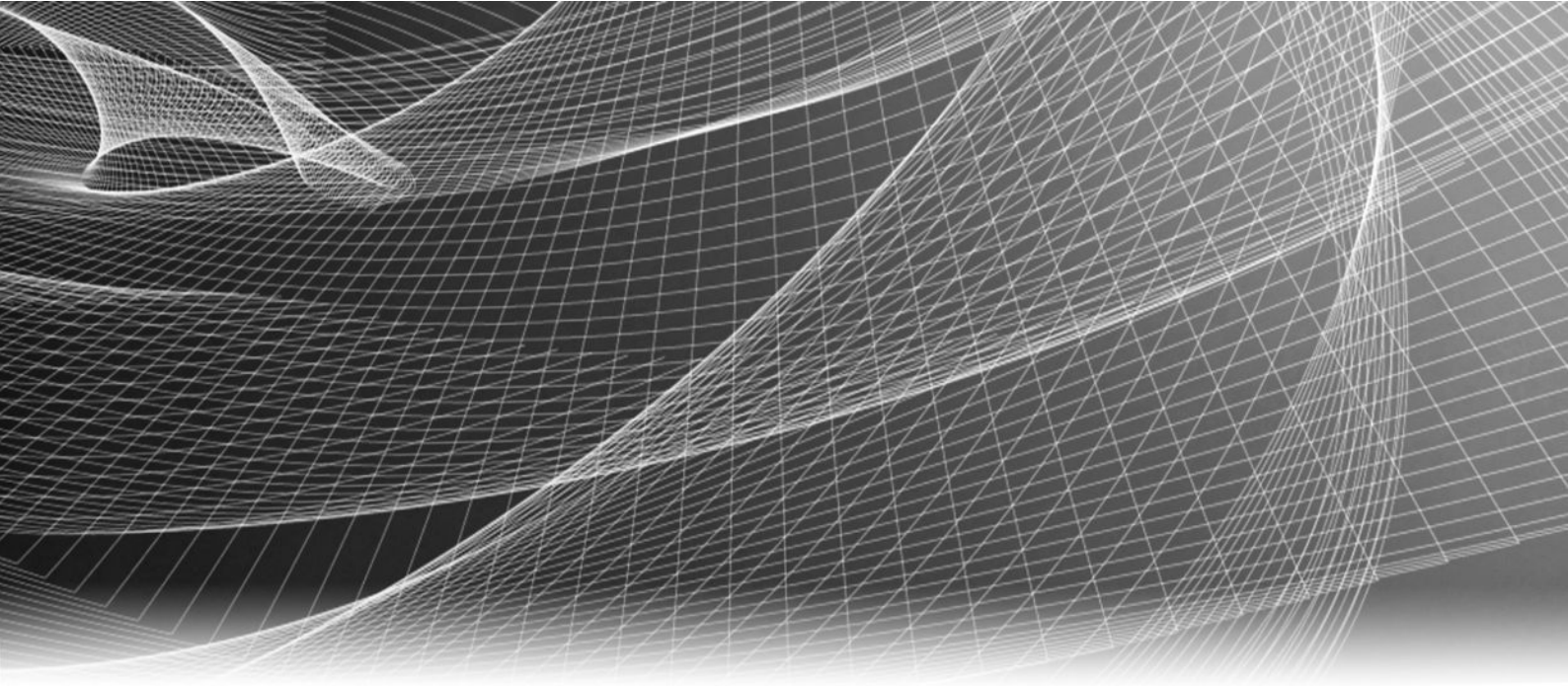

EMC® Avamar® 7.2 for SAP with Oracle

User Guide

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EMC²

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PREFACE

As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions 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 your EMC technical support professional if a product does not function properly or does not function as described in this document.

Note

This document was accurate at publication time. Go to EMC Online Support (https://support.EMC.com) to ensure that you are using the latest version of this document.

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.

Table 1 Revision history

Revision	Date	Description
01	June, 2015	GA release of Avamar 7.2.

Related documentation

The following EMC publications provide additional information:

- *EMC Avamar Compatibility and Interoperability Matrix*
- *EMC Avamar Administration Guide*
- *EMC Avamar and EMC Data Domain System Integration Guide*
- *EMC Avamar Backup Clients User Guide*
- *EMC Avamar for Windows Server User Guide*
- *EMC Avamar Operational Best Practices*

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

The following additional documentation may be useful:

- SAP with Oracle backup and recovery documentation

Special notice conventions used in this document

EMC uses the following conventions for special notices:

NOTICE

Addresses practices not related to personal injury.

Note

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

Typographical conventions

EMC uses the following type style conventions in this document:

Bold	Use 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	Use for full titles of publications referenced in text
`Monospace`	Use for: • System code • System output, such as an error message or script • Pathnames, file names, prompts, and syntax • Commands and options
Monospace italic	Use for variables
`Monospace bold`	Use 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 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 enable you to resolve a product issue before you contact EMC Customer Support.

To access the Avamar support page:

1. Go to https://support.EMC.com/products.
2. Type a product name in the **Find a Product** box.
3. Select the product from the list that appears.
4. Click the arrow next to the **Find a Product** box.
5. (Optional) Add the product to the **My Products** list by clicking **Add to my products** in the top right corner of the **Support by Product** page.

Documentation

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

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

To search the EMC Knowledgebase:

1. Click the **Search** link at the top of the page.
2. Type either the solution number or keywords in the search box.
3. (Optional) Limit the search to specific products by typing a product name in the **Scope by product** box and then selecting the product from the list that appears.
4. Select **Knowledgebase** from the **Scope by resource** list.
5. (Optional) Specify advanced options by clicking **Advanced options** and specifying values in the available fields.
6. Click the search button.

Online communities

Visit EMC 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 EMC products.

Live chat

To engage EMC 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 EMC 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 your EMC sales representative for details about obtaining a valid support agreement or with questions about your 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**.

Facilitating support

EMC recommends that you enable ConnectEMC and Email Home on all Avamar systems:

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

Your comments

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Send your opinions of 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 that will help us address the documentation issue

CHAPTER 1

Introduction

This chapter includes the following topics:

Architecture

The EMC® Avamar® Plug-in for SAP with Oracle (SAP plug-in) is 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 EMC 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.

You must 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 graphical user interface (GUI) to remotely administer an Avamar system from a supported Windows or Linux computer.

The Glossary provides details about terms used in this guide.

Stand-alone configuration

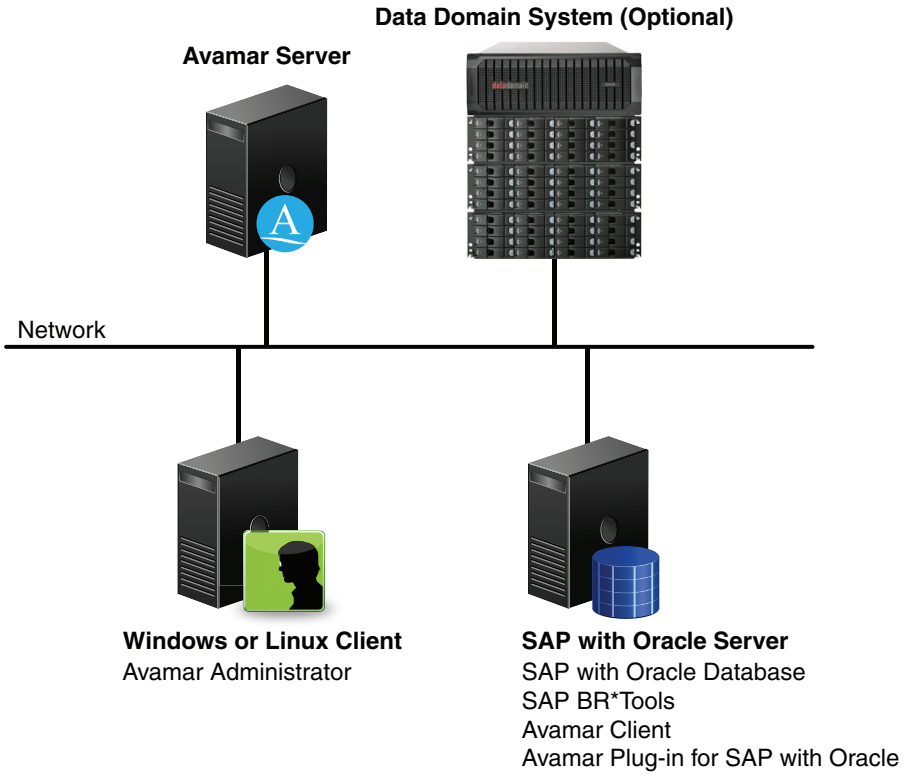
You can deploy the SAP plug-in a stand-alone configuration on one of the supported operating systems.

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

- Oracle database supported by the SAP system.
- SAP BR*Tools, which consists of `brbackup`, `brarchive`, `brrecover`, `brrestore`, and other utilities that the SAP plug-in supports. The *EMC Avamar Compatibility and Interoperability Matrix* 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 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.

You 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 *EMC Avamar Compatibility and Interoperability Matrix* 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 Avamar Administrator. 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, then 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 *EMC Avamar and EMC 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.

Backup

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

Backup processes with Avamar Administrator on page 23 and Backup processes with the CLI on page 24 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

For 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 68 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 or not the data has changed since the last backup.
- 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 versus 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. Scheduling backups on page 55 provides details.

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

- You can use the Avamar Administrator to specify the required backup options and to start the backup. Performing on-demand backups on page 46 provides details.
- You can manually run BR*Tools commands with the required options from the operating system CLI on the SAP Oracle database host. Performing on-demand backups from the CLI on page 80 provides details.

Restore and recovery

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

Restore processes on page 25 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 Avamar Administrator.

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 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 68 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*)

Concurrent backups and restores

The SAP plug-in supports a maximum of six concurrent backups or restores. You can start each backup or restore by using either Avamar Administrator or 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 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 and Avamar Administrator GUI.

The *EMC 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`

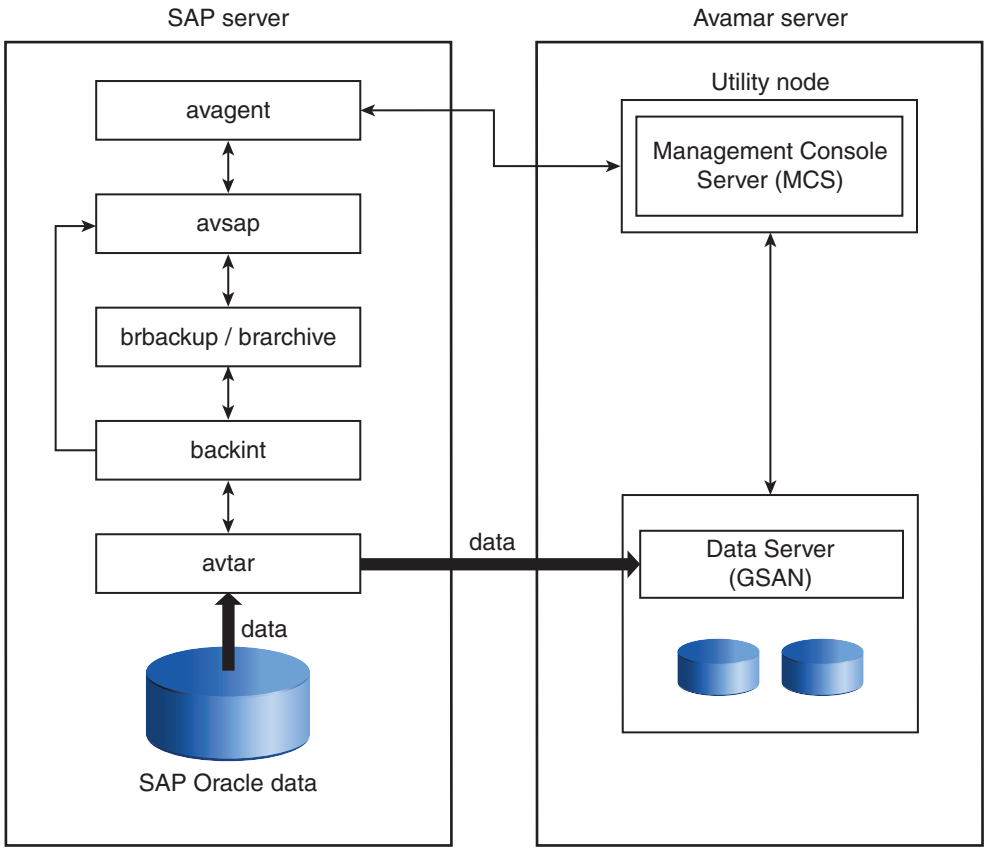
Software processes

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

Backup processes with Avamar Administrator

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

Figure 2 Backup processes initiated from Avamar Administrator



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.

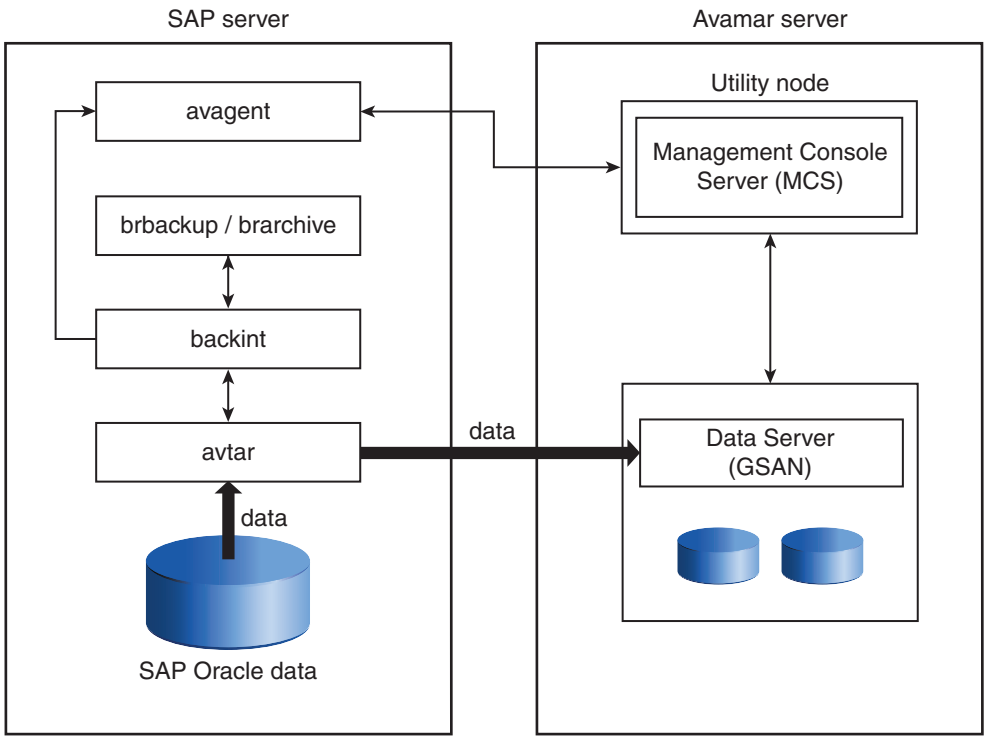
NOTICE

If you perform a backup with the verification option, Avamar Administrator 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

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

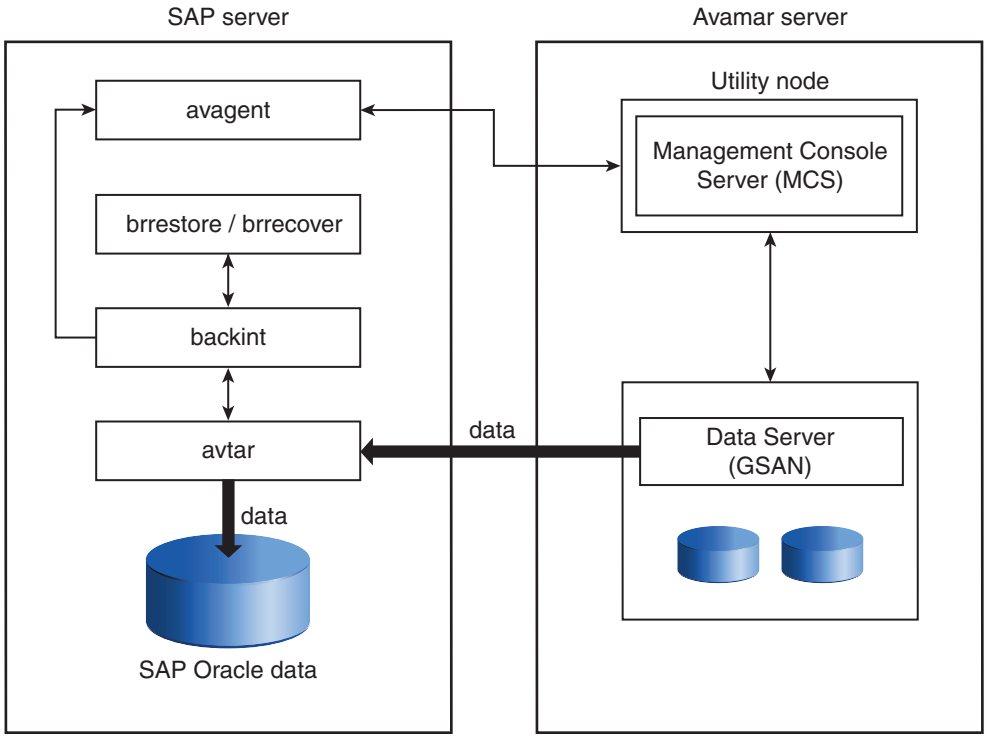
1. You can perform a backup by running a BR*Tools command, such as `brbackup` or `brarchive`, from the CLI.
2. The `brbackup` or `brarchive` process communicates with the Oracle database to gather information for the backup, shuts down or starts up the database instance if needed, and starts the SAP 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`.

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

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.

Client compatibility requirements are available in the *EMC Avamar Compatibility and Interoperability Matrix* on EMC Online Support at http://support.emc.com. The requirements in the matrix include 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 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 *EMC 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:

   `http://Avamar_server`

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

   The **EMC 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 2 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 *EMC Avamar Backup Clients User Guide*.
- For Windows systems, follow the instructions in the *EMC 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.

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

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 *EMC 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.

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 *EMC 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

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 *EMC 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

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 *EMC 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 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

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-solaris`*`version-package-version`*`.pkg`

   where `AvamarSAP-solaris`*`version-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 *EMC 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 *EMC 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 37 provides instructions.
2. Uninstall the Avamar file system client. The *EMC 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 *EMC 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 *EMC 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 *EMC 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.

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 method:
   - 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 *EMC 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 *EMC 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 *EMC 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 38 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, you use the Cluster Configuration Tool to uninstall the Avamar cluster client. Then you 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** › **EMC 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 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.

On Windows systems with UAC enabled, ensure that 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.

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.

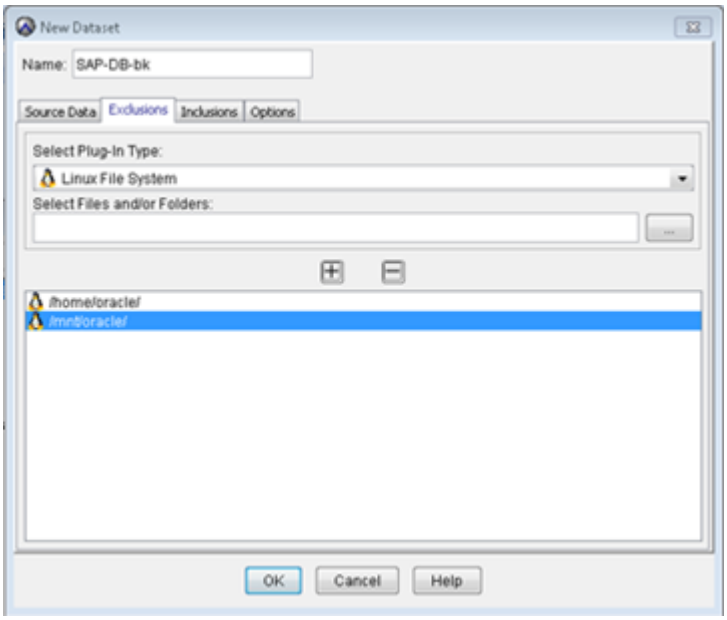
3. In the **Name** field, type a name for the new dataset for the file system backup.

   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.

   The following figure shows the 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 *EMC Avamar Administration Guide* provides instructions.

CHAPTER 3

Backup

This chapter includes the following topics:

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 Avamar Administrator to perform on-demand backups and configure scheduled backups:

- Performing on-demand backups on page 46
- Scheduling backups on page 55

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 80.

Performing on-demand backups

An on-demand backup is a user-initiated backup on a client. You can perform an on-demand backup for the first backup of the client immediately after you install the Avamar client software. You should also perform an on-demand backup before system maintenance, software installations, or software upgrades.

Procedure

1. Start Avamar Administrator and log in.
2. In Avamar Administrator, click the **Backup & Restore** launcher button.

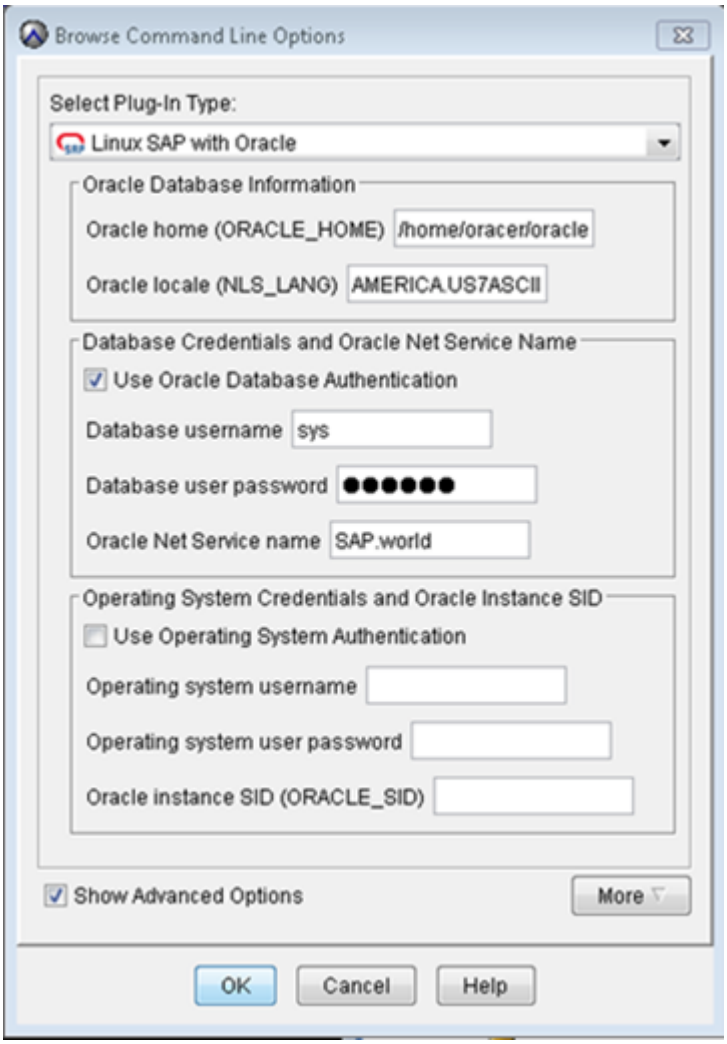
   The **Backup, Restore and Manage** window appears.
3. Click the **Backup** tab.

   The upper-left pane contains a list of domains.
4. Click the domain that contains the SAP server host.

   A list of Avamar clients appears in the pane below the domains list.
5. Select the SAP server host. If the SAP server is installed in a cluster, select the virtual server host.

   A list of plug-ins installed on the client appears in the left pane of the **Backup** tab.
6. In the left pane of the **Backup** tab, select the SAP plug-in.

   The **Browse Command Line Options** dialog box appears as in the following example. You need to reset the settings in this dialog box when you want to browse another SAP server on the same host. To reset the settings, you can close the **Browse Command Line Options** dialog box, then right-click the plug-in, select **Refresh**, and select the plug-in again.



7. Complete the settings in the **Browse Command Line Options** dialog box:
   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.

8. Click **OK**.

   The **Backup** tab in the **Backup, Restore and Manage** window displays information about the database selected for backup.

9. On the **Backup** tab, select the checkboxes next to 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 example, you would select the CID database in the preceding figure.
   - 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 12.g on page 52.

   Note

   If you choose to back up archive logs only, then the backup settings made here will be ignored. However, at least one tablespace must be selected in order to advance to the next screen.

10. Select **Actions › Back Up Now**.

    The **On Demand Backup Options** dialog box appears.

11. Complete the settings in the **On Demand Backup Options** dialog box:
    a. Specify the backup retention policy in the **Retention Policy Settings** group box:
       - To automatically delete this backup from the Avamar server after a specified period of time, select **Retention period** and then specify the number of days, weeks, months, or years.
       - 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 retain this backup as long as this client remains active in the Avamar server, select **No end date**.

NOTICE

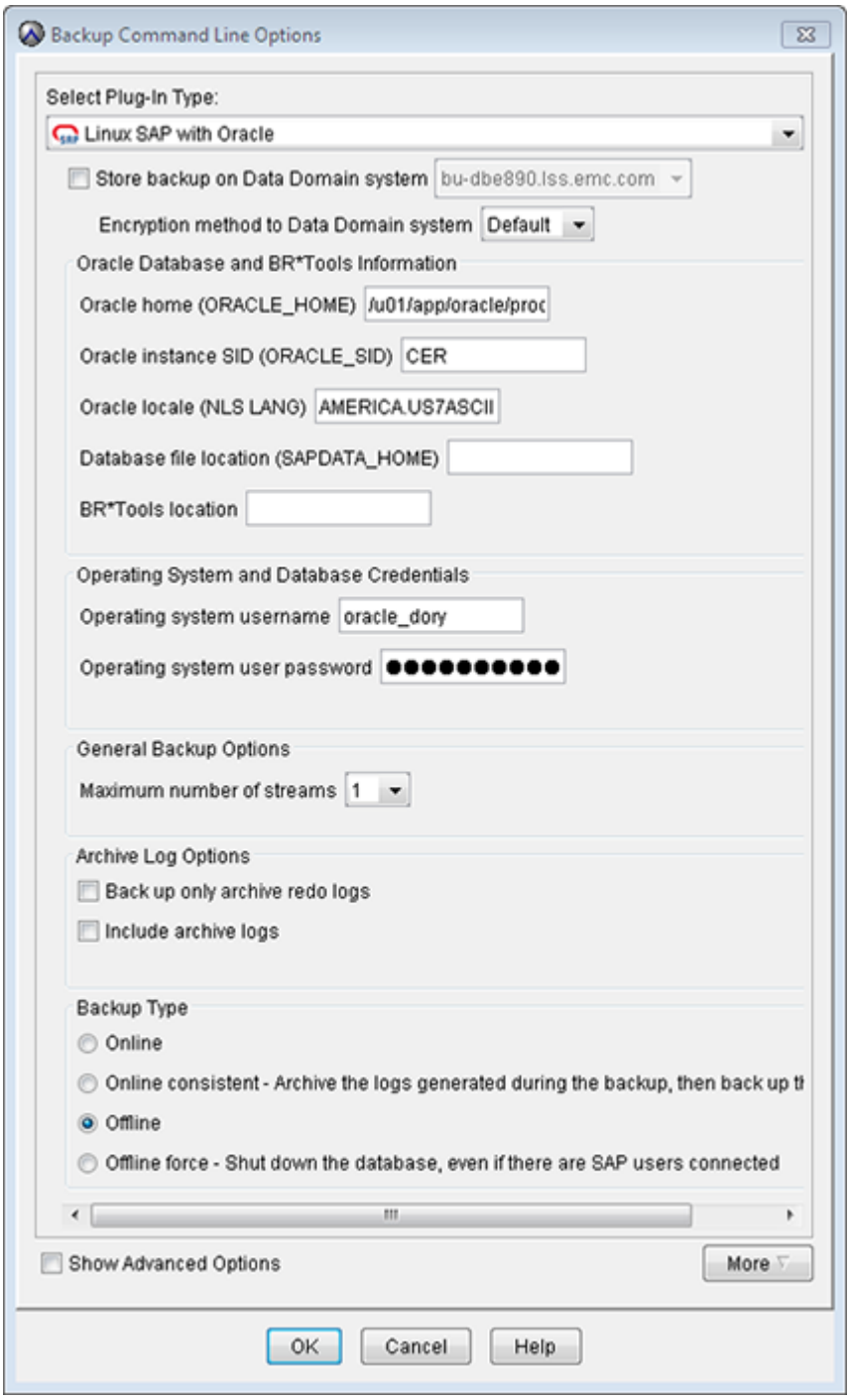
Ensure that the retention policies are set according to the rules described in Complete backup protection on page 18.

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

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

c. Click **More Options**.

   The **Backup Command Line Options** dialog box appears as in the following example.



12. Complete the settings in the **Backup Command Line Options** dialog box:

    a. To view the advanced options with red labels, select **Show Advanced Options** at the bottom of the dialog box. Advanced options with red labels are optional and only required for special configurations. All the text fields with black labels are mandatory.

    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. Select the checkbox for **Store backup on Data Domain system** if you want to store the backup data on an attached Data Domain system that you specify. The metadata for the backup will be stored on the Avamar server.

NOTICE

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.

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

c. From 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.

You must 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:

- From 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 a 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 86 provides details.

  NOTICE

  A file pathname used in the options cannot include spaces. If you want to specify a file pathname that contains spaces, then you must either 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 91 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, then 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**, then you cannot specify the `-delete_saved` option.

Note

A file pathname 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:

- Select **Online** 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.
- Select **Online consistent - Archive the logs generated during the backup, then back up these logs** 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.
- Select **Offline** 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.
- Select **Offline force - Shut down the database, even if there are SAP users connected** 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.

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

j. (Optional) If you need to configure additional plug-in options that do not appear in the dialog box, you can set the options as follows:

   a. Click **More**.

   b. Type the option name and value in the **Enter Attribute** and **Enter Attribute Value** fields, respectively.

   c. Click **+**.

      The option and value pair appears in the text box below the **+** and **-** buttons.

   Additional plug-in options on page 75 provides details about the additional plug-in options that the SAP plug-in supports.

   The Avamar software does not validate the option information you type in the **Enter Attribute** and **Enter Attribute Value** fields. In addition, the values in these fields override the option settings that you specify with GUI controls (text boxes, checkboxes, radio buttons, and so forth) in Avamar Administrator. The fields are often used to set options for troubleshooting purposes.

   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 96 provides details.

13. Click **OK** to close the **Backup Command Line Options** dialog box.
14. Click **OK** to close the **On Demand Backup Options** dialog box.

    After the dialog box closes, the backup begins. Monitoring backups on page 60 describes how to view operational messages about the backup status.

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. A scheduled backup can include multiple clients or a single server.

Procedure

1. Create a dataset for scheduled backups. Creating a dataset on page 55 provides instructions.
2. Create a group for the backups. Creating a group on page 58 provides instructions. During the group creation process, you perform the following tasks:
   a. Assign the new dataset to the new group.
   b. Assign a schedule to the new group.
   c. Assign a retention policy to the new group.
   d. Add the client to the new group.
3. Enable scheduling for the group. Enabling scheduled backups on page 59 provides instructions.

   The *EMC Avamar Administration Guide* provides details about backup groups, group policy, datasets, schedules, and retention policies.

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 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 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 step 7 on page 47, 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 12.g on page 52.

Note

If you choose to back up archive logs only, then the backup settings made here will be ignored. However, at least one tablespace must be selected in order 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.

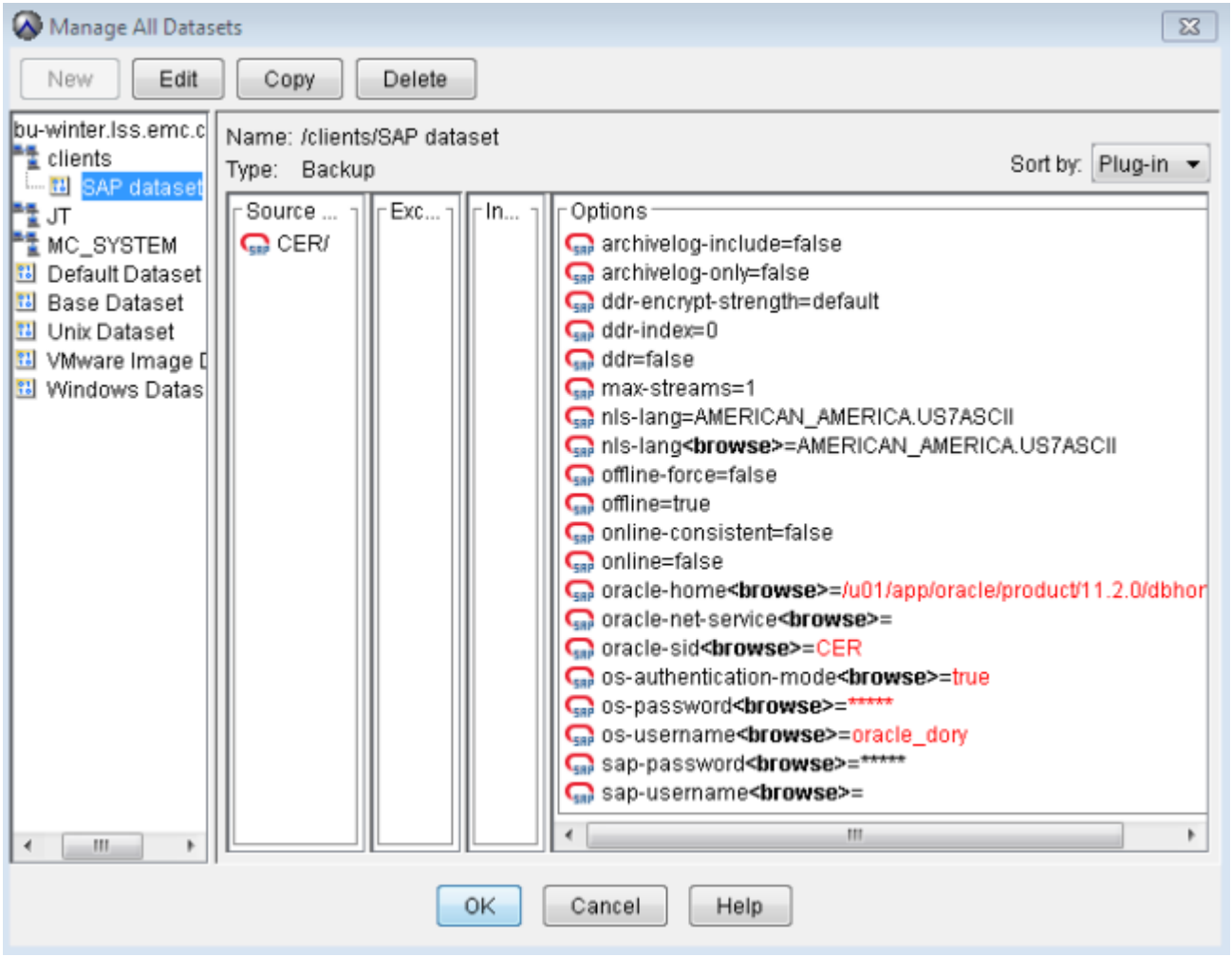
The SAP plug-in options appear on the **Options** tab.

b. Specify all the required options for the SAP plug-in backup as described in step 12 on page 50.

You must set values for all the mandatory fields. If you need to 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.



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 group

You cannot edit schedules or retention policies from the **New Group** wizard.

The *EMC Avamar Administration Guide* provides information about editing schedule properties and retention policies.

Procedure

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

   The **Policy** window appears.

2. Click the **Policy Management** tab.
3. Click the **Groups** tab.
4. In the left pane of the **Groups** tab, select the Avamar domain to which the group should belong.
5. Select **Actions** › **Group** › **New** › **Backup Group**.

   The **New Group** wizard appears.

6. In the **Name** box, type a name for the new group.

   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:

   ` ~ ! @ # $ % ^ & * ( ) = + [ ] { } | \ / ; : ’ ” ‹ › , ?

7. Clear the **Disabled** checkbox to use this group to perform scheduled client backups.

   Selecting the checkbox disables backups for the group.

8. From the **Avamar encryption method** list, select the encryption method for data transfer between the client and the Avamar server during the group backups. This is the method that all clients in the group use unless the method is overridden at the client level.

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

9. Choose whether to use the assigned schedule for the group or override the assigned schedule:
   - To use the assigned schedule, leave the **Override Schedule** checkbox clear.
   - To override the schedule:
     a. Select **Override Schedule**.

        Selecting **Override Schedule** enables the **Skip Next Backup** and **Run Next Backup Once** options.

     b. Choose whether to skip the next scheduled backup entirely or to perform the next scheduled backup one time only by selecting either **Skip Next Backup** or **Run Next Backup Once**.
10. Click **Next**.

    The next **New Group** wizard screen appears with dataset information.
11. From the **Select An Existing Dataset** list, select the dataset that you created in Creating a dataset on page 55, and then click **Next.**

    The next **New Group** wizard screen appears with schedule information.
12. From the **Select An Existing Schedule** list, select a schedule for the group, and click **Next**.

    The next **New Group** wizard screen appears with retention policy information.
13. From the **Select An Existing Retention Policy** list, select a retention policy for the group, and click **Next**.

    NOTICE

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

    The final **New Group** wizard screen appears with a tree of domains and clients.
14. Select the client from the client list.
15. Click **Finish**.

    The **New Group** wizard closes and the new group appears in the **Policy** window.

Enabling scheduled backups

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 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

Avamar Administrator displays operational messages on the status of on-demand SAP plug-in backups. The CLI displays such operational messages on the output terminal when you run a backup with the `brbackup` or `brarchive` command from the CLI.

The **Activity Monitor** tab in Avamar Administrator displays status information for SAP plug-in operations that you start through Avamar Administrator or the CLI:

- Each backup through Avamar Administrator displays a single row on the screen, which includes both database components and parameter files in the backup.
- Each backup that you run with the `brbackup` or `brarchive` command displays a separate row on the screen for each `backint` operation involved in the backup. For example, one row is for the backup of data files, and a second row is for the backup of parameter files.

Canceling backups

You must perform the required procedure to cancel a running backup either in Avamar Administrator or on the SAP client host.

Canceling backups in Avamar Administrator

Procedure

1. In Avamar Administrator, select **Activity** › **Activity Monitor**.
2. Select the running backup.
3. Select **Action** › **Cancel Activity**.

Canceling backups on the SAP client host

Perform one of the following procedures to cancel a running backup on the SAP plug-in host:

- (Backup from CLI only) Press either **Ctrl-C** or the equivalent “attention” key combination in the command shell or window in which the backup runs.
- (Backup from CLI or backup with Avamar Administrator) In a new command shell, type one of the following commands:

  ```
  brbackup -g -stop
  ```

  or

  ```
  brarchive -g -stop
  ```

  Note

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

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 named `/tmp/sapdata5`, which is a symbolic link with `/tmp/sapdata5` linked to `/oracle_data/SCE/sapdata5`. The files will be backed up under `tmp/sapdata5/*datafiles`.

At the end of each backup, the SAP plug-in groups together 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 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
```

CHAPTER 4

Restore and Recovery

This chapter includes the following topics:

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.

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 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 87 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 43.
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. It is recommended to use the brtools and brrecover commands in the interactive mode because they 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 you must perform the following:

    - 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 83 provide details about the BR*Tools restore and recovery interfaces.

Note

The brrestore program, when used for a restore operation, whether invoked directly from the command line or indirectly from the brrecover command or the brtools interface, first 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:

- 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** tab in Avamar Administrator 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 involved in the restore.

Note

If Avamar server release is earlier than 7.0, then the Activity Monitor displays the restore with `On-Demand Backup` in the **Type** column, instead of `Restore`.

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. Keep all the original software media in a safe location. Include the following:

- 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 described in the SAP documentation, modified for the specific requirements of the SAP plug-in environment.

Restoring the required Oracle and SAP BR*Tools files

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 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 required for the restore operation. SAP plug-in parameter file on page 86 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 69 describes how to use BR*Tools for the disaster recovery.

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

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 66 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

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

Use either of the following methods to specify the plug-in options in Avamar Administrator:

- Set the options with the GUI controls (text boxes, checkboxes, radio buttons, and so on) in different dialog boxes.
- Click **More** in the **Backup Command Line Options** dialog box. Then type **`[avsap]`*`option_name`*** in the **Enter Attribute** field, and type the option value in the **Enter Attribute Value** field.

  Use the **More** button to set only additional options that you cannot specify with the GUI controls. For example, if you specify the maximum streams value in the **Backup Command Line Options** dialog box, do not also click **More** and type **`[avsap]max-streams`** in the **Enter Attribute** field and do not type the maximum streams value in the **Enter Attribute Value** field.

  Additional plug-in options on page 75 describes the additional plug-in options that the SAP plug-in supports.

  NOTICE

  The Avamar software does not validate the option information you type in the **Enter Attribute** and **Enter Attribute Value** fields. In addition, the values in these fields override settings that you specify with the GUI controls for the options.

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 3 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.

Table 3 SAP browse options in Avamar Administrator (continued)

Browse option	How to set the option value
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.
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 4 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`.

Table 4 SAP backup options in Avamar Administrator (continued)

Backup option	How to set the option value
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.
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.

Table 4 SAP backup options in Avamar Administrator (continued)

Backup option	How to set the option value
	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`.
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 will be 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

You must 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 96 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 configured for role-based storage must execute 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

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 86 provides examples and details about configuring the file.
6. If a Data Domain system will be 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 43.
8. If you will 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 96 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 82 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 enclosed in brackets ([ ]) are optional. Options 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 `initDBSID.sap`.

Table 5 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 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, and so on. 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 86 provides details.

Table 5 Options for brbackup and brarchive commands (continued)

Option	Description
-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 the backup after the files have been backed up. Helps 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 enclosed in brackets ([ ]) are optional. Options 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 6 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.
-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 86 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 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.

  For example, step 12.f on page 52 describes how to specify a verify operation for a backup with Avamar Administrator.
- 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 a SAP plug-in parameter file (flagfile).

Table 7 SAP plug-in parameters

Parameter	Description	Examples
`--account`	Mandatory for all operations from the CLI and for backups through Avamar Administrator with the BR*Tools verify operation. Specifies the Avamar domain of the client. This 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 to be 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 will be saved. An index number is assigned to the Data Domain system when it is added to the Avamar server configuration. Contact the Avamar administrator to determine the required index number. If you do not set this option when `--ddr` is set, then the backup is not reported correctly.	**`--ddr-index=1`**
`--debug`	Optional. Turns on the debugging messages. 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 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 *EMC 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 supported for this parameter are `high`, `medium`, and `cleartext`. The default value for all backups is the `high` encryption strength.	**`--encrypt-strength=high`**

Table 7 SAP plug-in parameters (continued)

Parameter	Description	Examples
`--expires`	Optional. Specifies the backup expiration time in number of days for a backup from the CLI. A backup with Avamar Administrator 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 *EMC Avamar Administration Guide* provides more details about expiration.	**`--expires=120`**
`--id`	Mandatory for all operations from the CLI and for backups through Avamar Administrator 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. The default value is 1. The maximum value is 128. The recommended maximum number of concurrent sessions on a host is 10.	**`--max-streams=2`**
`--password`	Mandatory for all operations from the CLI and for backups through Avamar Administrator with the BR*Tools verify operation. Specifies the password of the MCS user 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 then use with the `--password` parameter in the parameter file (flagfile).	**`--password=a6338f5876bc47974641a51ddcbbbae21aebc7345254de0120f58063211ffc4b947c4eb344b48e7c`** 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. A backup with Avamar Administrator ignores this parameter if it is set in the parameter file. The default value is none.	**`--retention-type=daily, weekly, monthly`**

Table 7 SAP plug-in parameters (continued)

Parameter	Description	Examples
	The *EMC Avamar Administration Guide* provides more details about retention.	
`--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 Avamar Administrator 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: **`--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

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 Avamar Administrator 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 Avamar Administrator.
- 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 Avamar Administrator:

    `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 Avamar Administrator.
  - 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 79 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 Avamar Administrator:

  `avsap_log_name``-log-`*`backint_pid`*`-backint.log`

  where:

  - *`avsap_log_name`* is the name of the `avsap` log file 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 Avamar Administrator.
- 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 79 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

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 8 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:

Table 8 Command to verify the Avamar client and SAP plug-in installation (continued)

Platform	How to verify the installation

	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, Avamar Administrator lists the platform-specific SAP plug-in installation. In addition, the `avagent.log` file, 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 written to files called the `.switch` files.

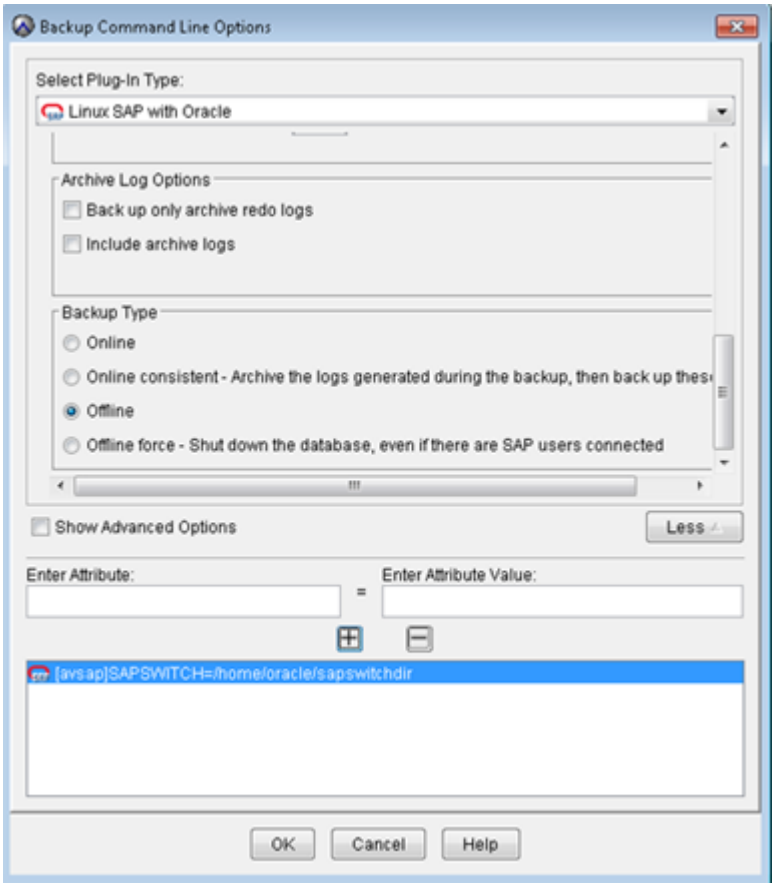
BR*Tools expects the `backint` program to create the `.switch` files (`.switch.lis`, `.switch.sem`, and `.switch.log`) in a predefined location. By default, the program creates the `.switch` files in the following directory:

- 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 non-default 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 Avamar Administrator, click **More** in the **Backup Command Line Options** dialog box and set the SAPSWITCH value as an additional plug-in option according to step 12.j on page 54. The following figure displays an example SAPSWITCH setting in the dialog box.

Figure 5 SAPSWITCH setting



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.

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 Avamar Administrator includes a final slash character, /.

If the ORACLE_HOME setting includes a trailing slash, the `avsap` process displays a warning message prior to 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.

In order 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 Avamar Administrator

The **Browse for Instances, Tablespaces,** or **Datafiles** option in Avamar Administrator 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 **Browse Command Line Options** dialog box, including mistakes such as an incorrect username or password or incorrect spelling.
- The database user 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.