plug-in parameter file 79

Performing on-demand backups from the CLI

The SAP plug-in enables you to perform backups from the command line interface (CLI) by using the SAP BR*Tools commands, `brbackup`, and `brarchive`, on the SAP plug-in host.

Procedure

1. Log in to the Avamar client as the operating system user configured for BR*Tools operations. The SAP BR*Tools documentation provides details.
2. Ensure that the SAP environment specifies the correct settings for ORACLE_HOME and ORACLE_SID. The SAP BR*Tools documentation provides details.

   Note: Ensure that the ORACLE_HOME setting does not include a final slash, `/`.

3. If you installed the SAP plug-in in an alternate directory, then ensure that the LD_LIBRARY_PATH or LIBPATH environment variable includes the library location. For example, if you use a csh shell on UNIX, type the appropriate command to set the variable on the particular system:
   - On AIX:
     setenv LIBPATH *alternate_path*/usr/local/avamar/lib64:$LIBPATH
   - On HP-UX or Solaris x86_64:
     setenv LD_LIBRARY_PATH *alternate_path*/lib:$LD_LIBRARY_PATH
   - On Solaris SPARC:
     setenv LD_LIBRARY_PATH *alternate_path*/lib64:$LD_LIBRARY_PATH
4. Change to the directory that contains the BR*Tools binaries, `brbackup`, and `brarchive`.
5. Create a SAP plug-in parameter file with all the required parameters for the backup. SAP plug-in parameter file on page 79 provides examples and details about configuring the file.
6. If a Data Domain system is used for the backup, enable the following fields in the parameter file:

   `--ddr=true`
   `--ddr-index=`*index_number*

   where *index_number* is the identification number of the Data Domain system to be used for the backup. Contact the Avamar administrator to determine the required index number.

7. On a Windows system that has User Account Control (UAC), ensure that the SAP plug-in has administrator privileges as described in Enabling administrator privileges for the SAP plug-in on Windows on page 42.
8. If you run concurrent online backups of two or more databases on the same client, set the SAPSWITCH environment variable to a separate non-default directory for each backup. For example, if you use a csh shell on UNIX or Linux, you can type the following command to set the variable:

   setenv SAPSWITCH *.switch_file_directory_pathname*

   The separate settings ensure that the `.switch` file directory is different for each concurrent backup. Directory for the .switch files on page 89 provides details.

9. Type the `brbackup` command with appropriate parameters as shown in the following examples:

Note: The `brbackup` or `barchive` command line option takes precedence over a corresponding parameter set in the BR*Tools `init`*`DBSID`*`.sap` file.

- To back up the whole database, run the appropriate command:
  - To perform an offline backup, type the following command:

    `brbackup -r parameter_file -d util_file -t offline`

    or

    `brbackup -m all -r parameter_file`
  - To perform an online backup, type the following command:

    `brbackup -r parameter_file -d util_file_online -t online`

    or

    `brbackup -m all -r parameter_file -d util_file_online -t online`
- To back up one or more tablespaces, run the appropriate command:
  - To perform an offline backup, type the following command:

    `brbackup -m tablespace -r parameter_file`
  - To perform an online backup, type the following command:

    `brbackup -m tablespace -r parameter_file -t online`
- To perform a log backup, run the `brarchive` or `brbackup -a` command.

  You can back up archive logs either in an independent backup with the `brarchive` command or as part of a database or tablespace backup with the `brbackup -a` command. An archive log backup backs up the archive logs, SAP profile, and backup catalogs.

  For example, to back up a tablespace, type one of the following commands:

  `brarchive`

  or

  `brbackup -r parameter_file -a`

BR*Tools backup commands on page 75 provides more details.

Examples of BR*Tools command syntax

This section provides concise versions of the BR*Tools options described in the SAP BR*Tools documentation, modified for the specific requirements of the SAP plug-in environment.

You can run the BR*Tools commands, such as `brbackup`, `brarchive`, `brrestore`, and `brrecover`, from the CLI to initiate backups and restores with the SAP plug-in.

BR*Tools backup commands

You can run the `brbackup` and `brarchive` commands from the CLI to initiate backups with the SAP plug-in. Examples of the syntax and options for these commands are provided in the following sections.

Synopsis of backup commands

```
brbackup [-c force] -d {util_file | util_file_online}
[-m {all | all_data | full | tablespace_list | file_ID | file_ID1_range |
```

file_list}] [-p ***profile***] [-r ***parameter_file***] [-t {online | online_cons | offline | offline_force}] [-u ***username/password***] [-w [use_dbv | only_conf]]

brarchive [-c force] -d util_file [-f [***number*** | stop | suspend | resume]] [-p ***profile***] [-r ***parameter_file***] [-u ***username/password***]

Backup command options

Options that are enclosed in brackets ([ ]) are optional. Options that are enclosed in braces ({ }) must use at least one of the enclosed options. Variables are in italics. Keywords are in bold text.

The following table lists example options for these commands. The SAP documentation provides complete details about these commands.

Note: The command line options override the corresponding parameters set in the SAP parameter file `init*DBSID*.sap`.

Table 6 Options for brbackup and brarchive commands

Option	Description
-c force	Suppresses most of the confirmation messages that interrupt the backup or archive operation.
-d {util_file | util_file_online}	Specifies that the SAP plug-in with `backint` is used for the backup or archive operation.
-f [*number*]	Instructs `brarchive` to wait for the next offline redo log file that is written by Oracle and then send it to `backint` for backup. If number is specified, `brarchive` waits until the specified number of files have accumulated in the archiving directory. **Note:** A backup with Avamar Administrator or any other backup from the CLI should not perform an archive log backup when this option is used.
-m *database_objects_to_back_up*	Specifies what database objects to back up, for example, a whole database, selected tablespaces or data files. This option is used by `brbackup`.
-p *profile*	Specifies an initialization BR*Tools parameter file if the file does not have the default name or is not stored in the default location.
-r *parameter_file*	Specifies the SAP plug-in parameter file (flagfile) used during the backup or archive operation. SAP plug-in parameter file on page 79 provides details.
-t *backup_type*	Specifies the type of backup that `brbackup` and `backint` perform. During an online backup, to reduce the number of redo logs that Oracle generates, use this option with the `-d util_file_online` option.
-u *username/password*	Specifies the username and password of the Oracle database administrator.
-w [use_dbv | only_conf]	Verifies that the backup after the files have been backed up. Helps to detect possible hardware problems. The `use_dbv` option performs the backup followed by a restore of the backup to a temporary location. This option approximately doubles the backup time.

BR*Tools restore and recovery commands

It is recommended that you use the `brtools` and `brrecover` commands in the interactive menu-driven mode to guide you through the process of restore and recovery.

The following example screen shows how to start a restore by using the `brrecover` command.

```
BR0280I BRRECOVER time stamp: 2014-11-06 11.35.06
BR0707I Recovery of database: CER
BR0708I BRRECOVER action ID: vepdccuk
BR0709I BRRECOVER function ID: rif
BR0710I Recovery type: restore

BR0280I BRRECOVER time stamp: 2014-11-06 11.35.06
BR0656I Choice menu 120 - please make a selection
------------------------------------------------------------
Restore of individual backup files main menu
1 = Restore files from BRBACKUP backup
2 - Restore individual files from tape
3 - Restore individual files from disk
4 - Restore individual files from backup utility
5 - Restore and apply incremental backup
6 * Exit program
7 - Reset program status

Standard keys: c - cont, b - back, s - stop, r - refr, h - help
------------------------------------------------------------
BR0662I Enter your choice:
BR0280I BRRECOVER time stamp: 2014-11-06 11.36.00
BR0663I Your choice: '1'

BR0699I Reading log file /mnt/oracle/CER/sapbackup/backCER.log ...
BR0280I BRRECOVER time stamp: 2014-11-06 11.36.00
BR0658I List menu 121 - please select one entry
------------------------------------------------------------
BRBACKUP database backups for restore

Pos. Log Start Type Files Device RC
1 = bepdbusr.aff 2014-11-06 10.04.13 offline 5/6 util_file 0
2 - bepcswen.aff 2014-11-04 14.24.13 offline 0/6 util_file 6
3 - bepaldei.aff 2014-10-23 11.47.00 offline 5/6 util_file 0
4 - bepalcyt.aff 2014-10-23 11.44.35 offline 5/6 util_file 0
5 - bepakyjs.aff 2014-10-23 10.53.00 offline 5/6 util_file 0
6 - bepakydp.aff 2014-10-23 10.50.21 offline 5/6 util_file 0
7 - bepakxyi.aff 2014-10-23 10.48.04 offline 5/6 util_file 0
8 - bepakvie.aff 2014-10-23 10.18.32 offline 5/6 util_file 0
9 - bepakuxs.aff 2014-10-23 10.14.00 offline 5/6 util_file 0
10 - bepakuay.aff 2014-10-23 10.04.08 offline 5/6 util_file 0
11 - bepaktss.aff 2014-10-23 10.00.34 offline 5/6 util_file 0
12 - bepagudv.aff 2014-10-22 14.33.39 offline 5/6 util_file 0
13 - bepagtwl.aff 2014-10-22 14.30.27 offline 5/6 util_file 0
14 - bepacaeo.aff 2014-10-21 15.16.54 offline 5/6 util_file 0
15 - bepabzbc.aff 2014-10-21 15.04.08 offline 5/6 util_file 0
16 - bepabqri.aff 2014-10-21 13.29.46 offline 5/6 util_file 0
17 - bepabhnw.aff 2014-10-21 11.46.52 offline 5/6 util_file 0
18 - bepabckh.aff 2014-10-21 10.48.59 offline 5/6 util_file 5
19 - bepaayfi.aff 2014-10-21 10.01.46 offline 5/6 util_file 0
```

You can also run the `brrestore` and `brrecover` (in non-menu mode) commands from the CLI to initiate restore and recovery operations with the SAP plug-in. Examples of the syntax and options for these commands are as follows.

Synopsis of restore and recovery commands

brrestore [-a [*seq1-seq2=new_directory*]] [-b *backup_catalog_file*] [-c force] -d {util_file [-f last | *brrestore_log1, brrestore_log2,...* | *yyyy-mm-dd hh.mm.ss* | *number_of_days*}] [-m {all | all_data | full | *tablespace_list* | *file_ID* | *file_ID1_range* | *file_list*}] [-p *profile*] [-q check] [-r *parameter_file*] [-u *username/password*]

brrecover [-c force] -d util_file [-p *profile*] [-pit *yyyy-mm-dd hh.mi.ss*] [-r *parameter_file*] [-scn *scn*] [-t {complete | dbpit | tspit | reset | restore | apply | disaster}] [-tsp {*tablespace_name* | *tablespace_name_list*}] [-u *username/password*]

For example:

brrecover -d util_file -p initGC2.sap -t complete

Restore and recovery command options

Options that are enclosed in brackets ([ ]) are optional. Options that are enclosed in braces ({ }) must use at least one of the enclosed options. Variables are in italics. Keywords are in bold text.

To restore a complete backup (reset of the database), use the `-m full` option. This option restores all files, not just the tablespaces, but also the control files, online redo log files (consistent online backup), and offline redo log files (complete offline backup).

By default, the `brrestore` operation uses the backup catalog file (also called the `brbackup` log in SAP BR*Tools documentation) created by the last successful backup. However, you can specify a previous catalog file by using the `-b backup_catalog_file` option, where the backup catalog file was created from a full backup of a whole database.

The following table lists example options for these commands. The SAP documentation provides complete details about these commands.

Table 7 Options for brrestore and brrecover commands

Option	Description
-a [*seq1-seq2=new_directory*]	Specifies to restore the offline redo log files from the first backup copy. The `brrestore` process uses the `brarchive` summary log to decide where to restore the requested files. For example, this command restores the log sequence numbers from 44 to 99 into the specified new location: **brrestore -a 44-99=/*new_location* -c force -r *parameter_file***
-b *backup_catalog_file*	Specifies the backup catalog file to use for a restore, where the catalog file was created from a full backup of a whole database.
-c force	Suppresses most of the confirmation messages that interrupt the restore or recovery operation.
-d util_file	Specifies that the SAP plug-in with `backint` is used for the restore or recovery operation.
-f *restore_to_complete*	Specifies which restores to restart to restore missing files.
-m *database_objects_to_restore*	Specifies the database objects to restore, for example, the whole database, selected tablespaces, or data files.

Table 7 Options for brrestore and brrecover commands (continued)

Option	Description
`-p` *`profile`*	Specifies an initialization BR*Tools parameter file if the file does not have the default name or is not stored in the default location.
`-pit` *`yyyy-mm-dd hh.mi.ss`*	Specifies the recovery of the database or tablespaces to a specific point-in-time.
`-r` *`parameter_file`*	Specifies the SAP plug-in parameter file (flagfile) used during the restore or recovery operation. SAP plug-in parameter file on page 79 provides details.
`-scn` *`scn`*	Specifies the recovery of the database to the specified Oracle system change number.
`-t {complete | dbpit | tspit | reset | restore | apply | disaster}`	Specifies the type of recovery: • `complete`—Complete database recovery • `dbpit`—Database point-in-time recovery • `tspit`—Tablespace point-in-time recovery • `reset`—Whole database reset • `restore`—Restore of individual backup files • `apply`—Apply offline redo log files (archive logs) • `disaster`—Disaster recovery
`-tsp {`*`tablespace_name`* `|` *`tablespace_name_list`*`}`	Specifies the recovery of a single specified tablespace or the tablespaces that are listed in the specified file.
`-u` *`username/password`*	Specifies the username and password of the Oracle database administrator.

SAP plug-in parameter file

A SAP plug-in parameter file, also called a flagfile, is a text file that can be created to list sets of parameters and values that are frequently used for specific SAP plug-in backup and restore operations.

A parameter file (flagfile) is required for the following operations:

- Backups that include a BR*Tools verify operation.
- Restore operations.

The parameter file (flagfile) is specified with the `-r` option of the BR*Tools commands, `brbackup`, `brarchive`, `brrestore`, and `brrecover`.

A SAP plug-in parameter file should contain one parameter per line, with each parameter in the following format:

--parameter_name=value

or

--parameter_name

The following example shows sample parameters from a SAP plug-in parameter file for different platforms:

```
#-----Mandatory Flags
#----------- For AIX--------------------
```

```
--bindir=/space/avs_inst/usr/local/avamar/bin
--sysdir=/space/avs_inst/usr/local/avamar/etc
--vardir=/space/avs_inst/usr/local/avamar/var
--id=Avamar_server_username
--password=encoded_user_password
--account=/clients/AIX_SAP_1
--server=avamar.server.com

#----------- For Linux --------------------
--bindir=/usr/local/avamar/bin
--sysdir=/usr/local/avamar/etc
--vardir=/usr/local/avamar/var
--id=Avamar_server_username
--password=encoded_user_password
--account=/clients/Linux_SAP_1
--server=avamar.server.com

#---------- For Solaris -------------------
--bindir=/opt/AVMRclnt/bin
--vardir=/opt/AVMRclnt/var
--sysdir=/opt/AVMRclnt/etc
--id=Avamar_server_username
--password=encoded_user_password
--account=/clients/Solaris_SAP_1
--server=avamar.server.com

#---------- For Windows -------------------
--bindir="C:\Program Files\avs\bin"
--sysdir="C:\Program Files\avs\etc"
--vardir="C:\Program Files\avs\var"
--id=Avamar_server_username
--password=encoded_user_password
--account=/clients/Windows_SAP_1
--server=avamar.server.com

#----- Optional Flags
#----- All Operating Systems --------------
--max-streams=5
--encrypt-strength=high
--ddr=true
--ddr-index=1
--expires=120
--retention-type=daily,weekly,monthly,yearly

#----- For VCS cluster the directory path is ---------
--bindir=/opt/AVMRclusclnt/cluster/<cluster_group>/bin
--sysdir=/opt/AVMRclusclnt/cluster/<cluster_group>/etc
--vardir=/opt/AVMRclusclnt/cluster/<cluster_group>/var

#------For Sun cluster the directory path is ------
--bindir=/opt/AVMRclnt/avcluster<cluster_group>/bin
--sysdir=/opt/AVMRclnt/avcluster<cluster_group>/etc
--vardir=/opt/AVMRclnt/avcluster<cluster_group>/var
```

Specifying a SAP plug-in parameter file

There are two methods to specify a SAP plug-in parameter file (flagfile):

- Directly from the CLI with the BR*Tools command by using either the `-r` option or `-profile` option. For example:

  `brbackup -r parameter_file`

  or

  `brrestore -r parameter_file`

  where *parameter_file* is the full pathname of the SAP plug-in parameter file (flagfile).

- Indirectly in the `util_par_file` parameter in the BR*Tools initialization profile `init*DBSID*.sap`. All BR*Tools commands automatically refer to the `util_par_file` parameter if it is set. For example:

  `util_par_file=parameter_file`

  where *parameter_file* is the full pathname of the SAP plug-in parameter file (flagfile).

  Note: If both methods are used, then the CLI method takes precedence.

SAP plug-in parameters

The following table lists all the parameters that you can specify within an SAP plug-in parameter file (flagfile).

Table 8 SAP plug-in parameters

Parameter	Description	Examples
`--account`	Mandatory for all operations from the CLI and for backups through AUI with the BR*Tools verify operation. Specifies the Avamar domain of the client. This Avamar domain is usually */domain_name/client_hostname*.	**`--account=/clients/user_pc`**
`--bindir`	Mandatory for all operations from the CLI. Specifies the location of the Avamar binary or executable files.	• On AIX, HP-UX, Linux: **`--bindir=/usr/local/avamar/bin`** • On Solaris: **`--bindir=/opt/AVMRClnt/bin`** • On Windows: **`--bindir="C:\Program Files\avs\bin"`**
`--ddr`	Optional. Specifies that an Avamar backup is saved to a Data Domain system.	**`--ddr=true`**
`--ddr-index`	Mandatory when `--ddr` is set. Index number (1, 2, 3, or so on) of the Data Domain system on which the backup is saved. An index number is assigned to the Data Domain system when it is added to the Avamar server configuration.	**`--ddr-index=1`**

Table 8 SAP plug-in parameters (continued)

Parameter	Description	Examples
	Contact the Avamar Administrator to determine the required index number. If you do not set this option when `--ddr` is set, then the backup is not reported correctly.	
`--debug`	Optional. Turns on the debugging messages. **Note:** Do not set this option for normal operations because the setting significantly increases the size of the log files.	**`--debug`** or **`--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 the `tls` type of encryption. 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 the `high` encryption strength.	**`--encrypt-strength=high`**
`--expires`	Optional. Specifies the backup expiration time in number of days for a backup from the CLI. A backup with the AUI ignores this parameter if it is set in the parameter file. The default value is defined by the End User On Demand Retention policy, which has a default value of 60 days. The *Avamar Administration Guide* provides more details about expiration.	**`--expires=120`**
`--id`	Mandatory for all operations from the CLI and for backups through the AUI with the BR*Tools verify operation. Specifies an Avamar server username that has Avamar Administrator privileges.	**`--id=MCS_user`**
`--max-streams`	Optional. Specifies the maximum number of streams or `avtar` processes to be used during a backup or restore operation.	**`--max-streams=2`**

Table 8 SAP plug-in parameters (continued)

Parameter	Description	Examples
	The default value is 1. The maximum value is 128. The recommended maximum number of concurrent sessions on a host is 10.	
`--password`	Mandatory for all operations from the CLI and for backups through the AUI with the BR*Tools verify operation. Specifies the password of the MCS user who is used for restores. **Note:** You can run this `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. This `avtar` command returns an encoded password that you can use with the `--password` parameter in the parameter file (flagfile).	**`--password= a6338f5876bc47974641a51ddcbbbae21ae bc7345254de0120f58063211ffc4b947c4e b344b48e7c`** 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 from the CLI. This parameter defines the retention type only and does not override the expiration. If it is set in the parameter file, a backup with the AUI, ignores this parameter. The default value is none. The *Avamar Administration Guide* provides more details about retention.	**`--retention-type=daily, weekly, monthly`**
`--semaphore-timeout`	Optional. Specifies the number of minutes that `backint` waits for `brbackup` to delete a semaphore file during an online backup. If `brbackup` does not delete the file by the end of the timeout period, `backint` exits with an error. The default timeout is 30 minutes. If `brbackup` operates more slowly than expected, you can increase the timeout.	**`--semaphore-timeout=40`**
`--server`	Mandatory for restores, BR*Tools verify operations, and backups through the AUI with the BR*Tools verify operation. Specifies the DNS hostname or IP address of the Avamar server.	**`--server=server_name.example.com`**
`--sysdir`	Mandatory for all operations from the CLI. Specifies the location of the Avamar `etc` directory. The Avamar client documentation for the `avtar --sysdir` option provides details.	• On AIX, HP-UX, Linux: **`--sysdir=/usr/local/avamar/etc`** • On Solaris:

Table 8 SAP plug-in parameters (continued)

Parameter	Description	Examples
		`--sysdir=/opt/AVMRClnt/etc` • On Windows: **`--sysdir="C:\Program Files\avs\etc"`**
`--vardir`	Mandatory for all operations from the CLI. Specifies the location of the Avamar `var` directory. The Avamar client documentation for the `avtar --vardir` option provides details.	• On AIX, HP-UX, Linux: **`--vardir=/usr/local/avamar/var`** • On Solaris: **`--vardir=/opt/AVMRClnt/var`** • On Windows: **`--vardir="C:\Program Files\avs\var"`**

APPENDIX C

Troubleshooting

This appendix includes the following topics:

- Log information 86
- Configuration problems and solutions 87
- Common problems and solutions 90

Log information

During backup and restore operations, the Avamar Plug-in for SAP with Oracle (SAP plug-in) creates Avamar plug-in logs (`avsap` and `avtar` logs) as well as `backint` logs, created by the `backint` binary. Each of these logs is used for debugging purposes only.

avsap and avtar log files

SAP plug-in operations create log files as follows:

- Each SAP plug-in backup that is initiated through the AUI GUI runs an `avsap` process and creates an `avsap` log file. By default, these log files are created in the *`vardir`*`/clientlogs` or *`vardir`*`\clientlogs` directory, in the following format:
  - For on-demand backups: `MOD-`*`wid-pidnum-pid`*`.log`
  - For scheduled backups: *`schedule_name-group_name-wid-pidnum-pid`*`.log`

  Where:
  - *wid* is a unique number.
  - *pidnum* is the SAP plug-in ID number. Each Avamar plug-in has a unique ID number.
  - *pid* is the plug-in name, SAP.

  For example, `MOD-1326918336023-1030-SAP.log` is an `avsap` log from a backup through the AUI.
- Each SAP plug-in backup or restore operation runs the `avtar` process and creates `avtar` log files. By default, these log files are created in the *`vardir`*`/clientlogs` or *`vardir`* `\clientlogs` directory, in the following format:
  - For backup operations through the AUI:

    `MOD-`*`wid-pidnum-operation`*`_avtar.log`

    where *operation* can have any of the following values: SAPSNAPUP, SNAPVIEW, SAPRESTORE.

    For example, `MOD-1326918336023#1-1030-SAPSNAPUP_avtar.log` is an `avtar` log from a backup through the AUI.
  - For backup operations from the CLI:

    `COD-`*`wid-pidnum-operation`*`_avtar.log`

    For example, `COD-1328191530449#1-1030-SAPSNAPUP_avtar.log` is an `avtar` log for a backup from the CLI.
  - For restore operations:

    `CLI-`*`backup_label-log-backint_pid`*`-backint.log`

    For example, `CLI-beidjwrc6182cfd8-log-29392-backint.log` is an `avtar` log for a restore.

Command Line Interface on page 73 provides details about log options.

backint log files

Each SAP plug-in backup or restore operation runs the `backint` process, which in turn creates a `backint` log file. By default, these log files are created in the *`vardir`*`/clientlogs` directory in the following formats:

- For backup operations through the AUI:

  `avsap_log_name-log-backint_pid-backint.log`

  where:

  - *avsap_log_name* is the name of the `avsap` log file that is associated with the `backint` binary.
  - *backint_pid* is the process ID of the `backint` instance.

  For example, `MOD-1326918336023-1030-SAP-log-31219-backint.log` is a `backint` log from a backup through the AUI.

- For operations from the CLI:

  `CLI-backup_label-log-backint_pid-backint.log`

  where CLI-*backup_label* is the backup label of the backup, which is formed from the SAP detaillog file name (without the file extension) and a timestamp.

  For example, `CLI-behummlm6f19ad09-log-425-backint.log` is a `backint` log for an operation from the CLI.

Command Line Interface on page 73 provides details about log options.

Configuration problems and solutions

The following sections describe common configuration problems and their solutions.

Verify the versions of SAP BR*Tools

About this task

You can determine the version of SAP BR*Tools by using the `brbackup -V[ALL]` command.

Procedure

1. Log in to the SAP Oracle database host as the SAP user.
2. Type the following:

   `brbackup -V[ALL]`

   Information similar to the following appears in the command shell:

```
BR0051I BRBACKUP 7.20 (20)
Patch Date Info
1 2010-01-26 BR*Tools support for Oracle 11g (note 1430669)
4 2010-07-28 BR*Tools fail with segmentation fault (core dump)
(note 1493500)
6 2010-07-28 Parallel incremental backup on disk (note 1493614)
7 2010-08-25 No incremental backup with patch 6 possible (note
1502257)
9 2010-10-27 BR*Tools support for eSourcing databases (note
1523205)
14 2011-05-04 Syntax error in the 'keep' option in RMAN call (note
1585727)
17 2011-08-26 BRBACKUP 7.20 EXT fails on Windows with BR0274E (note
1625038)
18 2011-09-07 BR*Tools support for Oracle ASM and Exadata (note
1627541)
20 2011-10-28 BR*Tools support for bigfile tablespaces (note
1647271)
```

```
release note 1428529
kernel release 720
patch date 2011-10-28
patch level 20
make platform NTAMD64
make mode OCI_10201_SHARE
make date Nov 7 2011
```

Verify the Avamar client and SAP plug-in installation

For all supported platforms, the Avamar client software must be installed before installing the SAP plug-in software. The versions of the Avamar client and SAP plug-in software must be the same.

The following table describes how to verify the installation of the Avamar client and the SAP plug-in.

Table 9 Command to verify the Avamar client and SAP plug-in installation

Platform	How to verify the installation
Microsoft Windows	Use Windows Explorer to verify that the `C:\Program files\avs\bin` folder exists and contains the `avsap.exe` and `backint.exe` binaries.

Supported HP-UX	Use the `swlist` command:
	`swlist -l product hpuxclnt hpuxsap`
	The following type of output appears in the command shell:
	`hpuxclnt` *`version`* `Avamar client`
	`hpuxsap` *`version`* `Avamar SAP with Oracle plugin`

Supported IBM AIX	Use the `lslpp` command: **`lslpp -la | grep Avamar`** The following type of output appears in the command shell: `AvamarSAP-`*`version`* `AvamarClient-`*`version`*
Supported Linux	Use the `rpm` command: **`rpm -qa | grep -i Avamar`** The following type of output appears in the command shell: `AvamarSAP-`*`version`* `AvamarClient-`*`version`*

Supported Solaris	Use the `pkginfo` command:
	`pkginfo | grep -i AVMR`
	The following type of output appears in the command shell:
	`application AVMRclnt Avamar Client`
	`application AVMRsap Avamar Client SAP Plugin for Oracle`

Avamar client and SAP plug-in registration

Backup and restore operations with the SAP plug-in software require the Avamar client to be registered with the Avamar server. The registration can fail if:

- The Avamar `plug-in_catalog.xml` does not support the SAP plug-in version.
- An administrator has disabled the SAP plug-in.

If the Avamar client is successfully registered, the AUI lists the platform-specific SAP plug-in installation. In addition, the `avagent.log` file, which is located by default in the *vardir* directory, contains information that verifies a successful registration.

For example:

```
****** Current MCS name 'avamar-1.example.com' ******
2011-4-1 15:08:37 avagent Info <7452>: Registration of client
/clients/aiqplum.bgl.avamar.emc with MCS avamar-1.example.com:28001
successful.
2011-4-1 15:08:37 avagent Info <5928>: Registration of plugin 1002 SAP
successful.
2011-4-1 15:08:37 avagent Info <5928>: Registration of plugin 1001 Unix
successful.
2011-4-1 15:08:37 avagent Info <5619>: Registration of client and
plugins complete.
2011-4-1 15:08:37 avagent Info <7150>: first work request delayed for
180 seconds.
2011-4-1 15:11:37 avagent Info <7151>: first work request delay
finished.
```

Disk space for the /var/avamar directory

The `/var/avamar` directory must have sufficient disk space for log and other files. Otherwise, a backup or restore fails. Verify the amount of free disk space in the `/var/avamar` directory by using the applicable method for the system. A minimum of 100 MB of disk space is recommended for `avsap` log files and other files.

The following example shows output from the `df -h` command on a Linux system:

```
Filesystem Size Used Avail Use% Mounted on
/dev/mapper/VolGroup00-LogVol00 985G 310G 625G 34% /
```

Directory for the .switch files

During an online backup with the `backup_dev_type=util_file_online` setting, BR*Tools and `backint` programs coordinate the placing of tablespaces into a backup mode through a set of messages that are written to files called the `.switch` files.

BR*Tools expects the `backint` program to create the `.switch` files (`.switch.lis`, `.switch.sem`, and `.switch.log`) in a predefined location. By default, the program creates the `.switch` files in the following directory:

- On UNIX: `$ORACLE_HOME/sapbackup`
- On Windows: `%SAPBACKUP%`. If set otherwise, `%SAPDATA_HOME%\sapbackup`

With BR*Tools 7.10 or later and the SAP plug-in release 6.1 SP1 or later, you can set the BR*Tools SAPSWITCH environment variable to specify a nondefault location for the `.switch` files:

- For backups from the CLI, set the environment variable before you run the `brbackup` command:

  - On UNIX, set $SAPSWITCH in the system shell.
  - On Windows, set %SAPSWITCH% in the command window.
- For backups with the AUI, in the **More Options** window, set the SAPSWITCH value as an additional plug-in option by toggling **Show Free Form** switch to ON and on and completing the appropriate fields.

The setting of the SAPSWITCH environment variable can be useful when the default location has insufficient disk space or when concurrent backups cannot share the same `.switch` files location.

For concurrent online backups of two or more databases on the same client, set the SAPSWITCH environment variable. Set SAPSWITCH to a separate nondefault directory for each concurrent backup so that the .switch file directory is different for each backup.

Common problems and solutions

The following sections describe the most common problems and solutions for the SAP plug-in software.

Backup fails due to trailing slash in ORACLE_HOME setting

A SAP plug-in backup fails if the ORACLE_HOME setting in the environment or in the AUI includes a final slash character /.

If the ORACLE_HOME setting includes a trailing slash, the `avsap` process displays a warning message before the start of a backup.

The Oracle documentation specifies that the ORACLE_HOME setting must not include a trailing slash.

Restore fails in a Windows cluster environment

A restore in a Windows cluster environment fails if the restore directory does not exist.

To restore a file in a Windows cluster, the restore directory must exist before you run the `brrestore` command.

Unable to browse Oracle databases with the AUI

The **Browse for Instances**, **Tablespaces**, or **Datafiles** option in the AUI does not display SAP database information.

Any of the following circumstances can prevent you from browsing the SAP Oracle databases:

- The listener on the Oracle database server is not running or correctly configured (typically, the `tnsnames.ora` file).
- The Oracle database is not running on the server due to a server reboot or a failed startup of the database software.
- Information is not entered correctly in the AUI, including mistakes such as an incorrect username or password or incorrect spelling.
- The database user who is specified for the browse operation does not have sufficient privileges.

GLOSSARY

A

active/active cluster Type of cluster configuration where a group of linked virtual or physical hosts with shared storage, called cluster nodes, can access the database data from multiple nodes concurrently.

active/passive cluster Type of cluster configuration where the data server runs on the active physical node, and other nodes are passive nodes that maintain data updates and wait to take over if the active node fails.

archive (redo) logs Oracle transaction log files that record a history of all transactions made to a database. Archive redo logs are backed up and used to recover a database to a specific point-in-time.

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.

B

backup (noun)

1. Duplicate of database or application data or an entire computer system stored separately from the original, which can be used to recover the original if it is lost or damaged.
2. Operation that saves data to backup storage for use during a recovery.

back up (verb) Make backup copies of data to the Avamar server for later restore in the case of data loss.

backup browsing Type of browsing that generates a list of objects to be backed up.

C

cluster nodes Group of linked virtual or physical hosts with shared storage in a cluster, which work together and represent themselves as a single host called a virtual cluster host.

cold backup See "offline backup."

D

database

1. A collection of data arranged for ease and speed of update, search, and retrieval by computer software.
2. An instance of a database management system (DBMS), which in a simple case might be a single file containing many records, each of which contains the same set of fields.

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*.

F

flagfile or parameter file

Configuration file that specifies the parameters and values used by the `backint` program for backup and restore operations.

G

GUI backup or restore

On-demand backup or restore that a user initiates through the Avamar Administrator graphical user interface (GUI).

H

high-availability system

System of multiple computers configured as cluster nodes on a network that ensures the application services continue despite a hardware or software failure.

host

Computer on a network.

hot backup

See "online backup."

I

internationalization (I18N)

Capability of the software to display and output data in the same language fonts and numeric formats that are passed to it by localized operating systems or applications.

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*.

multi-streaming

Feature that enables a single backup or restore to use multiple sessions (data streams) to the Avamar server or Data Domain system.

O

offline backup Backup of database objects performed while the corresponding database instance is shut down and unavailable to users. Also known as a cold backup.

online backup Backup of database objects performed while the corresponding database or instance is running and available to users. Also known as a hot backup.

P

point-in-time restore Restore of a backup to a specific point-in-time.

R

recover The process of applying transaction logs to the restored data to bring it to a given point-in-time.

redo log Oracle transaction log file, which records a history of all transactions made to a database. Archive redo logs are backed up and used to recover a database to a specific point-in-time.

relocated restore Restore of data from a backup to a different location on the same host or an alternate host.

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.

restore browsing Type of browsing that searches the previously created backups for specific backups to be restored.

S

scheduled backups Type of backup that is configured to start automatically through an Avamar policy for a group of one or more Avamar clients.