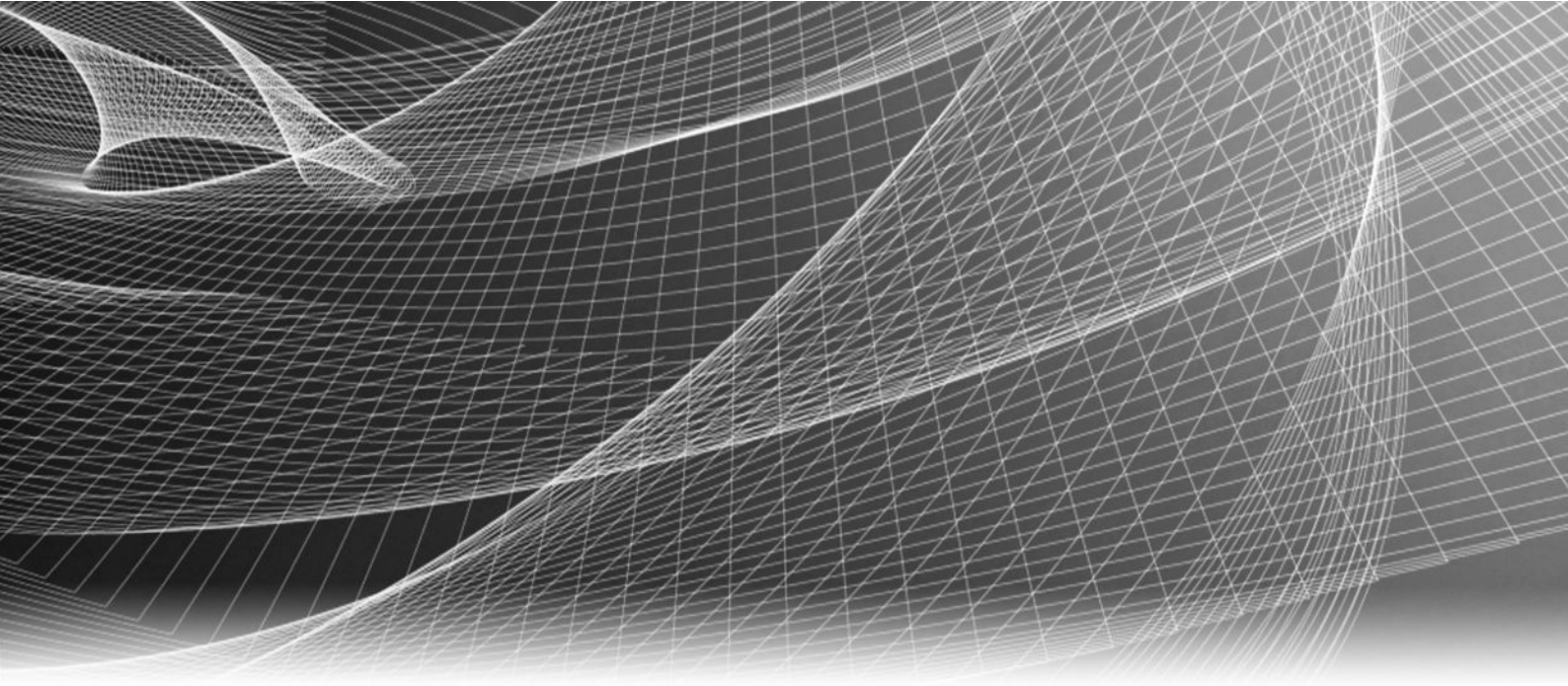

EMC® Avamar® 7.2 for Oracle

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, configure, administer, and use the EMC Avamar Plug-in for Oracle.

Audience

This document is intended for:

- 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

Revision history

The following table presents the revision history of this document.

Table 1 Revision history

Revision	Date	Description
01	June, 2015	Initial release of Avamar 7.2.
02	August, 2015	GA release of Avamar 7.2. Updated to include the new **SYSBACKUP privilege** plug-in option.

Related documentation

The following EMC publications provide additional information:

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

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 Oracle works with Oracle and Oracle Recovery Manager (RMAN) to back up Oracle databases, tablespaces, or datafiles to an Avamar server or an EMC Data Domain® system. The Avamar Plug-in for Oracle serves as a backup module and the Avamar server or Data Domain system as a storage device. You can perform backups and restores from Avamar Administrator or from the RMAN command line interface.

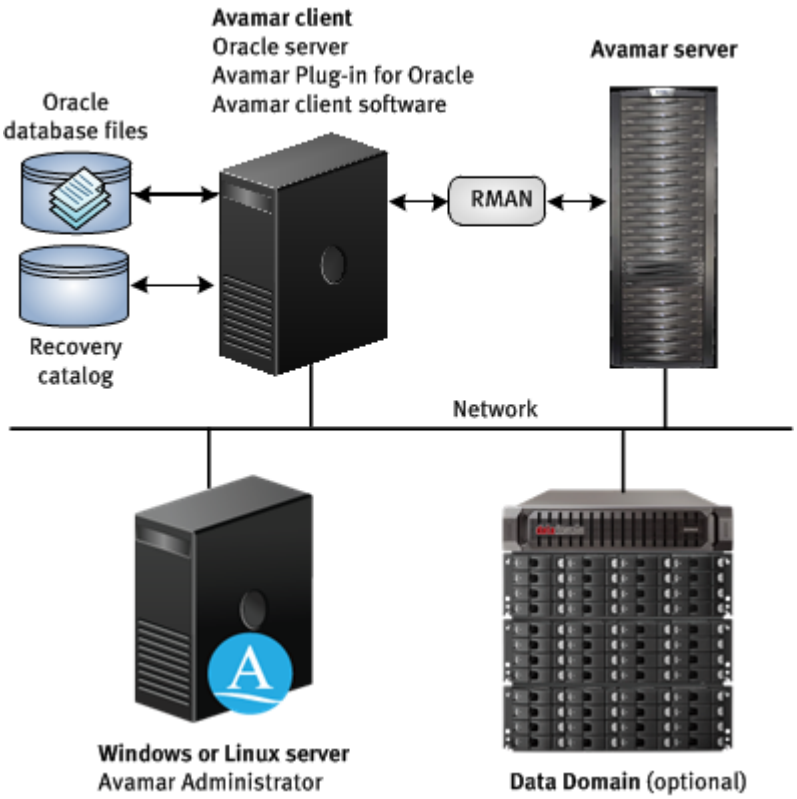
From the RMAN command line interface, RMAN uses the Avamar Plug-in for Oracle as a data mover to perform backup and recovery. From Avamar Administrator, the Avamar Plug-in for Oracle creates an RMAN script to perform the backup or restore operation and spawns an RMAN process to run the script. RMAN then uses the Avamar Plug-in for Oracle as a data mover to perform a backup or a restore operation.

Stand-alone configuration

You can deploy the Avamar Plug-in for Oracle in stand-alone configurations for all supported platforms.

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

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



The *EMC Avamar Compatibility and Interoperability Matrix* provides more information about supported platforms.

High-availability configuration

You can also deploy the Avamar Plug-in for Oracle in high-availability (HA) configurations such as Microsoft Cluster Server (MSCS), Solaris Cluster Server (VCS), and Oracle Real Application Clusters (RAC).

MSCS configurations

The Avamar Plug-in for Oracle supports two-node MSCS configuration. You can use the Avamar Plug-in for Oracle to back up Oracle database files from Windows Server 2008 and MSCS for both 32-bit and 64-bit platforms.

VCS configurations

The Avamar Plug-in for Oracle supports both two-node active/active and two-node active/passive VCS configurations. You can use the Avamar Plug-in for Oracle to back up Oracle database files from Solaris platforms that run VCS.

In an active/active cluster configuration, each node runs an instance of the Avamar Plug-in for Oracle as an application in separate service groups. This functionality provides application redundancy. When a failure occurs on one active node, the other active node hosts both service groups.

In an active/passive cluster configuration, the service group is online on the active node until a failover occurs. Then the service group comes online on the passive node.

You can run backups and restores from both nodes.

RAC configurations

RAC is an option for an Oracle database that enables multiple nodes to have shared access to a single database. The Avamar Plug-in for Oracle supports backups of RAC configuration on HP-UX, IBM AIX, Linux, Solaris, or Windows platforms.

The Avamar Plug-in for Oracle installation packages for the HP-UX, IBM AIX, Linux, and Solaris platforms include three configuration scripts for Oracle RAC:

- `rac_config`—Configures the Avamar Plug-in for Oracle to back up and restore RAC databases.
- `rac_deconfig`—Deletes the RAC configuration from the Avamar Plug-in for Oracle.
- `rac_stop`—Removes the Avamar agent (`EMCagent`) from the Oracle Clusterware resource list.

The Avamar Plug-in for Oracle installation package for Microsoft Windows includes `AvamarRACConfiguration.exe`.

You use Avamar Administrator to back up and restore Oracle RAC databases just as you would for non-RAC databases. In an Oracle RAC configuration, each cluster node runs a local instance of the Oracle database and maintains a local copy of online logs. The instance name differs from the database unique name.

To back up an Oracle RAC database, the Avamar Plug-in for Oracle connects to the instance of the database that is running on the current active node. To restore an Oracle RAC database, you must first shut down all database instances, and then start the instance on the registered node in a “no mount” state.

When one cluster node fails or is taken offline, the other cluster nodes continue operating. The Oracle RAC database remains available to users without interruption. The Avamar Plug-in for Oracle backs up and restores Oracle RAC databases by connecting to

the instance that runs on the cluster node. This node is the one registered with the Avamar server.

Because each node runs an instance of the Oracle database in a RAC configuration, when a failover occurs, users access the database on the failover node. The failover process is transparent to the users.

Data Domain system support

The Avamar Plug-in for Oracle supports backups to and restore from Data Domain systems. You can back up Oracle data to a Data Domain system by using Avamar Administrator or by using RMAN backup scripts. The Avamar Plug-in for Oracle stores the metadata for the backup on the Avamar server.

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. After you configure the Data Domain system, you can back up Oracle database files to the Data Domain system by selecting the appropriate plug-in option from Avamar Administrator or by specifying the Data Domain system as the target system for RMAN backup scripts. You can also specify a Data Domain system when you create a dataset for a scheduled backup.

You must store the full backup for a client and all subsequent incremental backups on either the Avamar server or a single Data Domain system. The Avamar Plug-in for Oracle does not support backups that are stored partly on Avamar and partly on a Data Domain system. For example, the Avamar Plug-in for Oracle does not support the following types of backups:

- Full backup on a Data Domain system and incremental backups on the Avamar server
- Full backup on the Avamar server and incremental backups on a Data Domain system
- Full backup on one Data Domain system and incremental backups on another Data Domain system

If you change the device on which backups for a client are stored, you must then perform a full backup before you perform any further incremental backups.

The steps to restore backups are the same whether you restore backups from the Avamar server or from a Data Domain system. The restore process determines the location of the backup.

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

Log files

The Avamar Plug-in for Oracle creates log files during backup and restore operations. The log files are for debugging purposes. Backup and restore operations from Avamar Administrator create the `avoracle.log` file in the *`install-directory`*`/var/clientlogs` directory.

Backup and restore operations

You can perform backup and restores by using Avamar Administrator or by running RMAN scripts from the command line.

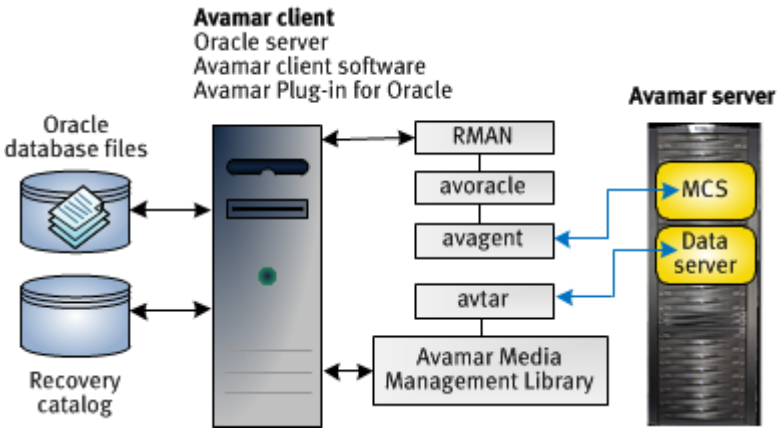
Backups and restores in Avamar Administrator

During backups or restores in Avamar Administrator, the Avamar Plug-in for Oracle generates an RMAN script that performs the backup or restore of the specified database.

The Avamar client agent runs RMAN with this script. The script directs Oracle to open a connection with an Avamar Media Management library, which invokes an `avtar` session to connect to the Avamar server.

The following figure shows the process flow between the Avamar client and Avamar server.

Figure 2 Avamar client and Avamar server process flow diagram



The Oracle backup process generates an RMAN script similar to the following script:

```
configure controlfile autobackup on;
run {
allocate channel c1 type sbt;
send 'connect information for avtar to connect to the Avamar
server';
backup database;
}
```

During the backup or restore operation, RMAN creates a log file that you can view from Avamar Administrator:

```
Recovery Manager: Release 11.1.0.7.0 - Production
Copyright (c) 1995, 2004, Oracle. All rights reserved.
connected to target database: ORACLE (DBID=1420649215) using target
database controlfile instead of recovery catalog
RMAN> configure controlfile autobackup on;
2> run {
3> allocate channel c1 type sbt;
4> send '... ';
6> backup database;
7> }
8>
old RMAN configuration parameters:
CONFIGURE CONTROLFILE AUTOBACKUP OFF;
new RMAN configuration parameters:
CONFIGURE CONTROLFILE AUTOBACKUP OFF;
new RMAN configuration parameters are successfully stored
allocated channel: c1
channel c1: sid=142 devtype=SBT_TAPE
channel c1: AVTAR/Avamar backup (EMC)
sent command to channel: c1

Starting backup at 23-NOV-12
channel c1: starting full datafile backupset
channel c1: specifying datafile(s) in backupset
input datafile fno=00001 name=D:\ORACLE\PRODUCT\10.1.0\ORADATA\ORACLE
\ORACLE\SYSTEM01.DBF
```

```
input datafile fno=00003 name=D:\ORACLE\PRODUCT\10.1.0\ORADATA\ORACLE
\ORACLE\SYSAUX01.DBF
input datafile fno=00002 name=D:\ORACLE\PRODUCT\10.1.0\ORADATA\ORACLE
\ORACLE\UNDOTBS01.DBF
input datafile fno=00004 name=D:\ORACLE\PRODUCT\10.1.0\ORADATA\ORACLE
\ORACLE\USERS01.DBF
channel c1: starting piece 1 at 23-NOV-12
channel c1: finished piece 1 at 23-NOV-12
piece handle=15gfs32k_1_1 comment=API Version 2.0,MMS Version
2.2.0.108 channel c1: backup set complete, elapsed time: 00:00:45
channel c1: starting full datafile backupset channel c1: specifying
datafile(s) in backupset including current controlfile in backupset
including current SPFILE in backupset channel c1: starting piece 1 at
23-NOV-12 channel c1: finished piece 1 at 23-NOV-12 piece
handle=16gfs341_1_1 comment=API Version 2.0,MMS Version 2.2.0.108
channel c1: backup set complete, elapsed time: 00:00:17 Finished
backup at 21-MAR-11 released channel: c1

Recovery Manager complete.
```

Backup

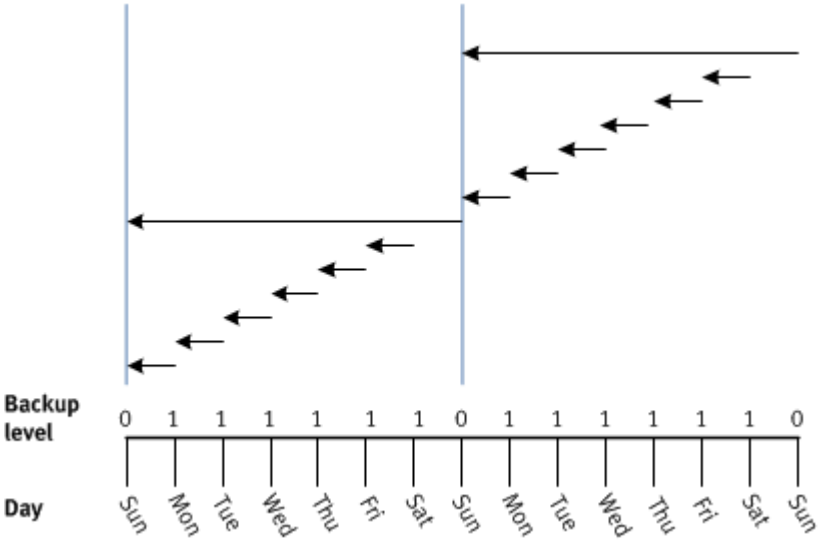
The Avamar Plug-in for Oracle enables you to back up Oracle database files and archive logs by using Avamar Administrator or RMAN backup scripts. When you use an RMAN script, you can back up an Oracle database, a tablespace, or a single datafile.

Backup types

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

- Backups of Oracle database files and archive logs.
- Cold (offline) backups of the Oracle file system.
- Four backup levels:
  - Full—Backs up all datafiles and archive logs. Level full, the default backup level, is not part of the incremental backup strategy.
  - Level 0 (incremental)—Backs up all datafiles and archive logs. You must run a Level 0 backup before you run a Level 1 backup.
  - Differential (incremental)—Backs up all database blocks that have changed since the most recent incremental (differential or cumulative) or level 0 backup. The following figure shows daily level 1 differential backups during a two-week period.

Figure 3 Level 1 differential backups

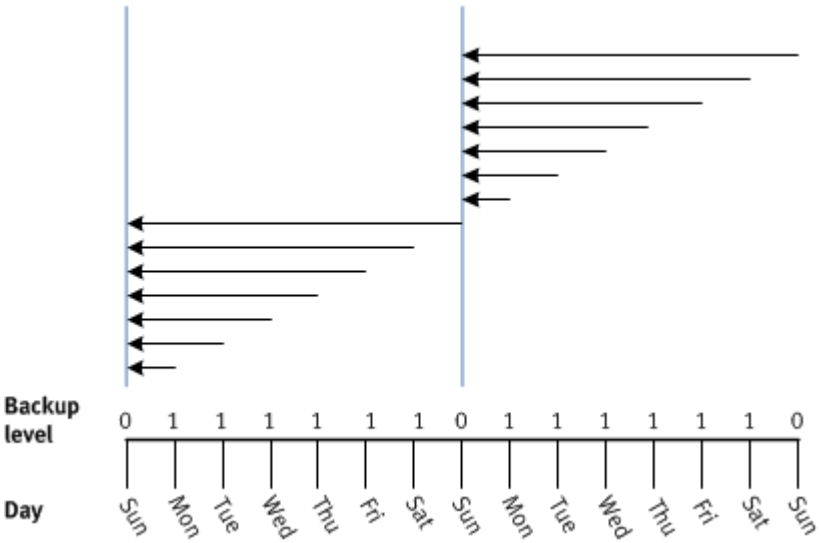


- Cumulative (incremental)—Backs up all database blocks that have changed since the most recent level 0 backup.

  Restoring a backup from a cumulative backup is faster than restoring a backup from a differential backup. Cumulative backups, however, require more disk space and take longer to complete than differential backups.

  Perform cumulative level backups when recovery time is more important than disk space. The following figure shows daily level 1 cumulative backups during a two-week period.

  Figure 4 Level 1 cumulative backups



- On-demand or scheduled backups—You can perform on-demand backups or schedule backups to run automatically.

Archive log backups

The **Backup Command Line Options** dialog box includes the following backup options: **Back up database**, **Back up archive logs**, and **Delete archive log after backup**.

You must select at least one of the backup options, otherwise the backup fails. The Avamar Plug-in for Oracle does not validate these options. When you select the **Back up archive logs** option, the Avamar Plug-in for Oracle ignores the incremental backup options and performs a full backup.

Avamar Administrator does not support restores of only archive logs. To restore only archive logs, you must use an RMAN script.

Automatic Storage Management and raw file structure support

The Avamar Plug-in for Oracle supports backups of databases that use Automated Storage Management (ASM) for storage management and raw file structure.

Oracle offline backup

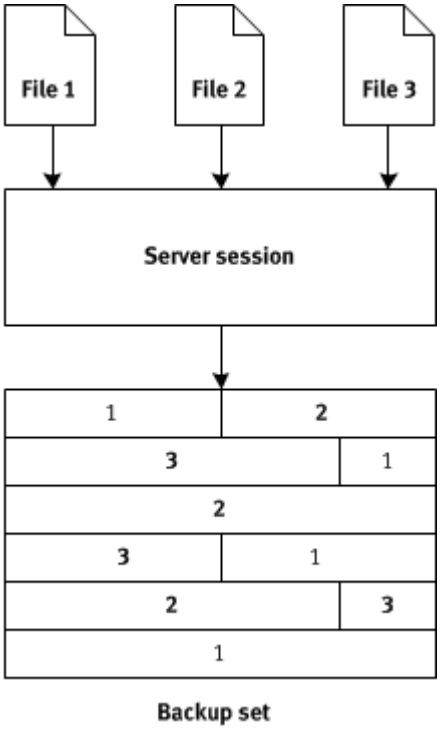
The Avamar Plug-in for Oracle supports Oracle's offline backup feature, which enables you to back up a database that is in a mount state. This type of backup is equivalent to a hot backup of a database. A restore of an offline backup uses the same procedure that a restore of a hot backup uses.

RMAN tuning options

Backups you perform with the Avamar Plug-in for Oracle in Avamar Administrator use RMAN. RMAN reads the individual data files, bundles the files into backup sets, and then sends the backup set to `avtar`.

To create the backup set, RMAN simultaneously reads multiple files from the disk, and then writes the blocks of file data into the same backup set. The combination of blocks from multiple files is called backup multiplexing. The following figure shows multiplexing three files into a backup piece.

Figure 5 RMAN multiplexing



In Figure 5 on page 23, RMAN simultaneously reads three files and writes them to the backup set intermingled. The RMAN multiplexing feature intermingles the backup files, and does not provide the data stream in a similar format for subsequent reads.

Because of the way the RMAN multiplexing feature intermingles files, backups by the Avamar Plug-in for Oracle to the Avamar server can contain the duplicate data even if no changes were made to the database since the last backup. The RMAN multiplexing feature, therefore, can negatively affect the data deduplication ratio of the Avamar Plug-in for Oracle.

The Avamar Plug-in for Oracle improves data deduplication performance by enabling you to use the **Filesperset** option in Avamar Administrator.

The **Filesperset** option specifies the number of files to include in each backup set. The default value of the **Filesperset** option is 1. When you specify a value for the **Filesperset** option, RMAN uses the value as a limit for the number of files RMAN includes in a backup set.

RMAN backup optimization

The Avamar Plug-in for Oracle supports the RMAN backup optimization feature through the RMAN CLI only. By enabling the backup optimization feature, the RMAN backup command skips the backup of a file if an identical file is already backed up to the allocated device type.

You enable backup optimization with the `configure backup optimization on RMAN` command.

Enabling backup optimization reduces backup time. The Oracle documentation provides more information about backup optimization.

Enabling RMAN backup optimization on page 98 provides more information about performing backups that use the backup optimization feature.

RMAN multisection backups

The Avamar Plug-in for Oracle supports the Oracle multisection backup feature through the RMAN CLI only. To use this feature, you perform backups with the `SECTION SIZE` parameter to divide data files into subsections. Each subsection is then backed up in parallel across multiple channels. The Oracle documentation provides more information about the multisection backup feature.

Restore and recovery

The Avamar Plug-in for Oracle supports the restore of a database backup from one system to another system or to a directory on the same system. During a restore you can recover corrupt blocks or recover data blocks from the flash recovery area (FRA).

Corrupt block recovery

The Avamar Plug-in for Oracle includes the **Corrupt blocks** option, which enables you to recover corrupt data blocks only and not the entire database. The **Corrupt blocks** option is an advanced option in the **Restore Command Line Options** dialog box.

To use the **Corrupt blocks** option, you must first configure the database to use checksums to verify data blocks. To enable this feature, set the initialization parameter, **`DB_BLOCK_CHECKSUM`**, to **`TYPICAL`** for the Oracle database. This setting enables RMAN to detect both physical and logical corruption:

- Physical corruption can occur because of defective memory boards, defective controllers, or broken sectors on a hard disk.
- Logical corruption can occur if the contents of a data block are logically inconsistent. Examples of logical corruption include corruption of a row piece or an index entry.

You can use the **Corrupt blocks** option while the database is open.

Flashback Database recovery

The Avamar Plug-in for Oracle supports Oracle Flashback Database recovery. The Flashback Database feature enables you to rewind the database to a target time, system change numbers (SCN), or a log sequence number. The Avamar Plug-in for Oracle provides a new option in the **Restore Command Line Options** dialog box that enables you to perform a recovery from Flashback Database logs.

Plug-in Options on page 121 provides more information about Flashback Recovery options.

Roll forward recovery

The Avamar Plug-in for Oracle supports roll-forward recovery by providing the **Open the database with resetlogs after recovery** advanced option in Avamar Administrator. The installation of the Avamar Plug-in for Oracle enables this advanced option by default.

The **Open the database with resetlogs after recovery** option instructs the restore operation to open the database with resetlogs after the restore completes. The opening of the database with resetlogs initializes the logs, resets the log sequence number, truncates the available changes in the redo logs, and starts a new incarnation of the database.

To roll forward a database after a restore operation completes, you must clear the **Open the database with resetlogs after recovery** option in the **Restore Command Line Options**

dialog box. When you clear this option, the restore operation does not open the database with resetlogs. You can then apply archive logs to recover the database to the most current point-in-time that is available.

Concurrent backups and restores

The Avamar Plug-in for Oracle supports concurrent backups, restore, or both types of operations from Avamar Administrator. You can select multiple databases for a backup or restore operation and the Avamar Plug-in for Oracle runs the backup or restore operations concurrently.

When the operation completes, the Avamar Plug-in for Oracle creates a snapview with all of the files backed up or restored. For differential, cumulative, and archive log only backups, the snapview also contains the backup files from the previous backups.

You can perform concurrent backups on Oracle 10g and later. You cannot run concurrent backups of the same database from Avamar Administrator and the RMAN CLI simultaneously.

Avamar Plug-in for Oracle backups from Avamar Administrator use the same page cache files per database. Concurrent backups to a Data Domain system do not use cache files.

Multiple databases

The Avamar Plug-in for Oracle supports the selection of multiple databases for both backup and restore operations.

When multiple databases are backed up on the same workorder, they are logically grouped so that Avamar Administrator can present a hierarchical view of the databases during subsequent restore operations. This grouping is accomplished by prefixing a path that comprises the ORACLE-INSTANCE and ORACLE-SID to each database within the backup. For example, an Oracle 11g database with ORACLE-SID set to orcl is prefixed with /11g/orcl/.

Multi-streaming

Multi-streaming is a feature that enables a backup or a restore to use multiple RMAN channels to the Avamar server or the Data Domain system. A backup or restore that uses multiple RMAN channels runs multiple instances of `avtar` in parallel.

RMAN might not use all the RMAN channels you specify. For example, if you specify 4 RMAN channels for a backup, RMAN might use only 2 channels. The backup ignores the other 2 channels. The default number of RMAN channels is 1 and the maximum is 10.

Allocating multiple RMAN channels for backups and restores can improve performance. Performance improvements for backups and restores, however, depend on the Oracle server configuration.

You can specify multiple RMAN channels for backups and restores by using the **Number of RMAN Channels** option in Avamar Administrator or by specifying `allocate channel` commands in an RMAN script.

Oracle Exadata

Oracle Exadata is a product that combines hardware and software to run Oracle. The Avamar Plug-in for Oracle supports Oracle Exadata for Oracle Database Machine and Exadata Storage Server (attached to an external database server) configurations.

The Avamar Plug-in for Oracle supports the same environment for Oracle Exadata (including the Oracle database versions, operating system versions, and Avamar versions) as the environment that the Avamar Plug-in for Oracle supports for Oracle RAC. The *EMC Avamar Compatibility and Interoperability Matrix* provides more information about supported environments for the Avamar Plug-in for Oracle.

You must install and configure the Avamar Plug-in for Oracle on the Exadata database server the same way you install and configure the Avamar Plug-in for Oracle in Oracle RAC configurations. Use Avamar Administrator to back up and restore the Exadata database server just as you would for non-Exadata database servers. Backup on page 63 and Restore and Recovery on page 77 provide more information.

Oracle recovery catalog

The Avamar Plug-in for Oracle supports the Oracle recovery catalog feature during backups and restores.

When you select the **Use recovery catalog** option for a backup, the backup updates the recovery catalog in the normal manner. All backups include the database control file so that future restore operations do not depend on the recovery catalog.

When Avamar Administrator cannot use the recovery catalog for a restore, the restore must use the database control file. You can, however, restore a database from an Avamar backup by using the recovery catalog from RMAN. Using the catalog for backup and restores on page 109 provides more information.

Preprocessing and postprocessing backup and restore scripts

The Avamar Plug-in for Oracle supports preprocessing and postprocessing scripts for both backup and restore operations that you perform in Avamar Administrator.

Preprocessing and postprocessing scripts are user-written shell scripts (`.sh`) on Linux or UNIX. On Windows, scripts are batch scripts (`.bat`), vb Scripts (`.vbs`), and JScripts (`.js`). The Avamar Plug-in for Oracle runs preprocessing and postprocessing scripts as root on Linux or UNIX, and as an administrator on Windows.

You can use preprocessing and postprocessing scripts for various tasks, such as the following tasks:

- Copying logs from the `var` directory to different directory before a backup.
- Preparing the databases for a backup or restore.
- Running SQL queries to get database information.
- Setting environment parameters.

All preprocessing and postprocessing scripts must be in the `/avamar/etc/scripts` directory on the client. The preprocessing and postprocessing feature is an advanced option in Avamar Administrator. Preprocessing and postprocessing scripts and attributes on page 128 provides more information.

In addition to using preprocessing and postprocessing scripts, the Avamar Plug-in for Oracle supports the use of preprocessing and postprocessing attributes. You specify

preprocessing and postprocessing attributes and attribute values in the **Enter Attribute** and **Enter Attribute Value** fields.

CHAPTER 2

Installation

This chapter includes the following topics:

Preparing to install the Avamar Plug-in for Oracle

Review the system requirements for the Avamar Plug-in for Oracle to ensure that the environment meets these requirements before you perform the installation. You must download the Avamar file system client and Avamar Plug-in for Oracle installation packages from the Avamar server.

System requirements

The environment must meet client compatibility requirements before you install the Avamar Plug-in for Oracle.

Client compatibility requirements are available in the *EMC Avamar Compatibility and Interoperability Matrix* on EMC Online Support at https://support.EMC.com. The requirements in the matrix include supported operating systems and application versions. The Avamar file system client and the Avamar Plug-in for Oracle that you install on the host must be the same version.

Hardware requirements

The following table lists hardware requirements for the Avamar Plug-in for Oracle.

Table 2 Hardware requirements

Resource	Requirement
RAM	64 MB
Hard drive space	130 MB permanent hard drive space for software installation. The Avamar client software also requires an additional 12 MB of permanent hard drive space for each 64 MB of physical RAM. The local cache files use this space.
Network interface	10BaseT minimum. 100BaseT or higher recommended, configured with the latest drivers for the platform.

Software requirements

To install the Avamar Plug-in for Oracle in a Windows cluster requires the Microsoft .NET Framework 4 software.

You can download and install the .NET Framework 4 from the Microsoft Download Center.

Oracle requirements

Ensure that you meet Oracle requirements before you install the Avamar Plug-in for Oracle.

1. Ensure that you have operating system root privileges on the Oracle server.
2. Ensure that Oracle and RMAN are installed and functioning properly.
3. Ensure that the Avamar server is operational and present on the same network as the Oracle server by opening a command shell on the Oracle server and typing the following command:

   `ping Avamar-server`

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

4. Note the network hostname (which is a DNS entry) for the Avamar server and the utility node.

   The installation and configuration of the Avamar system adds these entries to DNS.

VCS configurations

The Avamar Plug-in for Oracle supports both two-node active/active and two-node active/passive VCS configurations. You can use the Avamar Plug-in for Oracle to back up Oracle database files from Solaris platforms that run VCS.

In an active/active cluster configuration, each node runs an instance of the Avamar Plug-in for Oracle as an application in separate service groups. This functionality provides application redundancy. When a failure occurs on one active node, the other active node hosts both service groups.

In an active/passive cluster configuration, the service group is online on the active node until a failover occurs. Then the service group comes online on the passive node.

You can run backups and restores from both nodes.

Downloading the software

Download the installation package for the Avamar Plug-in for Oracle from the Avamar server, and then save the package to a temporary directory.

Note

For a Solaris cluster (VCS) configuration, download the Avamar Cluster Client for Solaris. The Avamar Cluster Client for Solaris includes the Avamar Plug-in for Oracle.

Procedure

1. Log in to the Oracle server 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 Oracle server.
5. Click **+** next to the operating system heading for the Oracle server.
6. Click the link for the Avamar Plug-in for Oracle installation package.
7. Save the Avamar Plug-in for Oracle installation package to a temporary directory.

Installing the Avamar file system client

You install the appropriate Avamar file system client before you install the Avamar Plug-in for Oracle.

Install and register the Avamar file system client.

Procedure

- 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*.

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

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

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

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

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

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

Procedure

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

   `cd /tmp`

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

   `swinstall -s AvamarRMAN-`*`platform`*`-`*`version`*`.depot \*`

   where:

   - *platform* is the HP-UX platform type.
   - *version* is the Avamar version number.
4. To install the Avamar Plug-in for Oracle in an alternate directory:
   a. Type the following command:

      `swinstall -x ask=true -s /`*`tmp`*`/AvamarRMAN-`*`platform`*`-`*`version`*`.depot hpuxrman,l=/`*`install_path`*

      where:

      - *platform* is the HP-UX platform type.
      - *version* is the Avamar version number.
      - *install_path* is the installation directory.

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

      The following appears in the command shell:

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

c. Type `y` to confirm the location.

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

The version of the Avamar Client for HP-UX and Avamar Plug-in for Oracle must be the same version.

Procedure

1. Uninstall the Avamar Plug-in for Oracle. Uninstalling the Avamar Plug-in for Oracle on HP-UX on page 33 provides instructions.
2. Uninstall the Avamar Client for HP-UX. The *EMC Avamar Backup Clients User Guide* provides instructions.
3. Download and install the new version of the Avamar Client for HP-UX. The *EMC Avamar Backup Clients User Guide* provides instructions.
4. Download the Avamar Plug-in for Oracle installation package. Downloading the software on page 31 provides instructions.
5. Install the new version of the Avamar Plug-in for Oracle. Installing the Avamar Plug-in for Oracle on HP-UX on page 32 provides instructions.

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

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

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

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

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

The EMC Avamar Administration Guide provides more information.

Procedure

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

```
swremove hpuxrman
```

Installing, upgrading, and uninstalling the software on IBM AIX

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

Installing the Avamar Plug-in for Oracle on IBM AIX

You can install the Avamar Client for AIX software in either the default installation directory or an alternate directory. Use the `geninstall` command to install the Avamar

Plug-in for Oracle in the default `var` directory or use the `installp` command to install the Avamar Plug-in for Oracle in a new location.

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

Procedure

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

   cd /*tmp*

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

   geninstall -d AvamarRMAN-aix6-ppc-*version*.bff all

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

   installp -R /*install_path* -d AvamarRMAN-aix6-ppc-*version*.bff all

   where:

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

Upgrading the Avamar Plug-in for Oracle on IBM AIX

You must upgrade the Avamar Plug-in for Oracle before you upgrade the Avamar Client for AIX. The versions of the Avamar Client for AIX and Avamar Plug-in for Oracle must be the same.

Procedure

1. Download the Avamar Plug-in for Oracle installation packages. Downloading the software on page 31 provides instructions.
2. Log in to the Oracle server as root.
3. Change the directory to the temporary directory by typing the following command:

   cd /*tmp*

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

   geninstall -d AvamarRMAN-*platform*-*version*.bff all

   where:

   - *platform* is the AIX system type.
   - *version* is the Avamar software version.
5. To upgrade the Avamar Plug-in for Oracle in an alternate installation directory, type the following command:

installp -R /install_path -d AvamarRMAN-*platform-version*.bff all

where:

- *install_path* is the alternate installation directory.
- *platform* is the AIX system type.
- *version* is the Avamar software version.

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

   geninstall -d AvamarClient-*platform-version*.bff all

   where:

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

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

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

   where:

   - *install_path* is the alternate installation directory.
   - *platform* is the AIX system type.
   - *version* is the Avamar software version.

Uninstalling the Avamar Plug-in for Oracle on IBM AIX

You can uninstall the Avamar Plug-in for Oracle from an IBM AIX system by using the `geninstall -u` command.

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

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

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

The *EMC Avamar Administration Guide* provides more information.

Procedure

1. Log in to the Oracle server as root.
2. To list Avamar packages installed in the default directory, type the following command:

   lslpp -l | grep Avamar

   The following appears in the command shell:

   ```
   AvamarClient-aix6-ppc VERSION COMMITTED EMC Avamar client
   VERSION
   ```

```
AvamarRMAN-aix6-ppc VERSION COMMITTED EMC Avamar client
VERSION
```

3. To list Avamar packages installed in an alternate installation directory, type the following command:

   lslpp -la -R /*install_path* | grep Avamar

   where *install_path* is the alternate installation directory.

4. To uninstall the Avamar Plug-in for Oracle software, type the following command:

   geninstall -u AvamarRMAN-aix6-ppc-*version*.bff

   where *version* is the Avamar version number.

Installing, upgrading, and uninstalling the software on Linux

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

Installing the Avamar Plug-in for Oracle on Linux

You can install the Avamar Plug-in for Oracle software in either the default installation directory or an alternate directory.

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

Procedure

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

   cd /*tmp*

   where *tmp* is the temporary directory.

3. To install the Avamar Plug-in for Oracle in the default directory, type the following command:

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

   where:

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

4. To change base directory for the installation, type the following command:

   rpm --relocate /usr/local/avamar=/*install_path* -i AvamarRMAN-linux-*platform*-*version*.rpm

   where:

   - *install_path* is the new directory.
   - *platform* is the Linux system type.
   - *version* is the Avamar software version.

5. To change the base directory and `var` directory locations during the installation, type the following command:

rpm -ivh --relocate /usr/local/avamar=*install_path* --relocate /var/avamar=*var_path* AvamarRMAN-linux-*platform*-*version*.rpm

where:

- *install_path* is the new directory.
- *var_path* is the new `var` directory.
- *platform* is the Linux system type.
- *version* is the Avamar software version.

Upgrading the Avamar Plug-in for Oracle on Linux

You upgrade the Avamar Plug-in for Oracle by using the `rpm –Uvh` command. You can use the `--relocate` option to specify the alternate installation or `var` directory that you specified when you installed the initial version. The versions of the Avamar Client for Linux and Avamar Plug-in for Oracle must be the same.

Procedure

1. Upgrade the Avamar Client for Linux by using the instructions in the *EMC Avamar Backup Clients User Guide*.
2. Change the directory to the temporary directory by typing the following command:

   cd /*tmp*

   where *tmp* is the temporary install directory.
3. To upgrade the software in the default directory, type the following command:

   rpm -Uvh AvamarRMAN-linux-*platform*-*version*.rpm

   where:

   - *platform* is the Linux platform type.
   - *version* is the Avamar software version.
4. To upgrade the software in a nondefault installation directory, type the following command:

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

   where:

   - *install_path* is the installation directory that you specified when you installed the earlier version of the Avamar Plug-in for Oracle software.
   - *platform* is the Linux platform type.
   - *version* is the Avamar software version.
5. To upgrade the software and use a nondefault `var` directory, type the following command:

   rpm -Uvh --relocate /var/avamar=*var_path* AvamarRMAN-linux-*platform*-*version*.rpm

   where:

   - *var_path* is the `var` directory that you specified when you installed the earlier version of the Avamar Plug-in for Oracle software.

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

The `rpm -Uvh` command automatically uninstalls the earlier version of the Avamar Plug-in for Oracle, and then installs the new version.

Uninstalling the Avamar Plug-in for Oracle on Linux

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

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

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

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

The *EMC Avamar Administration Guide* provides more information.

Procedure

1. Log in to the Oracle server as root.
2. To view all Avamar packages installed on the system, type the following command:

   rpm -qa | grep Av

   A list of Avamar software appears in the command shell:

   ```
   download-AvamarRMAN-version
   download-AvamarClient-version
   ```

   where *version* is the Avamar software version.
3. To uninstall the Avamar Plug-in for Oracle, type the following command:

   rpm -e AvamarRMAN-*version*

   where *version* is the version of the Avamar Plug-in for Oracle.
4. To uninstall the Avamar Client for Linux, type the following command:

   rpm -e AvamarClient-*version*

   where *version* is the version of Avamar Client for Linux.

   The following output appears in the command shell:

   ```
   avagent.d Info: Stopping Avamar Client Agent (avagent)...
   avagent.d Info: Client Agent stopped.
   ```

Installing, upgrading, and uninstalling the software on Solaris

You can install, upgrade, and uninstall the Avamar Plug-in for Oracle on a stand-alone Solaris system or on a Solaris cluster (VCS).

Installing the Avamar Plug-in for Oracle on a stand-alone Solaris

You can install the Avamar Plug-in for Oracle on a stand-alone system or on a Solaris cluster (VCS).

Note

To install the Avamar Plug-in for Oracle on a Solaris cluster (VCS), skip this procedure and continue with Installing the Avamar Plug-in for Oracle on a Solaris cluster on page 40.

Procedure

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

   cd /*tmp*

   where *tmp* is the temporary install directory.
3. Install the Avamar Plug-in for Oracle by typing the following commands:

   pkgadd -d AvamarRMAN-solaris10-*platform*-*version*.pkg

   where:

   - *platform* is the Solaris platform type.
   - *version* is the Avamar version number.

   The following output appears in the command shell:

   ```
   The following packages are available:
   1 AVMRrman Avamar Client Plugin for Oracle RMAN
   (sparc) 7.2.100-nnn
   Select package(s) you wish to process (or 'all' to process
   all packages). (default: all) [?,??,q]:
   ```
4. Type **1** and press **Enter**.

   The following output appears in the command shell:

   ```
   Processing package instance <AVMRrman> from
   </AvamarRMAN-solaris10-sparc-7.2.100-nnn.pkg>
   Avamar Client Plugin for Oracle RMAN(sparc) 7.2.100-nnn
   ## Executing checkinstall script.
   Using as the package base directory.
   ## Processing package information.
   ## Processing system information.
   4 package pathnames are already properly installed.
   ## Verifying package dependencies.
   ## Verifying disk space requirements.
   ## Checking for conflicts with packages already installed.
   ## Checking for setuid/setgid programs.
   This package contains scripts which will be executed with
   super-user permission during the process of installing this
   package.
   Do you want to continue with the installation of <AVMRrman>
   [y,n,?]
   ```
5. Type **y** and press **Enter**.

The installation runs to completion.

Installing the Avamar Plug-in for Oracle on a Solaris cluster

In a VCS configuration, you install the Avamar Cluster Client for Solaris on both nodes in the cluster. The Avamar Cluster Client for Solaris includes the Avamar Plug-in for Oracle.

Note

To install the Avamar Plug-in for Oracle on a stand-alone Solaris system, skip this procedure and complete Installing the Avamar Plug-in for Oracle on a stand-alone Solaris on page 39.

Procedure

1. Log in to the active VCS node as root.
2. Change the directory to the temporary directory by typing the following command:

   cd /*tmp*

   where *tmp* is the temporary install directory.
3. Install the software by typing the following commands:

   pkgadd -d AvamarClusterClient-solaris10-*platform-version*.pkg

   where:

   - *platform* is the Solaris platform type.
   - *version* is the Avamar version number.

   ```
   The following packages are available:
   1 AVMRclusclnt Avamar Cluster Client
   (sparc) 7.2.100-nnn
   Select package(s) you wish to process (or 'all' to process
   all
   packages). (default: all) [?,??,q]:
   ```
4. Type **1** and press **Enter**.

   The following output appears in the command shell:

   ```
   Processing package instance <AVMRclusclnt> from
   </home/source/fresh/installers/solpkgs/PKGS/
   AvamarClusterClient-solaris10-sparc-7.0.100-nnn.pkg>
   Avamar Cluster Client(sparc) 7.2.100-nnn
   This software is copyright EMC Corporation, 2001-2014
   Please read and agree to the End User License Agreement
   which will be placed in the base directory of the install
   as a file named AvamarClient-License.txt.
   ## Executing checkinstall script.
   Using as the package base directory.
   ## Processing package information.
   ## Processing system information.
   ## Verifying package dependencies.
   ## Verifying disk space requirements.
   ## Checking for conflicts with packages already installed.
   ## Checking for setuid/setvtgid programs.
   This package contains scripts which will be executed with
   super-user permission during the process of installing this
   ```

```
package.
Do you want to continue with the installation of
<AVMRclusclnt>
[y,n,?] y
```

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

   The installation runs to completion.

6. Run `avclustinstall` by typing the following commands:

   ```
   cd /opt/AVMRclusclnt/bin/
   ./avclusinstall
   ```

   The following output appears in the command shell:

   ```
   Setting PATH set for Veritas Cluster Server commands
   Available service groups for configuration
   1. oraclegrp
   Select an option:
   ```

7. Type **1** and press **Enter**.

   The following output appears in the command shell:

   ```
   Selected service group: oraclegrp
   Group State
   oraclegrp PARTIAL
   Enter the resource name of Avamar application for selected
   service group (Default: avagent_oraclegrp):
   ```

   Note

   The state of `oraclegrp` can be either `ONLINE` or `PARTIAL`. Usually the state is `ONLINE`.

8. Type the resource name of the Avamar application and press **Enter**.

   The following output appears in the command shell:

   ```
   Available mount Resources:
   1. oramnt (Mount point: /fsclus01)
   Selected mount resource: oramnt
   Do you want to install Avamar Client Plugin for Oracle RMAN?
   (y/n)[y]:
   ```

9. Type **y** and press **Enter**.

   The following output appears in the command shell:

   ```
   Enter the hostname or dns alias associated with virtual-ip
   (15.16.140.13):
   ```

10. Type the hostname or DNS alias and press **Enter**.

    The following output appears in the command shell:

    ```
    Active node detected
    === Client Registration and Activation
    This script will register and activate the client with the
    Administrator server.
    Using /opt/AVMRclusclnt/cluster/oraclegrp/var as the var dir
    for the group oraclegrp avagent
    ```

```
Enter the Administrator server address (DNS text name or
numeric IP address, DNS name preferred):
```

Note

The hostname or DNS alias must match the hostname specified by the HOST parameter in the `tnsnames.ora` and `listener.ora` files.

11. Type the hostname (defined in DNS) or IP address for the Administrator server and press **Enter**.

    The following output appears in the command shell:

    ```
    Enter the Avamar server domain [clients]:
    ```

12. Type the domain name and press **Enter**.

    The following output appears in the command shell:

    ```
    avagent.d Info: Client Agent not running.
    avagent Info <5241>: Logging to /opt/AVMRclusclnt/cluster/
    oraclegrp/var/avagent.log
    avagent Info <5174>: - Reading /opt/AVMRclusclnt/cluster/
    oraclegrp/var/avagent.cmd
    avagent.d Info: Client activated successfully.
    avagent Info <5241>: Logging to /opt/AVMRclusclnt/cluster/
    oraclegrp/var/avagent.log
    avagent Info <5174>: - Reading /opt/AVMRclusclnt/cluster/
    oraclegrp/var/avagent.cmd
    avagent Info <5417>: daemonized as process id 7154
    avagent.d Info: Client Agent started.
    avagent.d Info: Stopping Avamar Client Agent (avagent)...
    avagent.d Info: Client Agent stopped.
    Registration Complete.
    Avamar Client has been installed for service group
    'oraclegrp' successfully.
    Do you want to install Avamar in another service group?
    (y/n) [n]:
    ```

13. Type **n** and press **Enter**.

14. Log in to the passive node as root and type the following commands:

    ```
    cd /opt/AVMRclusclnt/bin
    ./avclusinstall
    ```

    The following output appears in the command shell:

    ```
    Setting PATH set for Veritas Cluster Server commands
    Available service groups for configuration
    1. oraclegrp
    Select an option:
    ```

15. Type **1** and press **Enter**.

    The following output appears in the command shell:

    ```
    Selected service group: oraclegrp
    Group State
    oraclegrp OFFLINE
    Do you want to install Avamar Client Plugin for Oracle RMAN?
    (y/n)[y]:
    ```

16. Type **y** and press **Enter**.

    The following output appears in the command shell:

    ```
    Passive node detected.
    Avamar Client has been installed for service group
    'oraclegrp' successfully.
    Do you want to install Avamar in another service group?
    (y/n) [n]:
    ```

17. Type **n** and press **Enter**.

18. Bring VCS resources online by typing the following command:

    hares -online avagent_*servicegroup* -sys *hostname*

    where:

    - avagent_*servicegroup* is the default name of the Avamar VCS cluster agent. If you did not select the default name in Upgrading the Avamar Plug-in for Oracle on HP-UX on page 33, use the name you specified in Upgrading the Avamar Plug-in for Oracle on HP-UX on page 33.
    - *hostname* is the system where the VCS service group is in PARTIAL state.

Upgrading the Avamar Plug-in for Oracle on Solaris

The versions of the Avamar Client for Solaris and Avamar Plug-in for Oracle must be the same.

Procedure

1. Uninstall the Avamar Plug-in for Oracle. Uninstalling the Avamar plug-in on a stand-alone Solaris on page 43 provides instructions.
2. Uninstall the Avamar Client for Solaris. The *EMC Avamar Backup Clients User Guide* provides instructions.
3. Download the Avamar Plug-in for Oracle installation package. Downloading the software on page 31 provides instructions.
4. Download and install the new version of the Avamar Client for Solaris. The *EMC Avamar Backup Clients User Guide* provides instructions.
5. Install the new version of the Avamar Plug-in for Oracle:
    - Installing the Avamar Plug-in for Oracle on a stand-alone Solaris on page 39 provides instructions for installations on a stand-lone system.
    - Installing the Avamar Plug-in for Oracle on a Solaris cluster on page 40 on a Solaris cluster.

Uninstalling the Avamar plug-in on a stand-alone Solaris

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

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

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

- To delete the backups for the client, delete the client by using Avamar Administrator.

The *EMC Avamar Administration Guide* provides more information.

Procedure

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

   pkginfo | grep AVMR

   Information similar to the following appears in the command shell:

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

3. To uninstall the software, type the following command:

   pkgrm *package_name*

   where *package_name* is the Avamar plug-in package displayed in step 2.

   The following output appears in the command shell:

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

4. Type **y** and press **Enter**.

   The following output appears in the command shell:

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

Uninstalling the Avamar Cluster Client for Solaris

The Avamar Cluster Client for Solaris includes the Avamar Plug-in for Oracle. To uninstall the Avamar Plug-in for Oracle on a Solaris cluster, you uninstall the Avamar Cluster Client for Solaris.

The *EMC Avamar Backup Clients User Guide* provides instructions for uninstalling the Avamar Cluster Client for Solaris software.

Installing, upgrading, and uninstalling the software on Windows

You can install, upgrade, and uninstall the Avamar Plug-in for Oracle on a stand-alone Windows system or on a Windows cluster.

Installing the Avamar Plug-in for Oracle on Windows

You install the Avamar Plug-in for Oracle on both Windows stand-alone systems and MSCS two-node clusters. In a cluster, install the Avamar Plug-in for Oracle on both nodes and in the same directory on each node.

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

Note

The Avamar Plug-in for Oracle is automatically installed in the same folder as the Avamar Client for Windows.

Procedure

1. Log in to the Oracle server as an administrator.
2. Go to the temporary directory that contains the installation files that you downloaded in Downloading the software on page 31.
3. Start the Avamar Plug-in for Oracle installation:
   - If UAC is disabled, double-click the installation package to open it.
   - If UAC is enabled, open a command prompt as an administrator, change directory to the location of the installation package, and then type the following command:

     msiexec /i AvamarRMAN-windows-*platform*-*version*.msi

     where:

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

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

   The **Ready to install EMC Avamar Backup Plug-in for Oracle** page appears.
5. Click **Install**.

   The **Installing EMC Avamar Backup Plug-in for Oracle** page appears. A status bar shows the installation's progress. After the installation completes, the **Completed the EMC Avamar Backup Plug-in for Oracle Setup Wizard** page appears.
6. Click **Finish**.
7. In a cluster, repeat this installation procedure on each node.

Configuring the Avamar cluster client on Windows

The Avamar cluster client enables you to back up and restore Oracle data on shared storage in a cluster, regardless of which node is managing the data at the time of the backup or restore. Use the Cluster Configuration Tool to configure the Avamar cluster client on the active node in an active/passive configuration or on both active nodes in an active/active configuration.

Before you begin

Before you run the Cluster Configuration Tool, ensure that the Avamar Client for Windows and the Avamar Plug-in for 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 2012, open the **Start** screen and select **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 **EMC Avamar Backup Plug-in for Oracle** from the **Avamar Backup Plug-ins** list, and then click **Next**.

   The **Cluster Nodes** page appears with a list of nodes and their status.

5. Ensure that the status of all nodes is Up, and then click **Next**.

   The **Operations** page appears.

6. Select the **Configure new Oracle Virtual Client for cluster** option, and then click **Next**.

   Note

   Select the **Use existing configuration to configure new nodes for Oracle Virtual Clients on cluster** option to add a node to an existing configuration. The *EMC Avamar for Windows Server User Guide* provides more information.

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

7. Ensure that the environment meets all prerequisites on the **Prerequisites** page.

   If a prerequisite is not met, exit the wizard, resolve the issue, and restart the wizard.

8. Select the Internet Protocol version that the environment uses, and then click **Next**.

   The **Attach to Service** page appears.

9. Select the cluster service for the plug-in, and then click **Next**.

   The **Server Settings** page appears.

10. 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 for the cluster client in the **Client domain for cluster** 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 Avamar 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 the 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.

11. Review the configuration settings, and then click **Configure**.

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

12. Click **Close**.

Upgrading the Avamar Plug-in for Oracle on Windows

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

Upgrading on a stand-alone Windows server

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

Procedure

1. Ensure that you meet all system requirements for the new version. Preparing to install the Avamar Plug-in for Oracle on page 30 provides more information.
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 Avamar Plug-in for Oracle by running the plug-in installation wizard for the new version on the client computer. Installing the Avamar Plug-in for Oracle on Windows on page 44 provides instructions.

Upgrading in a Windows cluster

When you upgrade the Avamar Client for Windows and Avamar Plug-in for Oracle software in a cluster, you must uninstall the earlier version of the Avamar client and plug-in from each node, and then install the new version.

Procedure

1. Uninstall the current version of the Avamar Client for Windows and Avamar Plug-in for Oracle:
   a. Use the earlier version of the Cluster Configuration Tool to uninstall the Avamar cluster client. Uninstalling the cluster client on page 48 provides instructions.
   b. Uninstall the earlier version of the Avamar Plug-in for Oracle 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 versions provides instructions.
2. Install the new version of the Avamar Client for Windows and Avamar Plug-in for Oracle:

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 Avamar Plug-in for Oracle in the same directory on each node in the cluster. Installing the Avamar Plug-in for Oracle on Windows on page 44 provides instructions.

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

d. Use the Cluster Configuration Tool to install the Avamar cluster client on an active node. Configuring the Avamar cluster client on Windows on page 45 provides instructions.

Uninstalling the Avamar Plug-in for Oracle on Windows

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

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

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

The *EMC Avamar Administration Guide* provides more information.

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

Uninstalling on a stand-alone Windows server

You use the Windows uninstall feature to uninstall the Avamar Client for Windows and Avamar Plug-in for Oracle software.

Procedure

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

Uninstalling the cluster client

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 Client for Windows and Avamar Plug-in for Oracle software from each node.

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 2012, open the **Start** screen and select **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 **EMC Avamar Backup Plug-in for Oracle** and click **Next**.

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

5. Ensure that the status of all nodes is Up, and then click **Next**.

   The **Operations** page appears.

6. Select **Remove the Oracle Virtual Client from all nodes in cluster** and click **Next**.

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

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

   The **Summary** page appears.

8. Review the configuration settings and click **Uninstall**.

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

9. Click **Close**.

10. Uninstall the Avamar Plug-in for Oracle from each node by using **Programs and Features**.

11. Uninstall the Avamar Client for Windows from each node by using **Programs and Features**.

Excluding Oracle directories from file system backups

You can optimize Oracle database backups and save storage space by creating a dataset that excludes the platform-specific file system from the Avamar Plug-in for Oracle backup.

Note

Including Oracle database files with the file system backup consumes storage space in the Avamar system and increases network traffic during the nightly backup window.

Create a dataset that excludes the entire root directory branch for each Oracle instance, and then assign the dataset to the Avamar client. For example, if the full pathname of a database instance is `/space/local/oracle/ora901`, exclude this directory in the Avamar dataset.

Procedure

1. Open the `oratab` file in a text editor and note the home directory for all Oracle database instances.

2. In Avamar Administrator, select **Tools** › **Manage Dataset**.

   The **Manage All Datasets** window appears.

3. Click **New**.

   The **New Dataset** dialog box appears.

4. 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 (-), and underscore (_). Do not use Unicode characters or the following special characters: ` ~ ! @ # $ % ^ & * ( ) = + [ ] { } | \ / ; : ' " ‹ › , ?

5. Click the **Source Data** tab.

The **Source Data** tab is where you define a list of source data plug-ins that contribute data to this dataset.

a. Select **Enter Explicitly** and select the plug-in from the **Select Plug-In Type** list.

b. To remove a plug-in from the dataset, select the plug-in from the list in the bottom portion of the **New Dataset** dialog box, and then click **-**. Repeat this step as necessary.

Note

The Avamar Plug-in for Oracle does not support include or exclude lists in datasets.

---

6. Click the **Options** tab and select the plug-in from the **Select Plug-In Type** list.

   The windows expands to display plug-in options.

7. Complete the following fields:

   a. Leave the **Oracle instance name** field blank. The Oracle instance name is filled in when the Oracle server is assigned to a group.

   b. (Optional) For Oracle 12c and later, if the Oracle user has `SYSBACKUP` privileges (instead of `SYSDBA`), select **SYSBACKUP privilege**.

   c. Type the username to use to authenticate the Oracle database in the **Username** field. If you leave the **Username** field blank, RMAN tries to log in with the same username and password that the Avamar client agent uses, and attempts to assume `SYSDBA` (or `SYSBACKUP`) privileges.

   d. Type the password for the account in the **Password** field.

   e. Click **OK**.

      The **New Dataset** dialog box closes. The new dataset appears in the left pane of the **Manage All Datasets** window.

8. Click **OK**.

   The **Manage All Datasets** window closes.

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

   The **Policy** window appears.

10. Click the **Policy Management** tab.

11. Click the **Clients** tab.

    The left pane contains a list of domains.

12. Click the domain that contains the Oracle server.

    A list of Avamar clients appears in a table to the right of the domains list.

13. Click the client that runs the Oracle server.

14. Select **Actions** › **Client** › **Edit Client**.

    The **Edit Client** dialog box appears.

15. In the **Edit Client** dialog box, complete the following setting:

    a. Click the **Dataset** tab.

    b. From the **Select An Existing Dataset** list, select the dataset you created in step 4 on page 49.

c. Select **Override group dataset**.

d. Click **OK**.

CHAPTER 3

Oracle RAC Configuration

This chapter includes the following topics:

Managing Oracle RAC on Linux or UNIX

The Avamar Plug-in for Oracle supports Oracle RAC configurations on HP-UX, IBM AIX, Linux, and Solaris systems. Before you can back up Oracle RAC configurations, you must run the `rac_config` script and register the client with the Avamar server.

Note

EMC recommends that you configure a shared `var` directory to ensure automatic failover for the Avamar agent if the active node goes down. If you do not configure a shared `var` directory, you must manually activate another node when the active node goes down. RAC Issues When Not Using Shared Var Directory on page 115 provides more information.

Running the rac_config script

To configure Oracle RAC on HP-UX, IBM AIX, Linux, or Solaris, you run the `rac_config` script on each RAC node. Specify the same shared Avamar `var` directory for each node that you configure.

Procedure

1. Log in to one of the Oracle RAC nodes as root.
2. Change the directory to `/usr/local/avamar/bin` by typing the following command:

   `cd /usr/local/avamar/bin`

3. Start the script by typing the following command:

   `./rac_config`

   The following output appears in the command shell:

   ```
   Enter the path of Oracle Clusterware Home : /u01/app/11.2.0/
   grid
   Using ORACLE_HOME : /u01/app/11.2.0/grid
   Setting PATH set for Oracle commands
   Oracle cluster version 11 R2
   Do you want to configure on a cluster shared filesystem?
   [y/n] [y]: y
   Enter the full path of var directory location[]:
   ```

4. Type the directory path, and then press **Enter**.

   The following output appears in the command shell:

   ```
   Enter the virtual hostname [vlrac1]:
   ```

   where *vlrac1* is the scan name for Oracle grid 11g R2.

5. Press **Enter** to accept the default virtual hostname.

   The following output appears in the command shell:

   ```
   Using vlrac1 as hostname
   ```

6. Repeat steps 2 through 5 on the other nodes.

Changing the listening port for RAC avagent

The `rac_config` script configures the system to use a fixed listening port number, 28003, for communication. Some RAC configurations might have firewall limitations that do not allow the use of the default listening port, 28003. In these instances, you can manually change the listening port to be a random port number by changing the value of the `--acport` option or by replacing the `--acport` option in the `avagent.cmd` file.

Changing the value of the acport option in the avagent.cmd file

Procedure

1. Log in to the Oracle RAC system as root.
2. Add the Oracle Clusterware Home directory to the `PATH` environment variable.
3. Stop the `avagent` process for RAC by typing the following command:

   ```
   crsctl stop resource EMCagent
   ```

4. Navigate to the shared `var` directory for RAC.

   This directory contains the `avagent.cmd` file.
5. Open the `avagent.cmd` file in an editor.
6. Change the value for the `--acport` option to a number between 28003 and 28008.
7. Save and close the `avagent.cmd` file.
8. Restart the `avagent` process for RAC by typing the following command:

   ```
   crsctl start resource EMCagent
   ```

Replacing the acport option in the avagent.cmd file

Procedure

1. Log in to the Oracle RAC system as root.
2. Stop the `avagent` process for RAC by typing the following command:

   ```
   crsctl stop resource EMCagent
   ```

3. Navigate to the shared `var` directory for RAC.

   This directory contains the `avagent.cmd` file.
4. Open the `avagent.cmd` file in an editor.
5. Replace the `--acport` line with the following two lines:

   ```
   --disable_nonlocal_listenport
   --disablegui
   ```

6. Restart the `avagent` process for RAC by typing the following command:

   ```
   crsctl start resource EMCagent
   ```

Registering the Avamar client

After you run the `rac_config` script on each RAC node, you run the `avregister` command on one cluster node. The `avregister` command registers and activates the Avamar client with the Avamar server.

Procedure

1. Log in to one of the Oracle RAC nodes as root.

   Note

   Run `avregister` on one RAC node only.

2. Change the directory to `/usr/local/avamar/ora_rac/bin` by typing the following command:

   `cd /usr/local/avamar/ora_rac/bin`

3. Start the registration script by typing the following command:

   `./avregister`

   The following output appears in the command shell:

   ```
   === Client Registration and Activation
   This script will register and activate the client with the
   Administrator server.
   Enter the Administrator server address (DNS text name or
   numeric IP address, DNS name preferred):
   ```

4. Type the DNS hostname or IP address of the Administrator server, and then press **Enter**.

   The following output appears in the command shell:

   ```
   Enter the Avamar server domain [clients]:
   ```

5. Press **Enter** to accept the default domain (clients).

   The following output appears in the command shell:

   ```
   avagent.d Info: Server stopped. [ OK ]
   avagent Info <5241>: Logging to /usr/local/avamar/
   ora_rac/var/avagent.log
   avagent.d Info: Client activated successfully. [ OK ]
   avagent Info <5241>: Logging to /usr/local/avamar/
   ora_rac/var/avagent.log
   avagent Info <5417>: daemonized as process id 3385
   avagent.d Info: Server started. [ OK ]
   Registration Complete.
   ```

Results

Once you register the Avamar client with the Avamar server, `start.sh` runs and starts `EMCagent` as an Oracle Clusterware resource on the current node. Backups and restores connect to the RAC database instance on the active node. If the active node goes down, `EMCagent` automatically restarts on one of the other RAC nodes. The new node then automatically notifies Avamar server of the address change for the active node.

Changing the active node

You can make the inactive node the active node by restarting the `EMCagent` on the inactive node.

Procedure

1. Log in to the inactive cluster node as root.
2. Change the directory to the shared `var` directory.
3. Restart `EMCagent` by typing the following command:

   `./start.sh`

Removing the Oracle RAC configuration

You can use `rac_deconfig` to remove the Oracle RAC configuration from one node only or both nodes. If the `EMCagent` resource is online, you must first move it to a different node before running `rac_deconfig`.

Procedure

1. Log in to the registered node as root.
2. Change the directory to `/usr/local/avamar/bin` by typing the following command:

   `cd /usr/local/avamar/bin`

3. Stop `EMCagent` and remove it from the Oracle Clusterware resources by typing the following command:

   `./rac_stop`

   The following output appears in the command shell:

   ```
   /usr/local/avamar/bin/rac_stop
   Enter the path of Oracle Clusterware Home:
   ```

4. Run the `rac_deconfig` script by typing the following command:

   `./rac_deconfig`

   The following output appears in the command shell:

   ```
   avagent.d Info: Client Agent not running.
   [PASSED]
   ```

Results

The `rac_deconfig` script deletes the *`Avamar_install_dir`*`/ora_rac` directory.

Managing Oracle RAC on Windows Server 2008

The Avamar Plug-in for Oracle supports Oracle RAC configurations on Windows Server 2008 systems. Before you can back up Oracle RAC configurations on Windows Server

2008 systems, you must run `AvamarRACConfiguration.exe` on one Oracle cluster node.

Note

EMC recommends that you configure a shared `var` directory to ensure automatic failover for the Avamar agent if the active node goes down. If you do not configure a shared `var` directory, you must manually activate another node when the active node goes down. RAC Issues When Not Using Shared Var Directory on page 115 provides more information.

Running AvamarRACConfiguration.exe

`AvamarRACConfiguration.exe` is installed as part of the Avamar Plug-in for Oracle installation and is located in `C:\Program Files\avs\bin`. To configure Oracle RAC on Windows Server 2008, run `AvamarRACConfiguration.exe` on one Oracle cluster node.

Procedure

1. Log in to one of the Oracle cluster nodes as an administrator.
2. Double-click `C:\Program Files\avs\bin\AvamarRACConfiguration.exe`.

   The **Setup Avamar RAC Configuration for Windows** dialog box appears.
3. Select the correct name from the **Choose Oracle RAC Scan Name/Virtual** list:
   - For Oracle 11g R1, select the virtual hostname.
   - For Oracle 11g R2, select the scan name.
4. Type the full pathname and folder name for the `var` folder in the **Var folder** field.

   To browse the file system for the `var` folder, click **Browse** and select the `var` folder from the **File Open** dialog box.
5. Select the **Shared** checkbox if the `var` folder is a shared folder or disk.

   Note

   The **Change Avamar Server Registration** option is disabled if the Avamar server is not configured.
6. Type the DNS hostname or IP address for the Avamar server in the **Administrator server hostname or IP** field.
7. Type the port for the Avamar server in the **Administrative server listen port** field. The default value is 28001.
8. Type the domain name in the **Backup domain for this client** field. The default value is clients.
9. Select one or more nodes from the **Available Nodes** box.

   To select multiple entries, press and hold the **Ctrl** key while you select entries with the mouse.
10. Click **Configure**.

Starting the EMCagent clusterware resource

You start the EMCagent on one node only.

Procedure

1. Log in to one of the Oracle cluster nodes as an administrator.
2. Start EMCagent from the **Command Prompt** by typing one of the following commands:
   - For Oracle 11g R1, type the following command:

     crs_start EMCagent
   - For Oracle 11g R2, type following command:

     crsctl start resource EMCagent

Verifying the Oracle RAC configuration

After running AvamarRACConfiguration.exe and starting the EMCagent, verify the Oracle RAC configuration.

Procedure

1. Log in to the Oracle cluster node as an administrator.
2. Ensure that the Avamar Oracle RAC Backup Agent appears in the Windows Services list.
3. Verify that the EMCagent resource was added to Oracle Clusterware by typing one of the following commands:
   - For Oracle 11g R1, type the following command:

     crs_stat EMCagent
   - For Oracle 11g R2, type the following command:

     crsctl status resource EMCagent

Stopping the Oracle EMCagent

You stop the EMCagent from the Oracle cluster node.

Procedure

1. Log in to the Oracle cluster node where EMCagent is running as an administrator.
2. Stop EMCagent from the **Command Prompt** by typing one of the following commands:
   - For Oracle 11g R1, type the following command:

     crs_stop EMCagent
   - For Oracle 11g R2, type the following command:

     crsctl stop resource EMCagent

Adding a new node to an Oracle RAC configuration

You add a node to an Oracle RAC configuration by running `AvamarRACConfiguration.exe` on any one node.

Procedure

1. Stop `EMCagent` from the **Command Prompt** by typing one of the following commands:
   - For Oracle 11g R1, type the following command:

     `crs_stop EMCagent`
   - For Oracle 11g R2, type the following command:

     `crsctl stop resource EMCagent`
2. Use Avamar Administrator to deactivate the registered Oracle RAC client:
   a. In Avamar Administrator, click the **Policy** launcher button.

      The **Policy** window appears.
   b. Click the **Policy Management** tab.
   c. Click the **Clients** tab.
   d. Select the client from the table.
   e. Select **Actions** › **Client** › **Edit Client**.

      The **Edit Client** dialog box appears.
   f. Click the **Properties** tab.
   g. Clear the **Activated** checkbox.
3. Run `AvamarRACConfiguration.exe` on any one node.

   The **Cluster Configured Node** section displays all configured nodes.
   The **Oracle RAC Parameters, Logs/ Var Folder**, and **Registration** group boxes are disabled when you add a new node to a cluster configuration.
4. Select a node from the **Available Nodes** group box.

   To select multiple entries, press and hold the **Ctrl** key while you select entries with the mouse.
5. After you add the node to the configuration, start the `EMCagent` on any Clusterware node:
   - For Oracle 11g R1, type the following command:

     `crs_start EMCagent`
   - For Oracle 11g R2, type the following command:

     `crsctl start resource EMCagent`

Re-registering a node with a different Avamar server

Run to `AvamarRACConfiguration.exe` to re-register a RAC node with a different Avamar server.

Procedure

1. Stop `EMCagent` from the **Command Prompt** by typing one of the following commands:

- For Oracle 11g R1, type the following command:

  crs_stop EMCagent

- For Oracle 11g R2, type the following command:

  crsctl stop resource EMCagent

2. Run `AvamarRACConfiguration.exe`.

   The **Cluster Configured Nodes** group box display all configured nodes.

3. Select the **Change Avamar Server Registration** checkbox.

   The **Setup Avamar Oracle RAC Configuration for Windows** dialog box appears. Selecting the **Change Avamar Server Registration** option clears the nodes in the **Available Nodes** group box.

4. Type the DNS hostname or IP address for the Avamar server in the **Administrator server hostname or IP** field.
5. Type the port for the Avamar server in the **Administrative server listen port** field. The default value is 28001.
6. Type the domain name in the **Backup domain for this client** field. The default value is clients.
7. Click **Register**.
8. After the registration completes, start the `EMCagent` on any of the Clusterware nodes by typing one of the following commands:

   - For Oracle 11g R1, type the following command:

     crs_start EMCagent

   - For Oracle 11g R2, type the following command:

     crsctl start resource EMCagent

Resetting the Oracle RAC configuration

You cannot perform a reset operation on a node that is not a member of the cluster configuration.

Procedure

1. Log in to the Oracle cluster node as an administrator.
2. On any cluster node, run `AvamarRACConfiguration.exe`.

   The **Setup Avamar RAC Configuration for Windows** dialog box appears.

3. Click **Reset**.

   All the nodes in **Cluster Configured Nodes** group box are deleted and unregistered from the Avamar server.

CHAPTER 4

Backup

This chapter includes the following topics:

Creating the Oracle user account

If an Oracle user account with SYSDBA (or SYSBACKUP) privileges does not already exist, you must create one. The Avamar software uses the Oracle account to perform database backups and restores.

Procedure

- Specify the username and password in the **Backup Command Line Options**, **Restore Command Line Options**, and **New Dataset** dialog boxes.

  Oracle documentation provides instruction for creating an Oracle user account.

  Note

  To use an RMAN catalog, you must configure the catalog.

Enabling Block Change Tracking

The Block Change Tracking feature can improve level 1 (differential and cumulative) backup performance by recording changed blocks in each datafile in a block change tracking file.

Procedure

1. Determine whether Block Change Tracking is enabled by typing the following command from an SQL prompt:

   ```
   select status from v$block_change_tracking;
   ```

   The STATUS column shows whether Block Change Tracking is enabled. The FILENAME column contains the file name of the block change tracking file. Oracle documentation provides more information about v$block_change_tracking.

2. Enable Block Change Tracking by typing the following command from an SQL prompt:

   ```
   alter database enable block change tracking using file 'filename';
   ```

   where *filename* is the absolute pathname of the file to be used for Block Change Tracking. Oracle uses this file to track datafile changes. Oracle documentation provides more information about Block Change Tracking.

   Note

   To schedule level 0, level 1 differential, and level 1 cumulative backups, create three backup schedules: one for level 0 backups, one for level 1 differential backups, and one for level 1 cumulative backups. Scheduling backups on page 69 provides more information.

Preparing the database for backup

Before you back up an Oracle database, you must prepare the database. You must determine whether the database is in ARCHIVELOG mode. If the database is not in

ARCHIVELOG mode, you must use the `alter database archivelog` command to set it.

Procedure

1. Connect to the database by typing the following command:

   sqlplus "/ as sysdba"

   The command prompt changes to the SQL prompt.

2. Determine if the Oracle database is in ARCHIVELOG mode by typing the following command:

   select log_mode from v$database;

   If archiving is not set for the database, screen output similar to the following output appears:

   ```
   LOG_MODE
   ----------
   NOARCHIVELOG
   ```

3. Shut down the database by typing the following command:

   shutdown immediate;

   The following information appears in the command shell:

   ```
   Database closed.
   Database dismounted.
   ORACLE instance shut down.
   ```

4. Start the database by typing the following command:

   startup mount;

   The following information appears in the command shell:

   ```
   ORACLE instance started.
   Total System Global Area 171966464 bytes
   Fixed Size 787988 bytes
   Variable Size 144964076 bytes
   Database Buffers 25165824 bytes
   Redo Buffers 1048576 bytes
   Database mounted.
   ```

5. Change the database archiving mode by typing the following command:

   alter database archivelog;

   The following information appears in the command shell:

   ```
   Database altered.
   ```

6. Open the database for normal operations by typing the following command:

   alter database open;

   The following information appears in the command shell:

   ```
   Database altered.
   ```

7. Disconnect from the database by typing the following command:

   exit

8. Back up the database by following the instructions in Performing on-demand backup on page 66.

Performing on-demand backup

An on-demand backup is a user-initiated backup of Oracle data 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. In Avamar Administrator, click the **Backup & Restore** launcher button.

   The **Backup, Restore and Manage** window appears.

2. Click the **Backup** tab.

   The top-left pane contains a list of domains.

3. Click the domain that contains the Oracle server.

   A list of Avamar clients appears in the pane below the domains list.

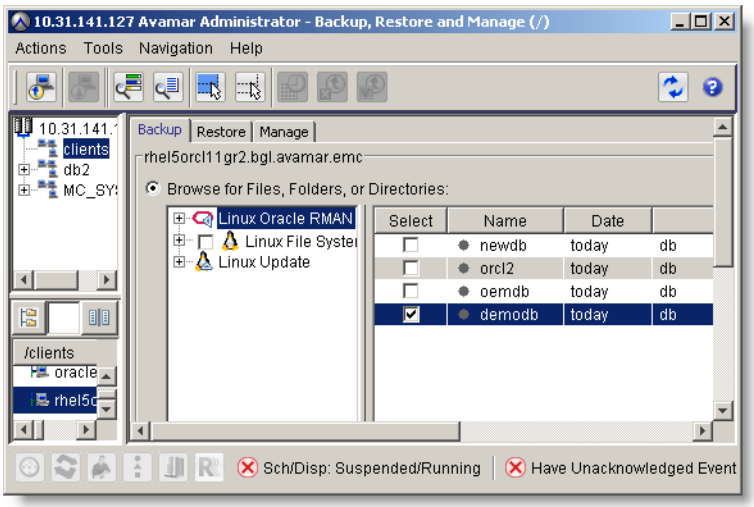
4. Click the client that runs the Oracle server.

   The plug-ins installed on the Oracle server appear in the left pane on the **Backup** tab.

5. Select the Oracle RMAN plug-in for the platform.

6. Select one or more databases for the backup.

   The following figure shows the **Backup, Restore and Manage** window after selecting the demodb database.



7. Select **Actions** › **Back Up Now**.

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

8. Select a retention policy setting for the backup:

   - To automatically delete this backup from the Avamar server after a specific amount of time, select **Retention period** and specify the number of days, weeks, months, or years for the retention period.
   - To automatically delete this backup from the Avamar server on a specific calendar date, select **End date** and browse to that date on the calendar.

- To keep this backup for as long as this client remains active in the Avamar server, select **No end date**.

9. From the **Avamar encryption method** list, select the encryption method to use for client/server data transfer during this backup.

   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 additional information.

10. Click **More Options**.

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

11. Set the plug-in options:

    a. Select **Show Advanced Options** to view advanced options.

    b. Leave the **Oracle Instance Name** field blank. The Avamar Plug-in for Oracle determines the Oracle instance name when you browse and select a target to back up.

    c. (Optional) For Oracle 12c and later, if the Oracle user has `SYSBACKUP` privileges (instead of `SYSDBA`), select **SYSBACKUP privilege**.

    d. Type the username to use to authenticate the Oracle database in the **Username** field. This is the user with `SYSDBA` (or `SYSBACKUP`) privileges.

    e. Type the password for the account in the **Password** field.

    f. Select the number of channels to allocate during the backup from the **Number of RMAN Channels** list. The maximum number is 10.

    Backup options on page 122 provides more information about the **Number of RMAN Channels** option.

    g. Select one or more backup options:

    - Select **Back up database** to back up the entire Oracle database.
    - Select **Back up archive logs** to back up only the archive logs.

      Archive backups are always full backups no matter which backup level you choose.
    - Select **Delete archive logs after backup** to automatically delete archive logs after a successful database backup.

      Note

      The selection of multiple options is cumulative. To back up the entire database and the archive logs, for example, select **Back up database** and **Back up archive logs**.

    h. (Linux and UNIX only) If the application bitness and OS bitness are not the same, select the appropriate setting from the **Media Management Library Bitwidth** list.

    If the application bitness and OS bitness are the same, leave the **Media Management Library Bitwidth** set to **Automatic**, the default setting.

    Note

    The **Management Library Bitwidth** option does not apply to Windows platforms.

i. Select **Exit a multiple target backup when any one backup fails** to prevent a multiple target backup from continuing after one of the backups fails.

j. Type the number of files that RMAN can open concurrently per channel in the **Filesperset** field. The default value is 1.

k. (Advanced option) Do not select the **Enable debugging message** option. This option is for troubleshooting backup problems. When you select the **Enable debugging messages** option, the Avamar Plug-in for Oracle creates large log files.

l. (Advanced option) Leave the **NLS_DATE_FORMAT** field blank.

m. (Advanced option) Select the appropriate option from the **Enhanced Data Deduplication** list:

- To use the global enhanced data deduplication setting already set on the server, select **Default**. This is the default setting.
- To back up the datafiles without using enhanced data deduplication, select **Disabled**.
- To use enhanced data deduplication for the backup, select **Enabled**.

n. Select a backup level from the **Incremental Backup** group box:

- **Full backup** backs up all the data in the database data files when you select the **Back up database** option.
- **Level 0** backup backs up all datafiles.

  You must perform a level 0 backup before you perform a level 1 (differential or cumulative) backup.
- **Level 1 differential backup** backs up only changed blocks of the database.
- **Level 1 cumulative backup** backs up all database blocks that have changed since the most recent level 0 backup.

Note

The Avamar Plug-in for Oracle supports incremental (level 0 and level 1) backups for Oracle 11g and later. To improve level 1 (differential or cumulative) backup performance, enable the `Block Change Tracking` feature. Enabling Block Change Tracking on page 64 provides more information.

o. (Optional) If you use a recovery catalog, select **Use recovery catalog** and complete the following fields:

- Type the recovery catalog service entry in the **Recovery Catalog Server Name** field.
- Type the recovery catalog username in the **Recovery Catalog User Name** field.
- Type the recovery catalog password in the **Recovery Catalog Password** field.

Note

The **Use recovery catalog** option uses the values in the **Recovery Catalog Server Name**, **Recovery Catalog User Name**, and **Recovery Catalog Password** fields to form a recovery catalog server connection string for RMAN.

p. (Advanced option) Complete options in the **Preprocessing Script** group box:

- Type the name of a preprocessing script in the **Run user-defined script at beginning of backup** field.

  The preprocessing script must be in the `/avamar/etc/scripts` directory on the client.
- Select **Exit backup if script fails** to stop processing the script when the script returns a non-zero status code.

Preprocessing and postprocessing scripts and attributes on page 128 provides more information about using scripts.

q. (Advanced option) Complete options in the **Postprocessing Script** group box:

- Type the name of a postprocessing script in the **Run user-defined script at end of backup** field.

  The postprocessing script must be in the `/avamar/etc/scripts` directory on the client.
- Select **Exit process with if script failure exitcode** to exit the script with an exitcode from the script rather than with the standard `avoracle` exitcode.

Preprocessing and postprocessing scripts and attributes on page 128 provides more information about using scripts.

r. Select **Store backup on Data Domain system** to store the backup on a Data Domain system instead of the Avamar server, and then select the Data Domain system from the list.

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

t. Click **OK** to close the **Backup Command Line Options** dialog box.

12. Click **OK** to close the **On Demand Backup Options** dialog box.

    The following status message appears:

    ```
    Backup initiated.
    ```

13. Click **OK**.

Scheduling backups

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

Procedure

1. Create a dataset for the backups.
2. Create a group for the backups.

   During the group creation process, you:

   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 one or more clients to the new group.

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

3. Enable scheduling for the group.

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.

3. 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 (-), and underscore (_). Do not use Unicode characters or the following special characters: ` ~ ! @ # $ % ^ & * ( ) = + [ ] { } | \ / ; : ' " ‹ › , ?

4. On the **Source Data** tab, select **Enter Explicitly**.
5. Select the Oracle RMAN plug-in for the platform from the **Select Plug-In Type** list.
6. Click **...** (the **Browse for files and/or folders** button).

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

7. Set the options in the **Select Files and/or Folder** dialog box:

   a. Select the domain to view the clients.

      A list of clients appears below the domain.

   b. Select the client that runs the Oracle server.

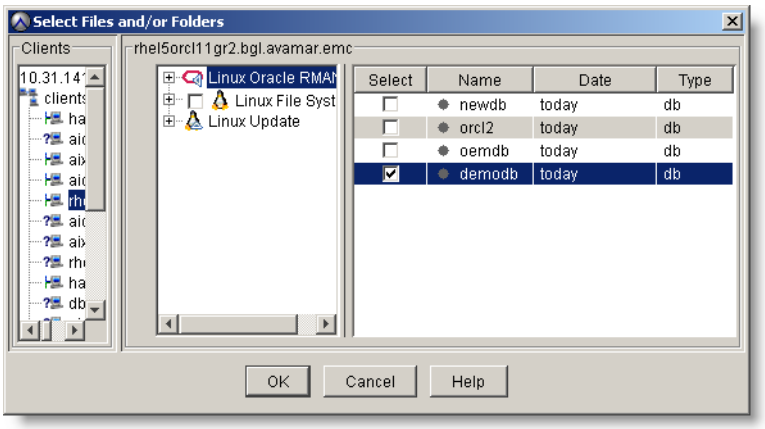
      A list of plug-ins appear in the pane to the right of the client's list.

   c. Click the Oracle RMAN plug-in.

      A list of databases appear in the table to the right of the plug-ins.

   d. Select one or more databases to include in the dataset.

      The following figure shows the **Select Files and/or Folders** dialog box after selecting the demodb database.



e. Click **OK**.

The **Select Files and/or Folders** dialog box closes and the **New Dataset** dialog box lists the files, folders, or databases that you selected.

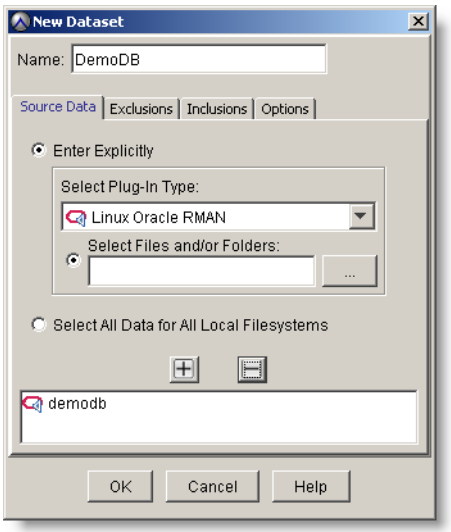
8. Remove all items from the source data list other than the Oracle databases:

a. Select an entry from the list.

b. Click -.

c. Repeat steps a and b to remove all other entries.

After removing non-database items, the **Source Data** tab should look similar to the following figure.



9. Leave the **Inclusion** and **Exclusion** tabs as they are. The Avamar Plug-in for Oracle does not support include or exclude lists.

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

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

The Oracle RMAN plug-in options appear.

b. Select **Show Advanced Options** to view advanced options.

c. Leave the **Oracle Instance Name** field blank. The Avamar Plug-in for Oracle determines the Oracle instance name when you browse and select a target to back up.

d. (Optional) For Oracle 12c and later, if the Oracle user has `SYSBACKUP` privileges (instead of `SYSDBA`), select **SYSBACKUP privilege**.

e. Type the username to use to authenticate the Oracle database in the **Username** field. This is the user with `SYSDBA` (or `SYSBACKUP`) privileges.

f. Type the password for the username account in the **Password** field.

g. Select the number of channels to allocate during the backup from the **Number of RMAN Channels** list. The maximum number is 10.

Backup options on page 122 provides more information about the **Number of RMAN Channels** option.

h. Select one or more backup options:

- Select **Back up database** to back up the entire Oracle database.
- Select **Back up archive logs** to back up only the archive logs.

  Archive backups are always full backups no matter what the backup level you choose.
- Select **Delete archive logs after backup** to automatically delete archive logs following a successful database backup.

Note

The selection of multiple options is cumulative. To back up the entire database and the archive logs, for example, select **Back up database** and **Back up archive logs**.

---

i. (Linux and UNIX only) If the application bitness and OS bitness are not the same, select the appropriate setting from the **Media Management Library Bitwidth** list. If the application bitness and OS bitness are the same, leave the **Media Management Library Bitwidth** set to the **Automatic**, the default setting.

Note

The **Media Management Library Bitwidth** option does not apply to Windows platforms.

---

j. (Optional) Select **Exit a multiple target backup when any one backup fails** to prevent a multiple target backup from continuing after one of the backups fail.

k. Type the number of files that RMAN can open concurrently per channel in the **Filesperset** field. The default value is 1.

l. Select a backup level from the **Incremental Backup** group box:

- **Full backup** backs up all the data in the database data files when you select the **Back up database** option.
- **Level 0 backup** backs up all datafiles.

  You must perform a level 0 backup before you perform a level 1 (differential or cumulative) backup.
- **Level 1 differential backup** backs up only changed blocks of the database.
- **Level 1 cumulative backup** backs up all database blocks that have changed since the most recent level 0 backup.

Note

The Avamar Plug-in for Oracle supports incremental (level 0 and level 1) backups for Oracle 11g and later. To improve level 1 (differential or cumulative) backup performance, enable the `Block Change Tracking` feature. Enabling Block Change Tracking on page 64 provides more information.

m. (Optional) If you use a recovery catalog, select **Use recovery catalog** and complete the following fields:

- In the **Recovery Catalog Server Name** field, type the recovery catalog service entry.
- In the **Recovery Catalog User Name** field, type the recovery catalog username.
- In the **Recovery Catalog Password** field, type the recovery catalog password.

Note

If you select the **Use recovery catalog** option, the **Recovery Catalog Server Name**, **Recovery Catalog User Name**, and **Recovery Catalog Password** settings are used to specify a recovery catalog server connection string for RMAN.

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

Note

Plug-in Options on page 121 provides more information about the Avamar Plug-in for Oracle plug-in options, including information about advanced options.

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

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

    The new dataset is added to the list of datasets in the **Manage All Datasets** window.

12. Click **OK** to close the **Manage All Datasets** window.

Creating a group

When you create a group, you define the dataset, schedule, and retention policy, which together comprise the group policy for scheduled backups of all members of the group. A group must contain at least one Avamar client. When the group contains two or more clients, the clients must belong to the same Avamar domain. You can override group policy settings at the client level.

You cannot edit schedules or retention policies when you use the **New Group** wizard to create a group. Review existing schedules and retention policies. If required, create new ones before you create the group. *EMC Avamar Administration Guide* provides information about schedules or 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. Select the domain for the group.

   The **Policy** window displays a table that contains groups for the domain.
5. Select **Actions** › **Group** › **New** › **Backup Group**.

   The **New Group** wizard appears.
6. Type a name for the new group in the **Name** box.

   The name can include alphanumeric characters (A-Z, a-z, 0-9) and the following special characters: period (.), hyphen (-), and underscore (_). Do not use Unicode characters or the following special characters: ` ~ ! @ # $ % ^ & * ( ) = + [ ] { } | \ / ; : ' " ‹ › , ?
7. Clear the **Disabled** checkbox to use this group for scheduled client backups.

   Selecting the checkbox disables backups for the group.
8. From the **Avamar encryption method** list, select the encryption method to use for client/server data transfer during this backup.

   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 additional information.
9. Select the dataset you created from the **Select an Existing Dataset** list, then and click **Next**.

   The next **New Group** page appears with schedule information.
10. Select a schedule from the **Select an Existing Schedule** list, and then click **Next**.

    The next **New Group** page appears with retention policy information.
11. Select a retention policy from the **Select an Existing Retention Policy** list, and then click **Next**.

    The final **New Group** page appears. A list of domains appears in the **Choose Domain** pane.
12. Select the domain for the client.

    A list of Avamar clients appears in the pane below the **Choose Domain** pane.
13. Select the checkbox next to the clients to include in the group.

    The clients appear in the **Members** pane.
14. (Optional)To remove a client from the group, select the client from the **Members** list, and then click the red **X**.
15. Click **Finish**.

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 domain for the Oracle server.
5. Select the group that you created.
6. 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.
7. Click **Yes** to enable this group.

Monitoring backups

You can monitor backups to ensure that the backups complete successfully and to troubleshoot issues. The **Activity Monitor** in Avamar Administrator enables you to view status information for both on-demand and scheduled backups.

Procedure

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

   The **Activity** window appears.
2. Click the **Activity Monitor** tab.

   A list of all activities appears.
3. To filter the results to display only backup activity, select **Actions** › **Filter**.

   The **Filter Activity** dialog box appears.
4. Select **All Backups** from the **Type** list.
5. Click **OK**.

Canceling backups

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

Procedure

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

   The **Activity** window appears.
2. Click the **Activity Monitor** tab.

   A list of all activities appears.
3. Select the backup from the list.
4. Select **Actions** › **Cancel Activity**.

   A confirmation message appears.
5. Click **Yes**.

Oracle RAC backup failures

An Oracle RAC backup fails when the Oracle instance on the active node goes down or when a node goes down. For each type of failure, you must restart the backup.

Restarting the backup after the active node's instance goes down

Procedure

1. Establish the active node by taking the appropriate action:
   - Restarting the instance on the active node.
   - Shutting down the current active node to enable one of the other nodes as the active node.
2. Start a new backup.

Restarting the backup after a node goes down

Procedure

- If the `var` directory is located on a shared file system, another node automatically takes over as the active node. You can then restart the backup.

  Note

  In this scenario, `EMCagent` is configured as an Oracle Clusterware resource.

- If `EMCagent` is not configured as an Oracle Clusterware resource and the `var` directory is not shared across all nodes:
  a. Activate the Avamar agent on one of the available nodes. RAC Issues When Not Using Shared Var Directory on page 115 provides more information.
  b. Restart the backup.

CHAPTER 5

Restore and Recovery

This chapter includes the following topics:

Preparing the database for recovery

Before you can use Avamar Plug-in for Oracle to recover data blocks from the flash recovery area or recover corrupt data blocks, you must configure the Oracle database.

Configuring Flashback Database recovery

Procedure

1. Set the database to `ARCHIVELOG` mode.
2. Enable the flash recovery area.

   The Oracle documentation provides instructions.
3. (For RAC configurations only) Configure the flash recovery area in a clustered file system or in ASM.
4. Start the database in mount state by using the `STARTUP` command with the `MOUNT` option.

   After the restore completes successfully, Avamar issues the command to open the database.

Configuring the database for corrupt block recovery

To configure the database for corrupt block recovery, set the `DB_BLOCK_CHECKSUM` initialization parameter to **`TYPICAL`** for the Oracle database. This parameter setting enables RMAN to detect both physical and logical corruption.

Preparing the database for restore

Before you restore an Oracle database, you must prepare the database depending on the types of activities you plan to perform.

Procedure

1. (VCS clusters only) To restore the Oracle database to a Solaris VCS cluster, stop the listener and other dependent processes. Otherwise, skip this step and continue with step 3.
2. (Raw devices only) Before you restore datafiles on a raw device, back up the files in the flash recovery area. Otherwise, skip this step and continue with step 3.

   Note

   For configurations in which you store the database on a raw file structure, Oracle recommends that you use a normal file system as the flash recovery area.
3. Ensure that `ORACLE_SID` is set correctly by typing the following command:

   `echo $ORACLE_SID`

   `$ORACLE-SID` must point to the correct system identifier to restore the Oracle database.
4. Complete the following steps to restore an Oracle Real Application Clusters (RAC) database:

a. Shut down all database instances on all nodes by typing the following commands:

```
sqlplus "/ as sysdba"
shutdown immediate;
exit
```

b. Start an instance without mounting the database on the registered node by typing the following commands:

```
startup nomount;
exit
```

c. Skip step 5 and continue with step 6.

5. To restore a non-clustered Oracle database, close the database and start an instance without mounting the database:

a. Connect to the database by typing the following command:

```
sqlplus "/ as sysdba"
```

The command prompt changes to the SQL prompt.

b. Shut down the database by typing the following command:

```
shutdown immediate;
```

The following information appears in the command shell:

```
Database closed.
Database dismounted.
ORACLE instance shut down.
```

c. Start the database by typing the following command:

```
startup nomount;
```

The following information appears in the command shell:

```
ORACLE instance started.
Total System Global Area 171966464 bytes
Fixed Size 787988 bytes
Variable Size 144964076 bytes
Database Buffers 25165824 bytes
Redo Buffers 1048576 bytes
Database mounted.
```

d. Disconnect from the database by typing the following command:

```
exit
```

The following information appears in the command shell:

```
Disconnected from Oracle Database 11g Enterprise Edition
Release 11.1.0.7.0
```

6. Move the existing datafiles (`*.dbf`), control files (`*.ctl`), redo log files (`*.log`), archive log files (`*.arc`), and autobackup files (`*.bkp`). The following commands move the existing database files to a convenient location:

```
mkdir $ORACLE_HOME/oradata/DB_NAME.saved
mv $ORACLE_HOME/oradata/DB_NAME/* \
$ORACLE_HOME/oradata/DB_NAME.saved
```

```
mkdir $ORACLE_HOME/flash_recovery_area/DB_NAME.saved
mv $ORACLE_HOME/flash_recovery_area/DB_NAME/* \
$ORACLE_HOME/flash_recovery_area/DB_NAME.saved
```

where *DB_NAME* is the database name in uppercase.

Note

The Oracle files can be in the default location or in a nondefault location. The default location of Oracle files varies depending on the version of Oracle. The previous commands use the default values for the directories.

For Oracle 11g R2, type the following additional commands:

```
mkdir $ORACLE_HOME/flash_recovery_area/db_name.saved
mv $ORACLE_HOME/flash_recovery_area/db_name/* \
$ORACLE_HOME/flash_recovery_area/db_name.saved
```

where *db_name* is the database name in lowercase.

Note

Starting with Oracle 11g R2, `flash_recovery_area` is referred to as `fast_recovery_area`.

The following directories are the default directories of the datafiles (`*.dbf`), control files (`*.ctl`), redo log files (`*.log`), archive log files (`*.arc`), and autobackup files (`*.bkp`):

- `$ORACLE_HOME/oradata/`*`DB_NAME`*
- `$ORACLE_HOME/flash_recovery_area/`*`DB_NAME`*

7. Restore the database to the `$ORACLE_HOME/oradata/`*`DB_NAME`* directory.

Restore types

Avamar Administrator supports the restore of a database backup from one system to another system or directory on the same system. The restore uses the same Oracle system identifier (SID) and database identification number (DBID) of the original database for the restored database.

Note

To perform a restore to a different client, prepare the target system by completing the instructions in Preparing the database for restore on page 78.

After preparing the database, you can restore database files to the original client or to a different client.

Restoring a database to the original client

You can restore Oracle databases to the original directory on the original client by using Avamar Administrator.

Procedure

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

   The **Backup, Restore and Manage** window appears.

2. Click the **Restore** tab.

   The top-left pane contains a list of domains.

3. Click the domain that contains the Oracle server.

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

   A list of Avamar clients appears in the pane below the domains list.

4. From the list of clients, select the client that runs the Oracle server.
5. Click the **By Date** tab.
6. Select the backup date from the calendar. Valid backups occurred on dates with a yellow highlight.

   A list of backups that were performed on that date appears in the **Backups** table next to the calendar.

7. Select a backup from the **Backups** table.

   The backup contents appear in the **Contents of Backup** pane.

8. Expand the folders in the **Contents of Backup** pane to display database SIDs.

   Note

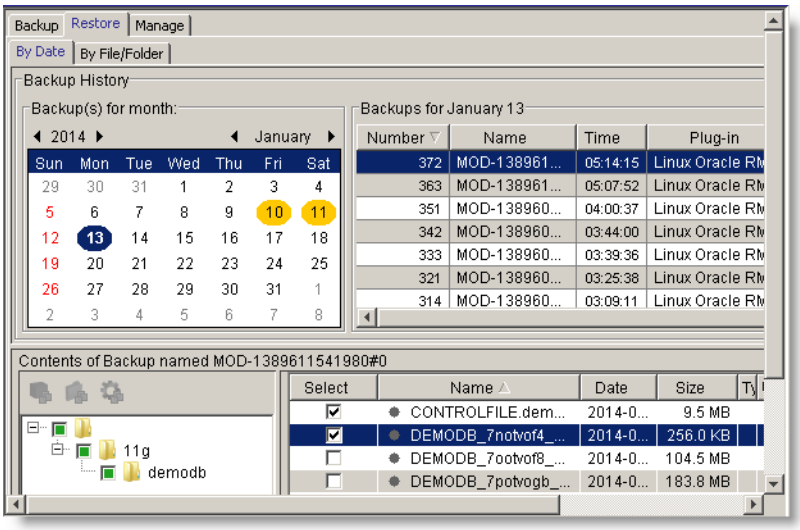
   For point-in-time recoveries, select only one database. Performing a point-in-time recovery of multiple databases is not supported.

9. Select a control file backup.

   Note

   You must select a control file for the restore to complete successfully.

   The following figure shows the **Backup, Restore and Manage** window after selecting a database and a control file.



10. Select **Actions** › **Restore Now**.

    The **Restore Options** window appears.

11. From the **Avamar encryption method** list, select an encryption method to use for client/server data transfer during the restore.

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

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

13. Click **More Options**.

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

14. Set the plug-in options:

    a. Select **Show Advanced Options** to view advanced options.

    b. Leave the **Oracle Instance Name** field blank. The Avamar Plug-in for Oracle determines the Oracle instance name when you browse and select a database to restore.

    c. (Optional) For Oracle 12c and later, if the Oracle user has `SYSBACKUP` privileges (instead of `SYSDBA`), select **SYSBACKUP privilege**.

    d. Type the username to use to authenticate the Oracle database in the **User Name** field. This is the user with `SYSDBA` (or `SYSBACKUP`) privileges.

    e. Type the password for the account In the **Password** field.

    f. (Linux and UNIX only) If the application bitness and OS bitness are not the same, select the appropriate setting from the **Media Management Library Bitwidth** list.

    If the application bitness and OS bitness are the same, leave the **Media Management Library Bitwidth** set to the **Automatic** (default).

    The **Management Library Bitwidth** option does not apply to Windows platforms.

    g. Select the number of channels to allocate during the restore from the **Number of RMAN Channels** list. The maximum number is 10.

    h. (Optional) Select **Exit a multiple target restore when any one restore fails** to prevent a multiple target restore from continuing after one of the restore operations fails.

i. (Advanced option) Do not select the **Enable debugging message** option. This option is for troubleshooting restore problems. When you select the **Enable debugging messages** option, the Avamar Plug-in for Oracle creates large log files.

j. (Advanced option) Type a timestamp format for the target database in the **NLS_DATE_FORMAT** field.

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

l. Select a **Recovery Type**:

- To recover the database to the present time or to a point-in-time in the past, select **Point-in-Time (PIT)**.

  Do not select multiple databases for a point-in-time recovery. You must select only one database for the restore.

- To recover data blocks from the flash recovery area, select **Flashback Database (FRA)**.

  You must configure flash recovery area before you can use the **Flashback Recovery (FRA)** recovery type. Configuring Flashback Database recovery on page 78 provides more information.

- (Advanced option) To restore corrupt blocks only, and not the entire database, select **Corrupt blocks**.

  To use the **Corrupt blocks** recovery option, you must set the `DB_BLOCK_CHECKSUM` initialization parameter to **`TYPICAL`** for the Oracle database. The database must be in a mounted or open state.

m. (Advanced option) Select **Validate database** if you selected **Corrupt blocks** from the **Recovery Type** group box.

The **Validate database** option is optional when you perform a corrupt block recovery. The restore operation is slower when you use the **Validate database** option.

n. Select an option from the **Recovery mode** list for the recovery type that you selected in step 13.l.

Recovery modes and values on page 127 provides more information about the **Recovery mode** options.

o. Specify the SCN, log sequence number, or timestamp in the **Recovery value** field. This value depends on the option you select from the **Recovery mode** list.

p. To open the database after the recovery finishes, select **Open the database with resetlogs after recovery**.

This option is selected by default.

Clear the **Open the database with resetlogs after recovery** option to disable this option. When you clear this option, the restore operation does not open the database with resetlogs. You can then apply archive logs to recover the database to the most current point-in-time that is available.

15. (Optional) Specify other advanced options in the **Restore Command Line Options** dialog box as appropriate:

a. To run a user-defined script at the beginning of the restore, type the script name in the **Run user-defined script at beginning of restore** field.

The script must be in the `avamar\etc\scripts` directory on the client.

b. Select **Exit restore if script fails** to stop the script from processing when the script returns a non-zero status code.

   This option is selected by default.

c. To run a user-defined script at the end of the restore, type the script name in the **Run user-defined script at end of restore** field.

   The script must be in the `avamar\etc\scripts` directory on the client.

d. Select **Exit process with script failure exitcode** to exit the script when it fails with an exitcode from the script rather than an exitcode from the Avamar Plug-in for Oracle.

   This option is selected by default.

   Preprocessing and postprocessing scripts and attributes on page 128 provides more information about using scripts and specifying attributes.

16. Specify the `[avoracle]lang_format` attribute and value if the database backup contains datafiles that use the UTF-8 character set:

a. Click **More**.

   The **Enter Attribute** and **Enter Attribute Value** fields appear.

b. Type **`[avoracle]lang_format`** in the **Enter Attribute** field.

Note

Precede all attributes you type in the **Enter Attribute** field with **`[avoracle]`**.

---

c. Type the appropriate value in the **Enter Attributes Value** field:

   `language_territory.charset`

   where:

   - *language* specifies the language. For example, Japanese.
   - *territory* specifies the country. For example, Japan.
   - *charset* specifies the character set. For example, JA16SJIS.

   The following example is the correct syntax for Japanese: **`Japanese_Japan.JA16SJIS`**.

Note

The use of the `[avoracle]lang_format` attribute and value sets the `NLS_LANG` environment variable for the restore. The Oracle documentation provides more information about `NLS_LANG`.

---

d. Click **+** (Add to List button).

   The `[avoracle]lang_format` attribute and value appear in the box below the **+** and **-** buttons.

   ORA-19870: error while restoring backup piece on page 138 provides more information about restoring datafiles that use the UTF-8 character set.

e. Click **OK** to close the **Restore Command Line Options** dialog box.

17. Click **OK** to close the **Restore Options** dialog box.

    The following status message appears:

    ```
    Restore initiated.
    ```

18. Click **OK**.

    Note

    If the restore process fails, manual recovery steps can be necessary. Restore fails to complete successfully on page 139 provides details.

19. (Solaris only) Restart the listener and other dependent processes if you restored a database to a Solaris VCS cluster.

Restoring a database to a different client

You can restore Oracle databases to a different client by using Avamar Administrator.

Before you begin

Before you restore the Oracle database, ensure that the following items on the target client match the source client:

- `ORACLE_HOME`
- `oradata`
- `flash_recovery_area` pathnames
- Database SID

Procedure

1. Prepare the target client by following the instructions in Preparing the database for restore on page 78.
2. In Avamar Administrator, click the **Backup & Restore** launcher button.

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

   The top-left pane contains a list of domains.
4. Click the domain that contains the Oracle server.

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

   A list of Avamar clients appears in the pane below the domains list.
5. From the list of clients, select the client that runs the Oracle server.
6. Click the **By Date** tab.
7. Select the backup date from the calendar. Valid backups occurred on dates with a yellow highlight.

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

   The backup contents appear in the **Contents of Backup** pane.
9. Expand the folders in the **Contents of Backup** pane to display database SIDs.

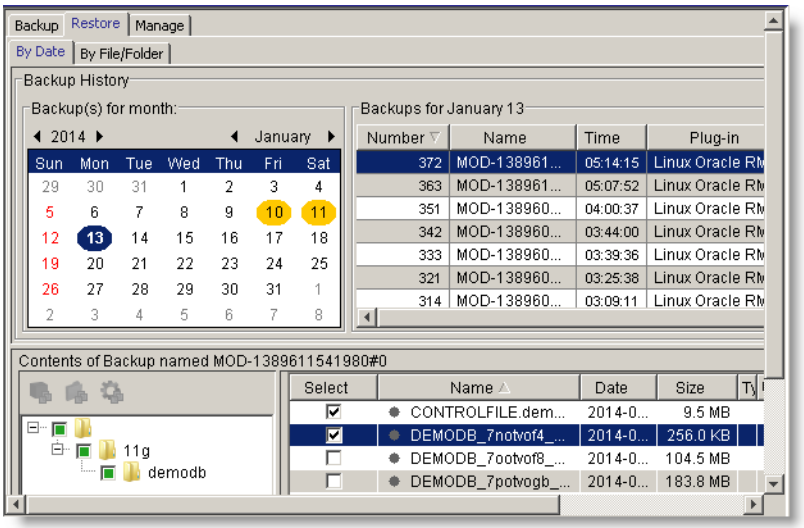
Note

For point-in-time recoveries, select only one database. Performing a point-in-time recovery of multiple databases is not supported.

10. Select one or more databases and a control file.

    You must select a control file for the restore to complete successfully.

    The following figure shows the **Backup, Restore and Manage** window after selecting databases and a control file.



11. Select **Actions** › **Restore Now**.

    The **Restore Options** dialog box appears.

12. Set options in the **Restore Options** dialog box:

    a. From the **Avamar encryption method** list, select an encryption method to use for client/server data transfer during the restore.

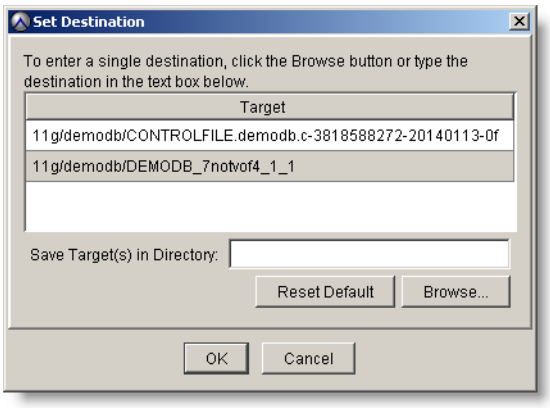
       The exact encryption technology and bit strength for a client/server connection depend on several factors, including the client platform and Avamar server version. The *EMC Avamar Product Security Guide* provides more information.

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

       Selecting **Restore everything to a different location** activates the **Reset Default** and **Set Destination** buttons

    c. Click **Set Destination**.

       The **Set Destination** dialog box appears.



d. Click **Browse**.

   The **Browse for File, Folder, or Directory** dialog box appears.

e. Select the target destination for the restore, and then click **OK**.

   The target appears in the **Save Target(s) in Directory** field.

f. Click **OK** to close the **Set Destination** dialog box.

   In the **Restore Options** dialog box, the **Destination** column in the Items **Marked for Restore** table contains the target destination.

g. Click **More Options**.

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

13. Set the plug-in options:

a. Select **Show Advanced Options** to view advanced options.

b. Leave the **Oracle Instance Name** field blank. The Avamar Plug-in for Oracle determines the Oracle instance name when you browse and select a database to restore.

c. (Optional) For Oracle 12c and later, if the Oracle user has `SYSBACKUP` privileges (instead of `SYSDBA`), select **SYSBACKUP privilege**.

d. Type the username to use to authenticate the Oracle database in the **User Name** field. This is the user with `SYSDBA` (or `SYSBACKUP`) privileges.

e. Type the password for the account In the **Password** field.

f. (Linux and UNIX only) If the application bitness and OS bitness are not the same, select the appropriate setting from the **Media Management Library Bitwidth** list.

   If the application bitness and OS bitness are the same, leave the **Media Management Library Bitwidth** set to the **Automatic** (default).

   The **Management Library Bitwidth** option does not apply to Windows platforms.

g. Select the number of channels to allocate during the restore from the **Number of RMAN Channels** list. The maximum number is 10.

h. (Optional) Select **Exit a multiple target restore when any one restore fails** to prevent a multiple target restore from continuing after one of the restore operations fails.

i. (Advanced option) Do not select the **Enable debugging message** option. This option is for troubleshooting restore problems. When you select the **Enable debugging messages** option, the Avamar Plug-in for Oracle creates large log files.

j. (Advanced option) Type a timestamp format for the target database in the **NLS_DATE_FORMAT** field.

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

l. Select a **Recovery Type**:

- To recover the database to the present time or to a point-in-time in the past, select **Point-in-Time (PIT)**.

  Do not select multiple databases for a point-in-time recovery. You must select only one database for the restore.

- To recover data blocks from the flash recovery area, select **Flashback Database (FRA)**.

  You must configure flash recovery area before you can use the **Flashback Recovery (FRA)** recovery type. Configuring Flashback Database recovery on page 78 provides more information.

- (Advanced option) To restore corrupt blocks only, and not the entire database, select **Corrupt blocks**.

  To use the **Corrupt blocks** recovery option, you must set the `DB_BLOCK_CHECKSUM` initialization parameter to **`TYPICAL`** for the Oracle database. The database must be in a mounted or open state.

m. (Advanced option) Select **Validate database** if you selected **Corrupt blocks** from the **Recovery Type** group box.

The **Validate database** option is optional when you perform a corrupt block recovery. The restore operation is slower when you use the **Validate database** option.

n. Select an option from the **Recovery mode** list for the recovery type that you selected in step 13.l on page 88.

Recovery modes and values on page 127 provides more information about the **Recovery mode** options.

o. Specify the SCN, log sequence number, or timestamp in the **Recovery value** field. This value depends on the option you select from the **Recovery mode** list.

p. To open the database after the recovery finishes, select **Open the database with resetlogs after recovery**.

This option is selected by default.

Clear the **Open the database with resetlogs after recovery** option to disable this option. When you clear this option, the restore operation does not open the database with resetlogs. You can then apply archive logs to recover the database to the most current point-in-time that is available.

14. (Optional) Specify other advanced options in the **Restore Command Line Options** dialog box as appropriate:

a. To run a user-defined script at the beginning of the restore, type the script name in the **Run user-defined script at beginning of restore** field.

The script must be in the `avamar\etc\scripts` directory on the client.

b. Select **Exit restore if script fails** to stop the script from processing when the script returns a non-zero status code.

This option is selected by default.

c. To run a user-defined script at the end of the restore, type the script name in the **Run user-defined script at end of restore** field.

The script must be in the `avamar\etc\scripts` directory on the client.

d. Select **Exit process with script failure exitcode** to exit the script when it fails with an exitcode from the script rather than an exitcode from the Avamar Plug-in for Oracle.

This option is selected by default.

Preprocessing and postprocessing scripts and attributes on page 128 provides more information about using scripts and specifying attributes.

15. Specify the `[avoracle]lang_format` attribute and value if the database backup contains datafiles that use the UTF-8 character set:

a. Click **More**.

The **Enter Attribute** and **Enter Attribute Value** fields appear.

b. Type **`[avoracle]lang_format`** in the **Enter Attribute** field.

Note

Precede all attributes you type in the **Enter Attribute** field with **`[avoracle]`**.

c. Type the appropriate value in the **Enter Attributes Value** field:

`language_territory.charset`

where:

- *language* specifies the language. For example, Japanese.
- *territory* specifies the country. For example, Japan.
- *charset* specifies the character set. For example, JA16SJIS.

The following example is the correct syntax for Japanese: **`Japanese_Japan.JA16SJIS`**.

Note

The use of the `[avoracle]lang_format` attribute and value sets the `NLS_LANG` environment variable for the restore. The Oracle documentation provides more information about `NLS_LANG`.

d. Click **+** (Add to List button).

The `[avoracle]lang_format` attribute and value appear in the box below the **+** and **-** buttons.

ORA-19870: error while restoring backup piece on page 138 provides more information about restoring datafiles that use the UTF-8 character set.

e. Click **OK** to close the **Restore Command Line Options** dialog box.

16. Click **OK** to close the **Restore Options** dialog box.

The following status message appears:

```
Restore initiated.
```

17. Click **OK**.

Note

If the restore process fails, manual recovery steps can be necessary. Restore fails to complete successfully on page 139 provides details.

18. (Solaris only) Restart the listener and other dependent processes if you restored a database to a Solaris VCS cluster.

Monitoring restores

You can monitor restores to ensure that the restores complete successfully and to troubleshoot issues. The **Activity Monitor** in Avamar Administrator enables you to view status information for restores.

Procedure

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

   The **Activity** window appears.
2. Click the **Activity Monitor** tab.

   A list of all activities appears.
3. To filter the results to display only restore activity, select **Actions** › **Filter**.

   The **Filter Activity** dialog box appears.
4. Select **Restore** from the **Type** list.
5. Click **OK.**

Canceling restores

You can cancel a restore any time before the restore completes. The cancellation can take five minutes or more. The restore might complete before the cancellation finishes.

Procedure

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

   The **Activity** window appears.
2. Click the **Activity Monitor** tab.

   A list of all activities appears.
3. Select the restore from the list.
4. Select **Actions** › **Cancel Activity**.

   A confirmation message appears.
5. Click **Yes**.

Performing a disaster recovery

With an effective data backup plan in place, you can successfully recover an Oracle server from a complete loss.

Procedure

1. Replace hardware if required.

   The hostname and IP address must be same as that of the original server.

2. Install the same version of the Avamar file system client and Avamar Plug-in for Oracle. Installation on page 29 provides instructions.

3. Register and activate the client with the same Avamar server.

   Note

   To resolve registration problems, retire the client and reregister it with the Avamar server.

   The *EMC Avamar Administration Guide* provides instructions for registering, retiring, and activating clients.

4. Install the same version of the Oracle software that was previously installed.

5. Set up the Oracle database:

   a. Ensure that you set the `ORACLE_HOME` to the same location as it was set to previously.

   b. Create the Oracle database with the same SID name that was used previously.

      Ensure that the `ORACLE_SID`, `oradata`, and `flash_recovery_area` pathnames are exactly the same as in the previous configuration.

6. Start the database in the `nomount` mode by typing the following command:

   ```
   startup nomount
   ```

7. Restore the server parameter file (`spfile`) by using the following RMAN script:

   ```
   connect target "/";
   set dbid=DBID;
   run{
   restore spfile to '/HOME/ORACLE/spfiletestdb.ora' from autobackup
   MAXSEQ=SEQ
   until time = "TO_DATE('DATE','YYYYMMDD')";
   }
   ```

   where:

   - *DBID* is the database ID.
   - */HOME/ORACLE* is the path for the `spfile` file.
   - *SEQ* is the highest sequence number for the control file autobackup search.
   - *DATE*, *YYYYMMDD* is the backup date.

8. Restore the Oracle database by completing the steps in Restoring a database to a different client on page 85.

CHAPTER 6

Backup and Restore with Oracle RMAN

This chapter includes the following topics:

Preparing the system for RMAN backups and restores

Before you use RMAN scripts to back up and restore Oracle data, you must prepare the system. This preparation includes creating an `avtar` flag file, defining backup channels, and specifying library path settings.

Before you begin

All RMAN backup and restore scripts in this chapter require an `avtar` flag file. When you use RMAN to back up or restore Oracle data, you must pass specific `avtar` options by using the `send` command. You include these `avtar` options in the `avtar` flag file, which is a text file.

Creating an avtar flag file

When you use RMAN to back up Oracle rather than Avamar Administrator, you must specify the backup expiration time. Otherwise, backups stored on the Avamar server never expire. You specify the backup expiration by including the `--expires` option for the `avtar` command in the `avtar` flag file. The `avtar` process reads the `avtar` flag file during RMAN backups and restores.

Note

Do not include the avtar `-c` and `-x` options in the `avtar` flag file. The `-c` and `-x` options might conflict with other `avtar` options specified for backup or restore operations that Avamar Administrator runs.

Procedure

1. Create a plain text file with a text editor.

   The remaining steps use `my-avtar-flags.txt` file as an example flag file.

2. Add the following entries to the text file:

   ```
   --pidname=Oracle
   --pidnum=pidnum
   --logfile=install-dir/var/avtar.log
   --vardir=install-dir/var
   --id=user
   --ap=password
   --path=/clients/my-db-client
   --expires={num-days |timestamp}
   ```

   where:

   - *pidnum* is the correct PID number for the operating system:
     - For Linux, use PID 1002.
     - For Solaris, use 2002.
     - For Windows, use 3002.
     - For HP-UX, use 4002.
     - For AIX, use 5002.

- *install-dir* is the base installation directory for the platform. For example, specify `/usr/local/avamar` on Linux, `/opt/AVMRclnt` on Solaris, `C:\Progra~1\avs\bin` on Windows, and so forth.
- *user* is an Avamar administrative user account.
- *password* is the Avamar administrative password.
- *my-db-client* is the Oracle database hostname.
- {*num-days* | *timestamp*} specifies backup expiration as the number of days from today (num-days) or an absolute timestamp.

3. To use an RMAN script to back up Oracle to Data Domain systems, add the following Data Domain-specific entries:

```
--ddr
--ddr-index=ddr-index
```

where *ddr-index* is the index number (1, 2, 3, and so forth) that you assign to the Data Domain system when you add it to the Avamar server configuration.

Note

Skip this step if you do not use a Data Domain system.

4. Save the file to `/oracle` or another convenient place in the search path.

Specifying the SBT_LIBRARY parameter

To use RMAN backup and restore scripts with the Avamar software requires you to define backup channels by using the `allocate channel` command. The `allocate channel` command must include a `PARMS` clause, which specifies the `SBT_LIBRARY` parameter.

Procedure

1. Set the `SBT_LIBRARY` parameter to point to the directory that contains the `libobk_avamar.so` file for 32-bit installations or the `libobk_avamar64.so` file for 64-bit installations:

```
SBT_LIBRARY=install-dir/lib/libobk_avamar.so
```

where *install-dir* is the base installation directory for the platform. For example, specify `/usr/local/avamar` on Linux, `/opt/AVMRclnt` on Solaris, `C:\Progra~1\avs\bin` on Windows, and so forth.

For 64-bit Oracle installations, use `libobk_avamar64.so` in place of `libobk_avamar.so`. On Windows, the equivalent libraries are `libobk_avamar64.dll` and `libobk_avamar.dll`.

2. Use the appropriate `allocate channel` command to define backup channels:
   - For IBM AIX, type the following command:

```
allocate channel c1 type sbt
PARMS="SBT_LIBRARY=/usr/local/avamar/lib/libobk_avamar.so";
```

   - For 64-bit HP-UX, type the following command

```
allocate channel c1 type sbt
PARMS="SBT_LIBRARY=/opt/AVMRclnt/lib/libobk_avamar64.so";
```

Specifying the library path settings

When RMAN loads `libobk_avamar.so` or `libobk_avamar64.so`, the path to the RMAN-dependent libraries must be communicated to the dynamic loader. The dynamic loader exits with a failure when it is unable to locate the libraries that `libobk_avamar.so` or `libobk_avamar64.so` requires. RMAN channel allocation, therefore, fails.

You use an environment variable to specify the location of the libraries. You must set the correct environment variable before an Avamar backup or restore operation runs an RMAN script. The location and the environment variable vary with each operating system. The following table lists the operating systems and the environment variables.

Table 3 Environment variables for libobk

Operating system	Environment variable
AIX	`LIBPATH`
HP-UX	`SHLIB_PATH`
Linux, Solaris	`LD_LIBRARY_PATH`

The library path is typically *`install-dir`*`/lib`, where *install-dir* is the base installation directory for the system. For example:

- On Linux, the path is `/usr/local/avamar`.
- On Solaris, the path is `/opt/AVMRclnt`.
- On Windows, the path is `C:\Progra~1\avs\bin`.

Procedure

1. Use the `set` and `export` commands (for the sh, ksh, or bash shell) or the `setenv` command (for the csh or bash shell) to set the library path variable.
2. Set the appropriate environment variable on the system. For example, to set the `LD_LIBRARY_PATH` variable on Solaris, use one of the following methods depending on the operating system shell:
   - For the sh, ksh, or bash shell, type the following command:

     ```
     set LD_LIBRARY_PATH=/opt/AVMRclnt/lib export LD_LIBRARY_PATH
     ```

   - For the csh or bash shell, type the following command:

     ```
     setenv LD_LIBRARY_PATH /opt/AVMRclnt/lib
     ```

Specifying the SECTION SIZE parameter for multisection backups

The `SECTION SIZE` parameter enables RMAN to create a multisection backup.

Procedure

- To set the `SECTION SIZE` parameter, add the following command to the RMAN backup script:

  ```
  backup section size sizespec database;
  ```

  where *sizespec* specifies the size of each backup section. For example: 250M.

The following example command creates a multisection backup of the database where each backup piece is 250M:

```
backup section size 250M database;
```

RMAN substitution variables %d and %U

You can use RMAN substitution variables `%d` and `%U` in an RMAN backup or restore script to ensure that the name of each backup piece is a unique name.

The name of a backup piece can be any name, as long as each backup piece has a unique name on the Avamar server.

- `%d` specifies the name of the database.
- `%U` specifies a unique Oracle system-generated file name.

You must specify both the `%d` and `%U` together to obtain a unique name. For example: **`format '%d_%U'`**.

Specifying RMAN parameters to improve performance

To improve performance, you can set RMAN parameters, such as `maxopenfiles` and `filesperset`, configure the database to skip certain file types, and use the `--before` and `--after` flags.

Specifying the maxopenfiles parameter

The `maxopenfile` parameter specifies the number of files that RMAN can open concurrently per channel.

Procedure

- To set the `maxopenfiles` parameter in an RMAN backup script, use the `allocate channel` or `configure channel` command. The following example uses the `allocate channel` command:

  ```
  allocate channel c0 maxopenfiles = 1 device type sbt;
  ```

  RMAN compares the value of the `maxopenfiles` parameter with the number of files in each backup set and uses the level of multiplexing as a minimum of two.

  Set the `maxopenfiles` parameter to 1 to disable multiplexing, which increases data deduplication performance. Disabling RMAN multiplexing results in more time to back up Oracle data because RMAN reads a single file instead of multiple files simultaneously.

Specifying the filesperset parameter

The `filesperset` parameter specifies the number of files that RMAN can include in each backup set.

Procedure

- To set the `filesperset` parameter in an RMAN backup script, use the `backup` command. The following example uses the `backup database` command:

```
backup filesperset = n database ...;
```

where *n* is the number of files RMAN includes in a backup set. The default value is 8.

Results

RMAN compares the value of the `filesperset` parameter with number of files to be backed up divided by the number of allocated channels, and then uses the lower of the two values. For example, if the total number of files to be backed up is 8, the number of channels is 1, and `filesperset` is 4, RMAN creates two backup sets each with four files.

Enabling RMAN backup optimization

Backups that use RMAN backup optimization skip any file that has not changed and has already been backed up to the allocated device type. A file can be a dbf file, an archived redo log, or an RMAN backup set.

Procedure

- Set the `CONFIGURE RETENTION POLICY` option:

  ```
  CONFIGURE RETENTION POLICY TO REDUNDANCY r
  ```

  where *r* is the redundancy setting.

Results

RMAN skips backups of offline or read-only datafiles only when there are *r*+1 backups of the files to SBT.

Setting backup optimization

To reduce backup time, enable the RMAN `backup optimization` feature.

Procedure

1. Open a command shell.
2. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.
3. Connect to the Oracle database to back up.
4. Type the following command:

   ```
   configure backup optimization on;
   ```

Guidelines for using RMAN backup optimization

The following guidelines apply to backups that use RMAN backup optimization:

Procedure

- Allocate only one type of channel. Do not mix disk and SBT channels in the same RMAN `backup` command.
- Run the `crosscheck` command periodically to synchronize the RMAN backup catalog with Avamar backups.

  Running the `crosscheck` command also ensures that RMAN does not skip a backup that has already expired in Avamar.
- Override RMAN backup optimization by specifying the force option with the RMAN `backup` command.

The Oracle documents provide more information about the RMAN backup optimization feature.

Specifying before and after flags to increase index lookup speed

The Avamar Plug-in for Oracle uses the `avtar --history` command to perform index lookups. This command can sometimes run slowly. To increase the index lookup speed, you can specify the `--before` and `--after` flags with the `send` command.

The Avamar Plug-in for Oracle runs the `avtar --history` command for each CLI backup and for each backup a restore retrieves. When a backup or restore involves hundreds of backups, the `avtar --history` command might take hours to run. The `avtar --history` command supports two time-range CLI flags:

- The `--before` flag instructs the `avtar` process to search only for backups that were created before the time specified by the `--before` flag.
- The `--after` flag instructs the `avtar` process to search only for backups that were created after the time specified by the `--after` flag.

The Avamar Plug-in for Oracle library, `libobk_avamar.x`, enables you to set the `--before` and `--after` flags for operations that perform an index lookup. The `libobk_avamar.x` uses the `--before` and `--after` flags to increase index lookup performance.

Procedure

- Do not set the `--before` or `--after` flags for backups. The `libobk_avamar.x` automatically sets these flags to the backup start time, which enables the backup index lookup to search only for backups created after the backup began.
- Set the `--before` or `--after` flags for restores with the `send` command in an RMAN script. The following RMAN script shows how to set the `--before` and `--after` flags:

```
connect target user/password@SID;
run {
allocate channel c1 type sbt
PARMS="SBT_LIBRARY=install-dir/lib/libobk_avamar.so";
send '"--after=2014-11-07 00:30:00" "--before=2014-11-11 01:00:00"
"--bindir=install-dir/avamar/bin" "--flagfile=my-avtar-flags.txt"';
restore datafile 4;
release channel c1;
```

Use the following time format for the `--before` and `--after` flags:

```
YYYY-MM-DD HH:MM:SS
```

Note

The smaller the time range between the `--before` and `--after` flags, the faster the searches.

- In addition to the `--before` and `--after` flags, use the `--nohist` flag to disable all index lookups for all operations. Set the `--nohist` flag with the `send` command in an RMAN script:

```
send '"--nohist" "--bindir=install-dir/avamar/bin"
"--flagfile=my-avtar-flags.txt"';
```

The `--nohist` flag does not require a value.

Results

When a backup or restore specifies all three flags, the `--nohist` flag takes precedence. The `--before` and `--after` flags are ignored.

Backing up Oracle data with RMAN

You can use RMAN scripts to back up an Oracle database, a tablespace, or a single datafile. You can specify an Avamar server or a Data Domain system as the target system for RMAN backup scripts.

Before you begin

All RMAN backup scripts in the following topics require an `avtar` flag file. Creating an avtar flag file on page 94 provides more information.

All Windows paths that you specify with the RMAN `send` command must use the 8.3 format.

Note

Avamar uses the RMAN interface to perform hot and cold backups. RMAN requires the Oracle database to be running to perform a hot backup.

Backing up a database

Procedure

1. Open a command shell.

   Note

   To back up the database by using a database control file instead of a recovery catalog, start RMAN by using the `nocatalog` option.

2. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.

3. Connect to the Oracle database to back up.
4. Back up the Oracle database by typing RMAN commands similar to the following commands:

```
run {
configure controlfile autobackup on;
allocate channel c1 type sbt\
PARMS="SBT_LIBRARY=install-dir/lib/libobk_avamar.so"\
format '%d_%U';
set controlfile autobackup format for device type sbt\
to "CONTROLFILE.%F";
send '"--flagfile=/oracle/my-avtar-flags.txt"\
"--bindir=install-dir/bin"';
```

```
backup database plus archivelog;
release channel c1;
}
```

where *install-dir* is the base installation directory for the platform. For example, specify `/usr/local/avamar` on Linux, `/opt/AVMRclnt` on Solaris, `C:\Progra~1\avs\bin` on Windows, and so forth.

Backing up a tablespace

The following procedure uses an RMAN script to back up a tablespace to an Avamar server or a Data Domain system.

An `avtar` flag file for the RMAN script specified in this procedure contains the following entries:

```
--debug
--pidname=Oracle
--pidnum=3002
--logfile=C:\test\rman\bacupdb.log
--vardir=C:\test\rman\var
--id=testuser@/clients/oraw2k864-mc2.bgl-avamar.emc
--password=testuser
--path=/clients/oraw2k864-mc2.bgl-avamar.emc
--server=avamar-1.emc.com
```

Note

To view the contents of a tablespace backup, use the `list backup` command. The `list backup` command lists all the datafiles and the control file that are part of the tablespace backup.

Procedure

1. Open a command shell.
2. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.
3. Connect to the Oracle database to back up.
4. Back up the Oracle tablespace by typing commands similar to the following RMAN commands:

```
run {
configure controlfile autobackup on;
set controlfile autobackup format for device type sbt to
'CONTROLFILE.ANT.%F';
allocate channel c0 type sbt
PARMS="SBT_LIBRARY=c:\PROGRA~1\avs\bin\orasbt64.dll"\
format '%d_%U';
send '"--prefix=11g/ANT/"
"--flagfile=c:\anant\rman\avtar-flags.txt"
"--bindir=c:\PROGRA~1\avs\bin"';
backup tablespace ant_ts;
```

```
release channel c0;
}
```

In the sample script, the database name is ANT and the tablespace name is ant_ts. The script backs up the tablespace and the database control file by using the `autobackup` option.

Backing up a datafile

Procedure

1. Open a command shell.
2. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.
3. Connect to the Oracle database to back up.
4. Back up the Oracle datafile by typing RMAN commands similar to the following commands:

```
run {
configure controlfile autobackup on;
allocate channel c1 type sbt\
PARMS="SBT_LIBRARY=install-dir/lib/libobk_avamar.so"\
format '%d_%U';
set controlfile autobackup format for device type sbt\
to "CONTROLFILE.%F";
send '"--flagfile=/oracle/my-avtar-flags.txt"\
"--bindir=install-dir/bin"';
backup datafile "MyFile.dbf";
release channel c1;
}
```

   where:

   - *install-dir* is the base installation directory for the platform. For example, specify `/usr/local/avamar` on Linux, `/opt/AVMRclnt` on Solaris, `C:\Progra~1\avs\bin` on Windows, and so forth.
   - *MyFile.dbf* is the Oracle datafile to back up.

Restoring Oracle data with RMAN

You can use RMAN scripts to restore an Oracle database, a tablespace, or a single datafile.

Before you begin

All RMAN backup scripts in the following topics require an `avtar` flag file. Creating an avtar flag file on page 94 provides more information.

The Oracle database you select to restore must be offline.

Restoring a database

To restore a database backup, you must specify a value from the control file name. Backups you perform from RMAN use the format, `c.DBID-DATE-SEQ`, for the control file

name. Backups you perform with Avamar Administrator add a prefix to the control file name.

You can modify the default RMAN format of the control file by passing directives to RMAN scripts.

Avamar Administrator generates scripts that contain the RMAN directive, `%F`:

```
set controlfile autobackup format for device type sbt\
to "CONTROLFILE.%F";
```

The `%F` directive combines the DBID, date, and sequence to form the following control file name:

```
CONTROLFILE.c.DBID-DATE-SEQ
```

The sample scripts in this guide assume this format for the control file name.

The control file name contains a prefix when you use a backup that you created with Avamar Administrator for the restore. You must then add the prefix to the `send` command. The prefix must be the first directive. The following `send` command specifies "11g/orcl" as the prefix for an Oracle 11g database with a SID of orcl:

```
send '"--prefix=11g/orcl/" "--flagfile=/oracle/my-avtar-flags.txt"\
"--bindir=install-dir/bin"';
```

The path that you specify by the `--prefix` option must contain a trailing slash (/). The direction of the slash does not change on Windows platforms.

The following procedure uses an RMAN script to restore an Oracle control file and database.

Procedure

1. Open a command shell.
2. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.
3. Connect to the Oracle database to restore.
4. List all available backups by typing the `list backup` command:

   ```
   list backup;
   ```
5. From the backup to be restored, retrieve the following information from the control file:
   a. Examine the database backup control file name.
   b. Note the values for the following variables:
      - *DATE*
      - *DBID*
      - *SEQ*

      Use the values of the *DATE*, *DBID*, and *SEQ* variables in the RMAN restore script.
6. Restore the Oracle control file by typing the following RMAN commands:

   ```
   set dbid=DBID;
   set controlfile autobackup format for device type sbt to\
   'CONTROLFILE.%F';
   run {
   allocate channel c1 type sbt\
   ```

```
PARMS="SBT_LIBRARY=install-dir/lib/libobk_avamar.so"\
format '%d_%U';
send '"--flagfile=/oracle/my-avtar-flags.txt"\
"--bindir=install-dir/bin"';
restore controlfile from autobackup MAXSEQ=SEQ\
until time = "TO_DATE('DATE','YYYYMMDD')";
startup mount;
release channel c1;
list backup;
}
```

where:

- *DBID* is the database ID.
- *install-dir* is the base installation directory for the platform. For example, specify `/usr/local/avamar` on Linux, `/opt/AVMRclnt` on Solaris, `C:\Progra~1\avs\bin` on Windows, and so forth.
- *YYYYMMDD* is a date.

The restore process copies the control file and puts the database in a mount state. A list of available database backups and corresponding system change numbers (SCN) appears in the command shell

7. Locate and note the SCN that corresponds to the backup to use for the recover process:
   - To recover an archive log backup, locate and note the next SCN for the archive log.
   - To recover from a database backup, locate and note the SCN for the database.
8. Log out of the RMAN session by typing the following command:

   ```
   exit
   ```

9. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.

10. Connect to the Oracle database to restore.
11. Restore the Oracle database by typing the following RMAN commands:

    ```
    run {
    allocate channel c1 type sbt PARMS="SBT_LIBRARY=install-dir\
    /lib/libobk_avamar.so" format '%d_%U';
    send '"--flagfile=/oracle/my-avtar-flags.txt"\
    "--bindir=install-dir/bin"';
    set until scn scn;
    restore database;
    recover database;
    release channel c1;
    }
    alter database open resetlogs;
    ```

    where:

    - *scn* is the next SCN value (noted in step 7) for the archive log recovery or the SCN value for the database.

- *install-dir* is the base installation directory for the platform. For example, specify `/usr/local/avamar` on Linux, `/opt/AVMRclnt` on Solaris, `C:\Progra~1\avs\bin` on Windows, and so forth.

Note

If the restore process fails, you might need to perform manual recovery steps. ORA-19870: error while restoring backup piece on page 138 provides more information.

Restoring a tablespace

You can use an RMAN script to restore a tablespace from an Avamar server or a Data Domain system.

Procedure

1. Open a command shell.
2. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.
3. Connect to the Oracle database to restore.
4. Restore the Oracle tablespace by typing the following RMAN commands:

```
run {
allocate channel c1 type sbt\
PARMS="SBT_LIBRARY=install-dir/lib/libobk_avamar.so"
format '%d_%U';
send '"--flagfile=/oracle/my-avtar-flags.txt"\
"--bindir=install-dir/bin"';
restore tablespace "USERS";
recover tablespace "USERS";
release channel c1;
}
```

   where:

   - *install-dir* is the base installation directory for the platform. For example, specify `/usr/local/avamar` on Linux, `/opt/AVMRclnt` on Solaris, `C:\Progra~1\avs\bin` on Windows, and so forth.
   - *USERS* is the tablespace to restore.

Restoring a tablespace to a specific time

You can use RMAN scripts to restore a tablespace to a specific point-in-time. You can restore a tablespace from an Avamar server or a Data Domain system.

Before you begin

The instructions to recover a tablespace to a specific point-in-time, require one or more of the following parameters:

- `DB ID` (database identification number)
- Control file `MAXSEQ` number

- SCN of the datafiles
- Latest timestamp

Listing information about the backup

Use the `list backup` command to obtain the parameters you need to recover a tablespace.

Procedure

1. Open a command shell and type the following `set` command:

   `set ORACLE_SID=`*`DB SID`*

   where *DB SID* is the database system ID (SID).

2. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.

3. Connect to the Oracle database.

4. Type the `list backup` command:

   `list backup;`

   The `list backup` command lists information similar to the following output:

```
BS Key  Type LV  Size   Device Type  Elapsed Time  Completion Time
------  ---- --  -----  -----------  ------------  ---------------
173      Full    2.25M   SBT_TAPE     00:00:08      07-SEP-14
BP Key: 173 Status: AVAILABLE Compressed: NO Tag: TAG20121007T2323
  Handle: ANT_6knn6l37_1_1 Media: avtar007

List of Datafiles in backup set 173
File LV   Type   Ckp SCN   Ckp Time    Name
---- --   ----   -------   --------    ------------------------
5         Full   1935412   07-SEP-14   C:\ORCL\ORADATA
\ANT_TS_DF.DBF
6         Full   1935412   07-SEP-14   C:\ORCL\ORADATA
\ANT_TS_DF2.DBF

BS Key Type LV Size Device Type Elapsed Time Completion Time
------ ---- -- ---- ----------- ------------ ---------------
174    Full    9.75M  SBT_TAPE    00:00:08     07-SEP-14
  BP Key: 174 Status: AVAILABLE Compressed: NO Tag:
TAG20121007T232335
  Handle: CONTROLFILE.ANT.c-107988049-20121007-0e Media: avtar007

SPFILE Included: Modification time: 07-SEP-14
SPFILE db_unique_name: ANT
Control File Included: Ckp SCN:1935425 Ckp time: 07-SEP-14
```

   From the `list backup` command's output, note the values for the *DB ID*, *MAXSEQ*, *SCN*, and timestamp parameters. For example, the sample output includes the following parameters values:

   - *DB ID* is 107988049.
   - Control file *MAXSEQ* number is 0e (14 in decimal).
   - *SCN* is 1935412.
   - Timestamp is 20121007T232335.

   You use these parameters in the tablespace restore script.

Restoring a tablespace to a specific point-in-time

Procedure

1. Start SQL*Plus.
2. Type the following SQL*Plus command to take the tablespace offline:

   ```
   alter tablespace tablespace-name offline;
   ```

   where *tablespace-name* is the name of the tablespace.
3. Type the following SQL*Plus command to shut down the database:

   ```
   shutdown immediate
   ```
4. Remove the tablespace datafiles and the control file from the `oradata` directory.
5. Type the following SQL*Plus command to start the Oracle instance in `nomount` mode:

   ```
   startup nomount;
   ```
6. Run the restore script to restore the control file. Then run the script that restores the tablespace. For more information about the restore scripts, review the following sample scripts:
   - Sample script to restore the control file on page 107
   - Sample script to restore the tablespace by using an SCN on page 108
   - Sample script to restore the tablespace by using a timestamp on page 108
7. Run the RMAN `recover database` command to recover the database:
   a. Log in to Oracle RMAN by using the Oracle user ID and password.

      The command prompt changes to an RMAN prompt.
   b. Connect to the Oracle database to restore.
   c. Type the `recover database` command:

      ```
      recover database;
      ```
8. Run the RMAN command to reset logs and open the database:

   ```
   alter database open resetlogs;
   ```

Sample script to restore the control file

```
connect target "/";
set dbid=107988049;
run{
set controlfile autobackup format for device type sbt to
'CONTROLFILE.ANT.%F';
allocate channel c0 type sbt\ PARMS="SBT_LIBRARY=c:\PROGRA~1\avs\bin
\orasbt64.dll"format '%d_%U';
send '"--prefix=11g/ANT/" "--flagfile=c:\anant\rman\avtar-flags.txt"
"--bindir=c:\PROGRA~1\avs\bin"';
restore controlfile from autobackup MAXSEQ=14 until
time="TO_DATE('20121007','YYYYMMDD')";
}
startup mount;
```

Sample script to restore the tablespace by using an SCN

```
connect target "/";
run {
allocate channel c0 type sbt PARMS="SBT_LIBRARY=c:\PROGRA~1\avs\bin
\orasbt64.dll" format '%d_%U';
send '"--prefix=11g/ANT/" "--flagfile=c:\anant\rman\avtar-flags.txt"
"--bindir=c:\PROGRA~1\avs\bin"';
set until scn 1935412;
restore tablespace ant_ts;
}
```

Sample script to restore the tablespace by using a timestamp

```
connect target "/";
run {
allocate channel c0 type sbt PARMS="SBT_LIBRARY=c:\PROGRA~1\avs\bin
\orasbt64.dll" format '%d_%U';
send '"--prefix=11g/ANT/" "--flagfile=c:\anant\rman\avtar-flags.txt"
"--bindir=c:\PROGRA~1\avs\bin"';
set until time "TO_DATE ('20141007 23:23:35','YYYYMMDD HH24:MI:SS')";
restore tablespace ant_ts;
}
```

Restoring datafiles

Procedure

1. Open a command shell.
2. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.
3. Connect to the Oracle database to restore.
4. Restore the Oracle datafile by typing the following RMAN commands:

   ```
   run {
   allocate channel c1 type sbt\
   PARMS="SBT_LIBRARY=install-dir/lib/libobk_avamar.so"\
   format '%d_%U';
   send '"--flagfile=/oracle/my-avtar-flags.txt"\
   "--bindir=install-dir/bin" "--labelnum=num"';
   restore datafile "MyFile.dbf";
   recover datafile "MyFile.dbf";
   release channel c1;
   }
   ```

   where:

   - *install-dir* is the base installation directory for the platform. For example, specify `/usr/local/avamar` on Linux, `/opt/AVMRclnt` on Solaris, `C:\Progra~1\avs\bin` on Windows, and so forth.
   - *num* is the backup number from which you want to restore.
   - *MyFile.dbf* is the Oracle datafile you want to restore.

Using advanced restore commands

You can restore a database by using the recovery catalog. Restore the database to the original location or to a different client system.

Before you begin

All RMAN restore scripts in the following topics require an `avtar` flag file. Creating an avtar flag file on page 94 provides more information.

Using the catalog for backup and restores

Before you begin

To use a catalog for restore, add the connect catalog string after the connect target string. For example, you can specify the following commands:

```
connect target user/password@mydb;
connect catalog catuser/catpassword@catalog;
```

Procedure

1. Open a command shell.
2. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.
3. Restore the Oracle database by typing the following RMAN commands:

   ```
   Connect catalog user/passwd@CATALOG;
   run {
   allocate channel c1 type sbt\
   PARMS="SBT_LIBRARY=install-dir/lib/libobk_avamar.so"\
   format '%d_%U';
   send '"--flagfile=/oracle/my-avtar-flags.txt"\
   "--bindir=install-dir/bin"';
   restore database;
   recover database;
   release channel c1;
   }
   ```

   where:

   - *user* and *passwd* are the credentials for the recovery catalog (CATALOG).
   - *install-dir* is the base installation directory for the platform. For example, specify `/usr/local/avamar` on Linux, `/opt/AVMRclnt` on Solaris, `C:\Progra~1\avs\bin` on Windows, and so forth.

Performing a redirected restore

You can use RMAN to restore Oracle to a different client system. This type of restore is known as a directed restore.

Before you begin

The system environment must meet the following requirements to restore Oracle to a different client system:

- Both the source and target platforms must be similar types with the same configuration.
- The version of RMAN on the target platform must be compatible with the version of RMAN that was used to create the backup.

Procedure

1. Open a command shell.
2. On the target system, create an `avtar` flag file.

   This file is the same as the one described in Creating an avtar flag file on page 94, except for the `--id`, `--ap`, and `--path` entries, which refer to the original client system (where the backup was originally performed), not the target system.
3. Save the changes.
4. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.
5. Create an empty database on the target system with the same SID as the original database.
6. Shut down the database and delete all control files, datafiles, logs, and FRA contents corresponding to the database.
7. Restart the database with the `nomount` option.
8. Restore the database by using the flag file. Restoring a database on page 102 provides instructions.

Managing backup retention

RMAN supports two types of retention policies: recovery window and redundancy.

The recovery window policy specifies a period of time that begins with the current time and extends backward in time to the point of recoverability. For example, a recovery window policy can be seven days. The redundancy policy specifies the number of backups that are kept for the database. The default retention policy keeps one backup. As backups accumulate, older backups become obsolete according to the retention policy. RMAN uses `crosscheck` and `delete` operations to manage backups stored on the Avamar server:

- Crosscheck operations verify that backups on the Avamar server exist. Crosscheck operations also work for backups created by Avamar Administrator.
- Delete operations remove expired backups from the Avamar server if the backups are marked as obsolete. Delete operations do not work for backups created by Avamar Administrator.

Configuring retention policies

To use the `crosscheck` command to verify backups performed by Avamar Administrator, you must configure an Avamar retention policy and an RMAN retention policy.

Configuring an Avamar retention policy

Procedure

1. In Avamar Administrator, select **Tools** › **Manage Retention Policies**.

The **Manage All Retention Policies** window appears.

2. Click **New**.

   The **New Retention Policy** dialog box appears.

3. Type a name in the **Name** field for the retention policy.

   Do not use any of the following characters in the retention policy name: ~!@$^%(){}[]|,`;#\/:*?<>'"&.

4. To configure a basic retention policy, select the appropriate option from the **Basic Retention Policy** group box:

   - To automatically delete backups after a specific number of days, weeks, months, or years, select **Retention period** and specify the number of days, weeks, months, or years.
   - To automatically delete backups on a specific calendar date, select **End date** and browse to that date on the calendar.
   - To keep backups for as long as a client remains active, select **No end date**.

5. To configure advanced retention settings:

   a. Select **Override basic retention policy for scheduled backups**.

   b. Click **Advanced**.

      The **Edit Advanced Retention Policy** dialog box appears.

   c. Specify the maximum number of daily, weekly, monthly, and yearly backups to retain.

   d. Click **OK**.

      The **Edit Advanced Retention Policy** dialog box closes.

6. Click **OK**.

   The new retention policy appears in the **Manage All Retention Policies** dialog box.

Configuring an RMAN retention policy

Procedure

1. Open a command shell.
2. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.

3. Connect to the Oracle database.
4. Create a retention policy by using the appropriate command. The following commands are examples:

   ```
   CONFIGURE RETENTION POLICY TO REDUNDANCY 2;
   CONFIGURE RETENTION POLICY TO RECOVERY WINDOW OF 3 DAYS;
   ```

   Ensure that the RMAN retention period and the Avamar retention policy are as close as possible to the same length of time.

Crosschecking backups

The `crosscheck` command verifies that backups on the Avamar server exist. RMAN marks the backup as available or expired upon successful completion of this command.

When the `crosscheck` command is unable to connect to the Avamar server, the operation fails.

When you back up a database from Avamar Administrator, the Avamar Plug-in for Oracle adds a prefix to the name of the backup file. To crosscheck this type of a backup, ensure that you add the prefix to the `avtar` flag file. The prefix you specify by the `avtar` flag file must match the prefix of the Avamar Administrator backup.

Procedure

1. Open a command shell.
2. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to and RMAN prompt.
3. Connect to the Oracle database.
4. Verify a backup by typing the following RMAN commands:

   ```
   allocate channel for maintenance type sbt
   PARMS="SBT_LIBRARY=install-dir/lib/libobk_avamar.so";
   send '"--flagfile=/oracle/my-avtar-flags.txt"\
   "--bindir=/usr/local/avamar/bin"';
   crosscheck backup device type sbt;
   ```

   where *install-dir* is the base installation directory for the platform. For example, specify `/usr/local/avamar` on Linux, `/opt/AVMRclnt` on Solaris, `C:\Progra~1\avs\bin` on Windows, and so forth.

Deleting backups

To delete backups, the Avamar user account must have the `delete` privilege. This user account is the account that corresponds to the `--id` value in the `avtar` flag file. When you run the `delete` command from an account that does not have the `delete` privilege, the `avtar` program issues a warning, not an error.

Before you begin

The following procedure requires an `avtar` flag file. Creating an avtar flag file on page 94 provides more information.

To add the `delete` privilege to the Avamar user account, use the `avmgr` command:

```
avmgr chgv --u=name --pv=delete
```

where *name* is the name of the user account.

Note

The `delete` command deletes expired backups from the Avamar server if the backups are marked as obsolete. Use the `delete` command only to manage RMAN backups. The use of the `delete` command to manage backups originally created by Avamar Administrator can cause unpredictable system behavior.

Procedure

1. Open a command shell.
2. Log in to Oracle RMAN by using the Oracle user ID and password.

   The command prompt changes to an RMAN prompt.

3. Connect to the Oracle database.
4. Delete an expired backup by typing the following RMAN commands:

```
run {
allocate channel c1 type sbt
PARMS="SBT_LIBRARY=/install-dir/lib/libobk_avamar.so";
send '"--flagfile=/oracle/my-avtar-flags.txt"\
"--bindir=/usr/local/avamar/bin"';
delete expired backupset;
}
```

where *install-dir* is the base installation directory for the platform. For example, specify `/usr/local/avamar` on Linux, `/opt/AVMRclnt` on Solaris, `C:\Progra~1\avs\bin` on Windows, and so forth.

Mixing RMAN and Avamar Administrator backups

Do not back up Oracle by using both RMAN and Avamar Administrator. You can, however, recover backups you create with Avamar Administrator by using RMAN.

Synchronizing the RMAN catalog

You can synchronize the RMAN catalog by using the `report obsolete` command or the `crosscheck` command.

To keep the RMAN catalog synchronized with the Avamar server, use either of the following methods.

Procedure

- Use the `report obsolete` command followed by the `delete obsolete` command.

  RMAN determines which backups have fallen outside of the retention policy, and then deletes them from its catalog and the Avamar server.

- Use the `crosscheck` command followed by the `delete expired` command.

  RMAN determines which backups are available on the Avamar server, and then updates its catalog accordingly.

Allocating multiple channels

An RMAN backup script that specifies multiple channels runs multiple instances of the `avtar` program in parallel. The maximum number of channels is 10.

To avoid cache file collisions, specify a separate cache file for each channel including cases where you only use one channel. The `cacheprefix` directive determines the name of the cache file. Use a separate set of cache files for each database.
You might lock out processes by allocating too many channels, which can result in a time-out error. If a time-out error occurs, retry the operation by using fewer channels.

Create an RMAN script to use multiple channels.

Procedure

1. Disable the file cache by adding the following entry to the `avtar` flag file:

```
--enable-filecache=false
```

2. Create an RMAN script that includes `allocate channel` commands similar to the following commands:

```
allocate channel c0 type sbt
PARMS="SBT_LIBRARY=/usr/local/avamar/lib/libobk_avamar64.so"
format '%d_%U';
allocate channel c1 type sbt
PARMS="SBT_LIBRARY=/usr/local/avamar/lib/libobk_avamar64.so"
format '%d_%U';
allocate channel c2 type sbt
PARMS="SBT_LIBRARY=/usr/local/avamar/lib/libobk_avamar64.so"
format '%d_%U'
```

3. Repeat the `allocate channel` command to allocate more channels, if required.
4. Add a `send` command to the RMAN script for each channel. For example, the following `send` commands correspond to the channels specified in step 2.

```
send channel='c0' '"--flagfile=/oracle/my-avtar-flags.txt"
"--bindir=install-dir/bin" "--cacheprefix=orcl-c0"';
send channel='c1' '"--flagfile=/oracle/my-avtar-flags.txt"
"--bindir=install-dir/bin" "--cacheprefix=orcl-c1"';
send channel='c2' '"--flagfile=/oracle/my-avtar-flags.txt"
"--bindir=install-dir/bin" "--cacheprefix=orcl-c2"';
```

   The script specifies a `cacheprefix` directive for each channel. If the `send` command is split into multiple instances, specify the `cacheprefix` directive only once for each channel.
5. Before running an RMAN script that allocates multiple channels, ensure the user account has permissions to create files in the *`install-dir`*`/var` directory or the cache files exists and has the correct permissions.

APPENDIX A

RAC Issues When Not Using Shared Var Directory

This appendix includes the following topics:

Configuring the plug-in without a shared var directory

You can configure the Avamar Plug-in for Oracle for RAC environments that do not use a shared `var` directory. When you do not use a shared `var` directory, you must manually activate another node when the active node goes down.

Installing the Avamar software

Install the Avamar client software and the Avamar Plug-in for Oracle for the platform on all nodes.

Installation on page 29 provides instructions.

Running the rac_config script

To configure Oracle RAC on HP-UX, IBM AIX, Linux, or Solaris, you run the `rac_config` script on each RAC node. You specify the same scan name or virtual name for each node.

Procedure

1. Log in to one of the RAC nodes as root.
2. Change to the directory that contains the `rac_config` script.
3. Start the script by typing the following command:

   `./rac_config`

   The following output appears in the command shell:

   ```
   sles11asm2:~ # /usr/local/avamar/bin/rac_config
   Enter the path of Oracle Clusterware Home :
   ```

4. Type the path for the Oracle Clusterware Home, and then press **Enter**.

   The following output appears in the command shell:

   ```
   Using ORACLE_HOME : /u01/grid/product/11gR2/crs/
   Setting PATH set for Oracle commands
   Oracle cluster version 11 R2
   Do you want to configure on a cluster shared filesystem?
   [y/n] [y]:
   ```

5. Type **n**, and then press **Enter**.

   The following output appears in the command shell:

   ```
   Not configuring EMCagent as cluster resource... Automatic
   failover not available...
   Enter the full path of var directory location[]:
   ```

6. Type the full path to the `var` directory, and then press **Enter**.

   The following output appears in the command shell:

   ```
   Using /home/oracle/lvar1 as var directory location
   Make sure the Cluster scan name is same across all nodes.
   Enter the cluster scan name [sles11-asmscan.bgl.avamar.emc]:
   ```

7. Type the cluster scan name (or the virtual name for Oracle versions 11g R1 and before), and then press **Enter**.

   The following output appears in the command shell:

```
Using sles11-asmscan.bgl.avamar.emc as hostname
```

8. Repeat steps 2 through 7 for all other RAC nodes.

Registering and activating the Avamar client

After you run the `rac_config` script on each RAC node, you run the `avregister` command on one cluster node. The `avregister` command registers and activates the Avamar client with the Avamar server.

Procedure

1. Log in to the first cluster node as root.
2. Change the directory to `/usr/local/avamar/ora_rac/bin` by typing the following command:

   `cd /usr/local/avamar/ora_rac/bin`

3. Start the registration script by typing the `avregister` command:

   `./avregister`

   The following output appears in the command shell:

   ```
   === Client Registration and Activation
   This script will register and activate the client with the
   Administrator server.
   Enter the Administrator server address (DNS text name or
   numeric IP address, DNS name preferred):
   ```

4. Type the DNS hostname or IP address of the Administrator server, and then press **Enter**.

   The following output appears in the command shell:

   ```
   Enter the Avamar server domain [clients]:
   ```

5. Press **Enter** to accept the default domain, or type the appropriate domain name, and then press **Enter**.

   The registration process runs to completion.

Results

The registration and configuration is complete. You can now back up and restore this node's RAC databases. Backup on page 63 and Restore and Recovery on page 77 provide more information.

Restoring a backup to the inactive node

To restore a backup to an inactive node in the RAC configuration, you deactivate the active node by using Avamar Administrator. Then you run the `avregister` command on the inactive node. The `avregister` command registers and activates the Avamar client with the Avamar server.

Deactivating the active node

Procedure

1. Log in to the active node.

2. Change the directory to `/usr/local/avamar/ora_rac/var` by typing the following command:

   `cd /usr/local/avamar/ora_rac/var`

3. Run the `deactivate.sh` script by typing the following command:

   `./deactivate.sh`

   The script runs to completion.

Registering and activating the inactive node

Procedure

1. Log in to the inactive node as root.
2. Change the directory to `/usr/local/avamar/ora_rac/bin` by typing the following command:

   `cd /usr/local/avamar/ora_rac/bin`

3. Start the registration script by typing the `avregister` command:

   `./avregister`

   The following output appears in the command shell:

   ```
   === Client Registration and Activation
   This script will register and activate the client with the
   Administrator server.
   Enter the Administrator server address (DNS text name
   or numeric IP address, DNS name preferred):
   ```

4. Type the DNS hostname or IP address of the Administrator server, and then press **Enter**.

   The following output appears in the command shell:

   ```
   Enter the Avamar server domain [clients]:
   ```

5. Type the same domain name that you specified for the first cluster node, and then press **Enter**.

   The registration process runs to completion.

6. Restore the backup. Restore and Recovery on page 77 provides instructions.

Removing the Avamar Plug-in for Oracle configuration

The `rac_deconfig` script removes the Oracle RAC configuration from the active and inactive nodes. After you run the `rac_deconfig` script, you uninstall the Avamar Plug-in for Oracle.

Removing the plug-in from the active node

Procedure

1. Log in to the active node as root.
2. Change the directory to `/usr/local/avamar/bin` by typing the following command:

cd /usr/local/avamar/bin

3. Run the `rac_deconfig` script by typing the following command:

   ./rac_deconfig

   The following output appears in the command shell:

   ```
   . avagent.d Info: Stopping Avamar Client Agent (avagent)...
   avagent.d Info:
   Client Agent stopped.
   avagent.d Info: Client Agent not running.
   [PASSED]
   ```

4. Uninstall the Avamar Plug-in for Oracle. Installation on page 29 provides specific uninstall instructions for each Linux or UNIX operating system.

Removing the plug-in from the inactive node

Procedure

1. Log in to the inactive node as root.
2. Change the directory to `/usr/local/avamar/bin` by typing the following command:

   cd /usr/local/avamar/bin

3. Run the `rac_deconfig` script by typing the following command:

   ./rac_deconfig

   The following output appears in the command shell:

   ```
   avagent.d Info: Client Agent not running
   [PASSED]
   ```

4. Uninstall the Avamar Plug-in for Oracle. Installation on page 29 provides specific instructions for each operating system.

APPENDIX B

Plug-in Options

This appendix includes the following topics:

How to set plug-in options

Plug-in options enable you to control specific actions for on-demand backups, restores, and scheduled backups. The plug-in options that are available depend on the operation type and client plug-in type.

You specify plug-in options in Avamar Administrator for on-demand backup or restore operations, or when you create a dataset for a scheduled backup. You set plug-in options with the graphical user interface (GUI) controls (text boxes, checkboxes, and radio buttons, and so forth). In addition to using the GUI controls for the options, you can type an option and its value in the **Enter Attribute** and **Enter Attribute Value** fields.

NOTICE

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

Detailed instructions on how to access and set plug-in options during a backup or restore are available in Backup on page 63 and Restore and Recovery on page 77.

Backup options

Backup plug-in options enable you to control backup functionality that is specific to the Avamar Plug-in for Oracle. You can specify plug-in options for on-demand and scheduled backups.

The following table lists options that are available for the Avamar Plug-in for Oracle when you perform an on-demand backup or when you configure dataset for scheduled backups.

Table 4 Backup plug-in options

Option	Description
Oracle Instance Name	Leave this field blank. The Avamar Plug-in for Oracle determines the Oracle instance name when you browse and select a target to back up.
Username	Specifies the username that is used to authenticate the Oracle database. Username and password comprise a connection string to Oracle. The connection string must specify a user that has backup privileges for the database. If left blank, RMAN tries to log in with the same username and password that the Avamar client agent uses and attempts to assume `SYSDBA` (or `SYSBACKUP`) privileges. Typically, this field should contain the special account name (backupuser). Creating the Oracle user account on page 64 provides more information.
Password	Specifies the password for the username account.
Number of RMAN Channels	Specifies the number of channels to allocate during a backup or restore. The maximum number is 10. The default is 1. This option impacts the number of streams that Data Domain systems use. The formula that determines the number of streams is: NUMBER OF RMAN CHANNELS x NUMBER OF DATA DOMAIN STREAMS.

Table 4 Backup plug-in options (continued)

Option	Description
	Note The number of Data Domain streams is set when you add a Data Domain system to the Avamar configuration. **Note** Allocating multiple channels for backups and restores can improve performance. Performance improvements for backups and restores, however, depend on the Oracle server configuration. In some instances, allocating too many channels can lock out processes, which can result in a time-out error. This problem does not occur when using RMAN scripts.
Back up database	Backs up the Oracle database. You can use this option by itself or with the **Backup archive logs** option.
Back up archive logs	Backs up Oracle archive logs. You can use this option by itself or with the **Back up database** option. **Note** The backup process does not use **Incremental Backup** options if you select only the **Back up archive logs** option.
Delete archive logs after backup	Automatically deletes Oracle archive logs after a successful database backup.
Media Management Library Bitwidth	Specifies Media Management Library (MML) bitwidth. Select an option: • **Automatic** (default) • **32-bit** • **64-bit** If the application bitness and OS bitness are not the same, select the appropriate setting from the **Media Management Library Bitwidth** list. If the application bitness and OS bitness are the same, leave the **Media Management Library Bitwidth** set to **Automatic**. **Note** The **Media Management Library Bitwidth** option is available for Linux and UNIX Oracle RMAN plug-ins. This option does not apply to Windows platforms.
Exit a multiple target backup when any one backup fails	Prevents a multiple target backup from continuing after one of the backups fails.
Enable debugging messages (advanced option)	Writes maximum information to log files. Use with caution.
NLS_DATE_FORMAT (advanced option)	Specifies a valid timestamp format for the target machine. For example: *mm*/*dd*/*yyyy*.
Enhanced Data Deduplication (advanced option)	Enables or disables data compression. During backups, enhanced data deduplication can reduce the amount of client data that is sent to the server, but might require additional client CPU resources. Select an option: • Select **Default** to use the global data compression setting already set on the server. This is the default setting.

Table 4 Backup plug-in options (continued)

Option	Description
	• Select **Disabled** to back up the datafiles without using compression. • Select **Enabled** to use enhanced data deduplication for the backup.
Full backup	Backs up all datafiles, redo logs, and archive logs. Full backups do not use the `Block Change Tracking` option. This option is the default.
Level 0 backup	Performs a level 0 backup. Level 0 backups back up all datafiles, redo logs, and archive logs. You must perform a level 0 backup before you perform a level 1 backup.
Level 1 differential backup	Backs up all database blocks that have changed since the most recent level 1 or level 0 backup. You must perform a level 0 backup before you perform a level 1 backup. Selecting the Level 1 backup option before you create a level 0 backup results in a level 0 backup.
Level 1 cumulative backup	Backs up all database blocks that have changed since the most recent level 0 backup.
Use recovery catalog	Select this option to use the values in the **Recovery Catalog Server Name**, **Recovery Catalog Username**, and **Recovery Catalog Password** fields to form a recovery catalog server connection string for RMAN. Using a recovery catalog server enables you to use specialized features of RMAN. A thorough discussion of these features is beyond the scope of this guide. The Oracle documentation provides more information.
Recovery Catalog Server Name	Specifies the recovery catalog server name.
Recovery Catalog Username	Specifies the recovery catalog username.
Recovery Catalog Password	Specifies the recovery catalog password.
Run user-defined script at beginning of backup (advanced option)	Specifies the name of a script that runs at the beginning of the backup. The preprocessing script must be in the `/avamar/etc/scripts` directory on the client.
Exit backup if script fails (advanced option)	Stops processing the script when the script returns a non-zero status code.
Run user-defined script at end of backup (advanced option)	Specifies the name of a script that runs at the end the backup. The postprocessing script must be in the `/avamar/etc/scripts` directory on the client.
Exit process with script failure exitcode (advanced option)	Exits the script with an exitcode from the script rather than with the standard `avoracle` exitcode.
Filesperset	Specifies the number of files that RMAN can include in each backup set. The default is 1.
Store backup on Data Domain system	Backs up the data to the Data Domain system rather than to the Avamar server. Select the checkbox, and then choose a Data Domain system from the list.
Encryption method to Data Domain system	Specifies the encryption method for data transfer between the client and the Data Domain system during the backup.
Show Advanced Options	Displays advanced options.

Specifying the channel_maxopenfiles option as normal text

The MAXOPENFILES parameter defines the number of files that RMAN can read and write simultaneously in each backup piece per channel. You can specify RMAN parameters for backups in Avamar Administrator by using avoracle flags in the avoracle.cmd file.

To modify the MAXOPENFILES value, specify the --channel_maxopenfiles flag in the avoracle.cmd file:

--channel_maxopenfiles=*value*

Tune the MAXOPENFILES value appropriately for the databases and hardware configuration. Specify the MAXOPENFILES value in the **Backup Command Line Options** dialog box.

Procedure

1. From the **Backup Command Line Options** dialog box, click **More**.

   The dialog box expands to display the **Enter Attribute** and **Enter Attribute Value** fields.
2. Type the **[avoracle]channel_maxopenfiles** option in the **Enter Attribute** field.
3. Type the number of files in the **Enter Attribute Value** field.
4. Click **+**.

   The option and value appear in the box below the **+** and **-** buttons.

Restore options

Restore plug-in options enable you to control restore functionality that is specific to the Avamar Plug-in for Oracle. You set restore options from the **Restore Command Line Options** dialog box.

The following table lists options for restore operations with the Avamar Plug-in for Oracle.

Table 5 Restore plug-in options

Option	Description
Oracle Instance Name	Leave this field blank. The Avamar Plug-in for Oracle determines the Oracle instance name when you browse and select a target to restore.
Username	Specifies the username that is used to authenticate the Oracle database. Username and password comprise a connection string to Oracle. The connection string must specify a user that has backup privileges for the database. If left blank, RMAN tries to log in with the same username and password that the Avamar client agent is running under, and attempts to assume SYSDBA (or SYSBACKUP) privileges. Typically, this field should contain the special account name (backupuser), Creating the Oracle user account on page 64 provides more information.
Password	Specifies the password for the username account.
Media Management Library Bitwidth	Specifies Media Management Library (MML) bitwidth. Choices are: • **Automatic** (default) • **32-bit** • **64-bit**

Table 5 Restore plug-in options (continued)

Option	Description
	If the application bitness and OS bitness are not the same, select the appropriate setting from the Media Management Library Bitwidth list. If the application bitness and OS bitness are the same, leave the **Media Management Library Bitwidth** set to the **Automatic**. **Note** The **Media Management Library Bitwidth** option is available for Linux and UNIX Oracle RMAN plug-ins. This option does not apply to Windows platforms.
Number of RMAN Channels	Specifies the number of channels to allocate during a backup or restore. The maximum number is 10. The default is 1. This option impacts the number of streams that Data Domain systems use. The formula that determines the number of streams is: NUMBER OF RMAN CHANNELS x NUMBER OF DATA DOMAIN STREAMS. **Note** The number of Data Domain streams is set when you add a Data Domain system to the Avamar configuration. **Note** Allocating multiple channels for backups and restores can improve performance. Performance improvements for backups and restores, however, depend on the Oracle server configuration. In some instances, allocating too many channels might lock out processes, which can result in a time-out error. This problem does not occur when using RMAN scripts.
Exit a multiple target restore when any one restore fails	Prevents a multiple target restore from continuing after one of the backups fails.
Enable debugging messages (advanced option)	Writes maximum information to log files. Use with caution.
NLS_DATE_FORMAT (advanced option)	Specifies a valid timestamp format for the target machine. For example: *mm*/*dd*/*yyyy*.
Encryption method from Data Domain system	Specifies the encryption method for data transfer between the Data Domain system and the client during the restore.
Point-in-Time (PIT)	Enables a point-in-time recovery. Do not specify a point-in-time option if you selected multiple databases for the restore. Before using a point-in-time recovery option, ensure that relevant backups are available on the Avamar server. The recovery operation fails if a backup has expired or has been deleted from the Avamar server.
Flashback Database (FRA)	Enables a flashback restore.
Corrupt blocks (advanced option)	Recovers corrupt blocks only, and not the entire database. To use the **Corrupt blocks** only option, you must set the `DB_BLOCK_CHECKSUM` initialization parameter to **`TYPICAL`** for the Oracle database. The database must be in a mounted or open state.
Validate database (advanced option)	Validates the database only if the option is selected during a corrupt blocks recovery
Recovery mode	Lists recovery modes for the **Point-in-Time (PIT)** and **Flashback Database (FRA)** recovery types. Select an option from the **Recovery mode** list. Recovery modes and values on page 127 provides more information.

Table 5 Restore plug-in options (continued)

Option	Description
Recovery value	Specifies the SCN, log sequence number, or timestamp, depending on which recovery mode is selected.
Open the database with resetlogs after recovery	Select this option to open the database after the recovery. Clear this option to enable a roll-forward operation to recover the database with archive log transactions.
Run user-defined script at beginning of restore (advanced option)	Specifies the name of a script that runs at the beginning of the restore. The preprocessing script must be in the `/avamar/etc/scripts` directory on the client.
Exit restore if script fails (advanced option)	Stops processing the script when the script returns a non-zero status code.
Run user-defined script at end of restore (advanced option)	Specifies the name of a script that runs at the end of the restore. The postprocessing script must be in the `/avamar/etc/scripts` directory on the client.
Exit process with script failure exitcode (advanced option)	Exits the script with an exitcode from the script rather than with the standard `avoracle` exitcode.
Show Advanced Options	Displays advanced options.

Recovery modes and values

The **Point-in-Time (PIT)** and **Flashback Database (FRA)** recovery types share recovery mode options.

The following table describes the recovery mode options and shows the relation each option has to each recovery type.

Table 6 Recovery mode options

Recovery mode options	Recovery value	Point-in-Time (PIT)	Flashback Database (FRA)
Backup Time (PIT only)	Recovers the database to the most recent SCN. The Avamar Plug-in for Oracle automatically determines the SCN from the control file.	X	
SCN	Recovers the database to the specified SCN: • To recover an archive log backup, type the next SCN for the archive log. • To recover only from a database backup, type the SCN for the database. Type the SCN in the **Recovery value** field.	X	X
Log Sequence	Recovers the database to the specified log sequence number. Specify the log sequence number in the **Recovery value** field.	X	X
Time Stamp	Recovers the database to the specified timestamp. The timestamp format must conform to the localization settings on the target machine and locale configuration setting for the Oracle server.	X	X
Restore Point	Recovers the database to the SCN associated with the specified restore point. The restore point can be an ordinary restore point or a guaranteed restore point.	X	X

Table 6 Recovery mode options (continued)

Recovery mode options	Recovery value	Point-in-Time (PIT)	Flashback Database (FRA)
Before SCN (FRA only)	Recovers the database to its state just before the specified SCN. Any changes at an SCN lower than that specified are applied. If there is a change associated with the specified SCN, it is not applied.		X
Before Log Sequence (FRA only)	Specifies a redo log sequence number and thread as an upper limit. RMAN applies changes up to (but not including) the last change in the log with the specified sequence and thread number.		X
Before Resetlogs (FRA only)	Recovers the database to its state including all changes up to the SCN of the most recent OPEN RESETLOGS.		X
Before Time Stamp (FRA only)	Recovers the database to its state including all changes up to but not including changes at the specified time.		X

Timestamp order of precedence rules

The timestamp order of precedence rules from highest to lowest are:

- Highest—A timestamp format specified by the **NLS_DATE_FORMAT** field (advanced option).
- Lower—A timestamp format specified by the `NLS_DATE_FORMAT` variable in environment settings.
- Lowest—The built-in default timestamp format uses american_america.us7asci.

The format is *MM DD YYYY HH24*:*MI*:*SS*:

- *MM* is a two-digit month.
- *DD* is a two-digit day of the month.
- *YYYY* is a four-digit year.
- *HH24* is the hour using a 24-hour format.
- *MI* is minutes.
- *SS* is seconds.

Preprocessing and postprocessing scripts and attributes

Preprocessing and postprocessing scripts are user-written shell scripts that you can run from Avamar Administrator when you perform backup and restore operations. You specify preprocessing or postprocessing scripts and attributes in the **Backup Command Line Options** dialog box or the **Restore Command Line Options** dialog box.

To specify preprocessing or postprocessing scripts, select **Show Advanced Options** in either of the two dialog boxes.

1. From the **Backup Command Line Options** or **Restore Command Line Options** dialog box, select **Show Advanced Options**.
2. Click **More**.

   The **Enter Attribute** and **Enter Attribute Value** fields appear.

The following table describes the attributes that you specify in the **Enter Attribute** and **Enter Attributes Value** fields.

Table 7 Preprocessing and postprocessing attributes

Attribute	Description
`run_at_start=`*`script_name`*	Specifies a script to run before a backup or restore operation. The user interface includes the **Run user-defined script at beginning of backup** and **Run user-defined script at beginning of restore** fields for this attribute.
`run_at_start_clause=`*`flags`*	Specifies flags to use with the `run_at_start` script.
`run_at_end=`*`script_name`*	Specifies a script to run after a backup or restore operation. The user interface includes the **Run user-defined script at end of backup** and **Run user-defined script at end of restore** fields for this attribute.
`run_at_end_clause=`*`flags`*	Specifies flags to use with the `run_at_end` script.
`run_before_database=`*`script_name`*	Specifies a script to run before a database backup or restore operation. When you specify multiple targets, the script runs for each database operation.
`run_before_database_clause=`*`flags`*	Specifies flags to use with the `run_before_database` script.
`run_after_database=`*`script_name`*	Specifies a script to run after a database backup or restore operation. When you specify multiple targets, the script runs for each database operation.
`run_after_database_clause=`*`flags`*	Specifies flags to use with the `run_after_database` script.

The following table describes flags that you specify for `run_at_start_clause`, `run_at_end_clause`, `run_before_database_clause`, and `run_after_database_clause` attributes.

Table 8 Attribute flags

Flag	Description	Usage	Default value
`desc`	Specifies a description for the script.	**`desc=`*`text string`***	Type of script being executed.
`env`	Specifies an environment variable to use.	**`env=variable_name=`*`value`***	None
`exit_on_error`	Set to `true` to exit the process if the preprocessing or postprocessing script fails.	**`exit_on_error=true`**	False
`skip_on_error`	Set to `true` to skip the next backup or restore component. The `skip_on_error flag` clause is valid only with the `run_before_database` attribute.	**`skip_on_error=true`**	False
`use_cscript` (Windows only)	Set to `true` to run the script with Microsoft `cscript.exe`.	**`use_cscript=`*`true`***	False
`use_cscript_raw` (Windows only)	Set to `true` to run the script with Microsoft `cscript.exe/nologo`.	**`use_cscript_raw=true`**	False

Table 8 Attribute flags (continued)

Flag	Description	Usage	Default value
`timeout_seconds`	Specifies the number of seconds a script has to complete before the plug-in considers the script as failed. The plug-in then terminates the script.	**`timeout_seconds=`*`num`***	1 hour (60 * 60 seconds)
`create_stdout_pipe`	Creates a `stdout` pipe for the script and sends output to the `avoracle` log file.	**`create_stdout_pipe=true`**	True
`create_stderr_pipe`	Creates a `stderr` pipe for the script and sends output to the `avoracle` log file.	**`create_stderr_pipe=true`**	True
`stringlist_args`	Set to `false` (default value) to split the specified argument's string into separate arguments. Set to `true` to use each argument's string as a separate argument to the script. Example of **`stringlist_args=false`**: **`[avoracle]run_at_start=script.bat First Second Third`** The plug-in passes `First`, `Second`, and `Third` as three command line parameters to `script.bat`. Example of **`stringlist_args=true`**: **`[avoracle]run_at_start=script.bat First Second Third`** The plug-in considers the script as a single file name. The arguments are not split. To pass arguments the correct way, use commas: **`[avoracle]run_at_start=script.bat,First,Second,Third`**	**`stringlist_args=true`**	False

Preprocessing and postprocessing usage examples

The following examples show how to specify preprocessing and postprocessing attributes in Avamar Administrator.

Running a preprocessing script before the backup

The **Run user-defined script at beginning of backup** field specifies a script that runs before the backup. Specifying a script in this field is equivalent to specifying a script with the `run_at_start` attribute.

To pass flags to a preprocessing script requires you to type attributes and values in the **Enter Attribute** and **Enter Attribute Value** fields. For example, the following procedure specifies attributes and flags that provide a description for the preprocessing script and a time-out of 60 seconds.

Procedure

1. From the **Backup Command Line Options** dialog box, select **Show Advanced Options**.
2. Type the name of the script in the **Run user-defined script at beginning of backup** field. This example uses `Avamar.bat` for the script:

   `Avamar.bat`
3. Type the following text after the name of the script:

   `First Second`

   `First` and `Second` correspond to the attributes and flags you pass to the script.

   The field now contains the following text:

   `Avamar.bat First Second`

   Note

   To pass a third attribute and flag, you append `Third` to the text string.
4. Click **More**.

   The **Enter Attribute** and **Enter Attribute Value** fields appear.
5. Type the `run_at_start_clause` attribute in the **Enter Attribute** field:

   `[avoracle]run_at_start_clause`

   You precede all attributes with **`[avoracle]`**.
6. Type the `desc` flag and value in the **Enter Attribute Value** field:

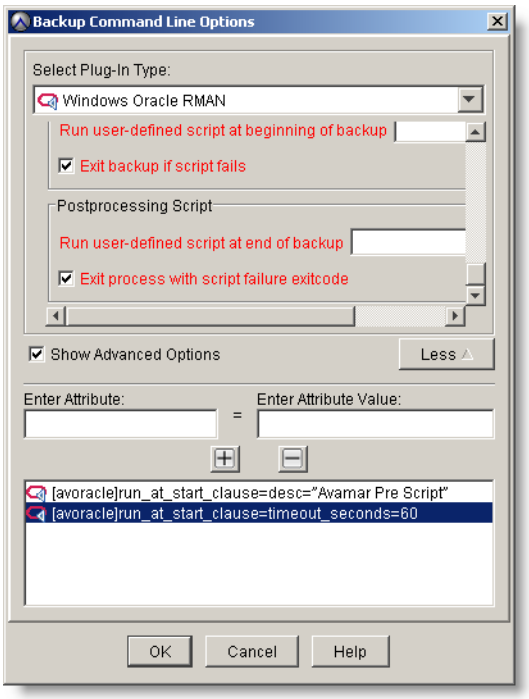
   `desc="Avamar Pre Script"`

   Enclose the text string in quotation marks.
7. Click **+**.
8. Type the `run_at_start_clause` attribute in the **Enter Attribute** field:

   `[avoracle]run_at_start_clause`
9. Type the `timeout_seconds` flag and value in the **Enter Attribute Value** field:

   `timeout_seconds=60`
10. Click **+**.

    The `run_at_start_clause` attributes and flags appear in the box below the **+** and **-** buttons.



11. Clear the **Exit backup if script fails** option to enable the backup to proceed if the script fails.

Running a postprocessing script after the backup

The **Run user-defined script at end of backup** field specifies a script that runs after the backup. Specifying a script in this field is equivalent to specifying a script with the `run_at_end` attribute.

The instructions for running a `run_at_end` script are the same as Running a preprocessing script before the backup on page 131.

Running a postprocessing script after each database backup

To run a postprocessing script after each backup requires you to type attributes and values in the **Enter Attribute** and **Enter Attribute Value** fields. For this type of operation you leave the **Run user-defined script at end of backup** field blank.

This procedure adds attributes and flags that run the `dbpostscript.bat` script after a database backup, sets the time-out to 200 seconds, specifies a description, and prevents the script's output from being written to the log file.

Procedure

1. From the **Backup Command Line Options** dialog box, select **Show Advanced Options**.
2. Click **More**.

   The **Enter Attribute** and **Enter Attribute Value** fields appear.
3. Type the `run_after_database` attribute in the **Enter Attribute** field:

   `[avoracle]run_after_database`
4. Type the script name, `first`, `second`, and `third` in the **Enter Attribute Value** field:

   `dbpostscript.bat first second third`

5. Click **+**.
6. Type the `run_after_database_clause` attribute in the **Enter Attribute** field:

   `[avoracle]run_after_database_clause`
7. Type the `desc` flag and value in the **Enter Attribute Value** field:

   `desc="Avamar post script after database"`
8. Click **+**.
9. Type the `run_after_database_clause` attribute in the **Enter Attribute** field:

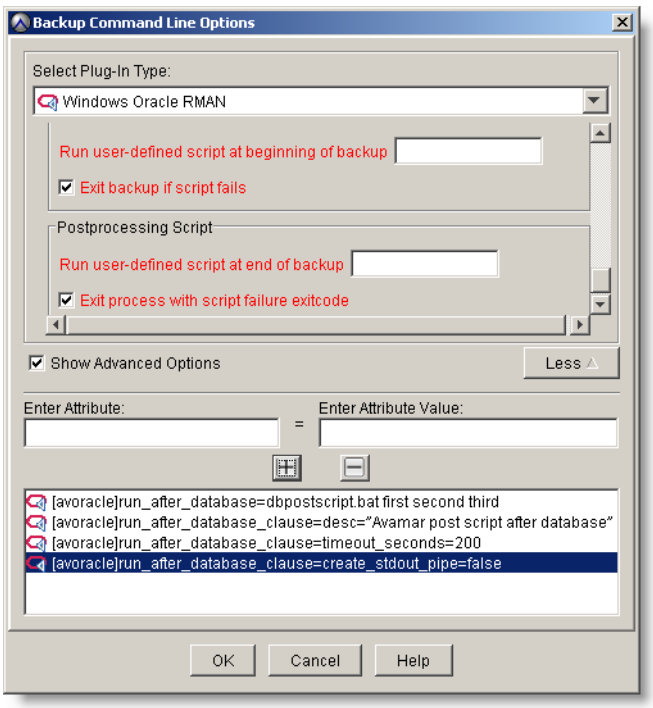
   `[avoracle]run_after_database_clause`
10. Type the `timeout_seconds` flag and value in the **Enter Attribute Value** field:

    `timeout_seconds=200`
11. Click **+**.
12. Type the `run_after_database_clause` attribute in the **Enter Attribute** field:

    `[avoracle]run_after_database_clause`
13. Type the `create_stdout_pipe` flag and value in the **Enter Attribute Value** field:

    `create_stdout_pipe=false`
14. Click **+**.

    The attributes and flags appear in the box below the **+** and **-** buttons.



Note

You do not need to specify the `exit_on_error` flag, because it is set to `false` by default.

APPENDIX C

Troubleshooting

This appendix includes the following topics:

Backup and restore problems and solutions

You can resolve common backup and restore problems with the following troubleshooting information.

avoracle Error ‹7936›: No valid targets found

A database restore fails with the following error:

```
avoracle Error <7936>: No valid targets found. Aborting the
operation
```

To work around this problem, increase the `snapupbrowsetimeoutsecs` option in Avamar Administrator:

1. From the **Restore Command Line Options** dialog box, click the **More** button.

   The dialog box expands to display the **Enter Attribute** and **Enter Attribute Value** fields.
2. Type the `[avoracle]snapupbrowsetimeoutsecs` option in the **Enter Attribute** field.
3. Type the number of seconds in the **Enter Attribute Value** field.
4. Click **+**.

   The option and value appear in the box below the **+** and **-** buttons.
5. Restart the restore.

Backups fail when backup copies is set to more than 1

In RMAN you can use the `BACKUP ... COPIES` command to make identical copies of backups. This ability to make copies is also known as backup duplexing.

If you configure backup copies to be more than 1 in RMAN, backups you perform with the Avamar Plug-in for Oracle fail. For example, the following RMAN command sets backup copies to 3:

```
CONFIGURE ARCHIVELOG BACKUP COPIES FOR DEVICE TYPE SBT_TAPE TO 3;
```

Backups that you run from Avamar Administrator or RMAN scripts that you run from the command line fail after setting backup copies to 3:

- For backups from Avamar Administrator, an error message similar to the following error appears in the `sbtio.log`:

  ```
  error 7501: Could not connect to avoracle
  ```
- For backups from the RMAN command line, an error message similar to the following error appears in the `avtar` log file:

  ```
  avtar Error <5064>: Cannot open file cache_filename
  ```

The Avamar Plug-in for Oracle does not support the RMAN backup copies feature.

To prevent this backup failure, do not configure backup copies to be more than 1. The Oracle RMAN documentation provides more information about the backup copies feature.

Note

To further protect the Oracle data beyond performing regular backups, consider using Avamar replication. The *EMC Avamar Administration Guide* provides more information about the Avamar replication feature.

Backups unavailable after registering secondary RAC node

Backups are unavailable after the following occurs:

- The Avamar `var` directory is accidentally deleted.
- You registered the secondary RAC node with a virtual hostname other than the original virtual hostname.

This problem applies only to Oracle 11g R1.

To prevent this problem, register the secondary node by using the original virtual hostname.

Cannot open file f_cache.dat error

The Avamar `activity.log` file contains `avtar` errors similar to the following:

```
avtar Info <8650>: Opening cache file /usr/local/avamar/var/
f_cache2.dat
avtar Error <5064>: Cannot open file "/usr/local/avamar/var/
f_cache2.dat"
avtar Error <0000>: Invalid cache file header for /usr/local/
avamar/var/f_cache2.dat, clearing the cache
avtar Info <5065>: Creating new paging cache file /usr/local/
avamar/var/f_cache2.dat
avtar Error <5803>: Error writing 32-byte header to cache
file /usr/local/avamar/var/f_cache2.dat.
```

These errors occur if the specified `var` directory does not have sufficient permissions for the Oracle user. The Oracle user requires read, write, and execute permissions for the `var` directory.

Specify the `/var/avamar/clientlogs` directory for backups that you perform from the RMAN CLI.

Backups with Avamar Administrator automatically access the cache files from the `/var/clientlogs` directory.

Cannot Sync error

If an RMAN session stops responding and a `Cannot Sync` message appears, try restarting RMAN by using `svrmgr`.

Hot backup fails with Oracle not available error

The Avamar Plug-in for Oracle uses Oracle RMAN for a hot backup. Oracle RMAN requires the Oracle database to be running for a hot backup.

If the database is not running, a hot backup will fail. Oracle RMAN then returns the following error:

```
Oracle not available
```

To start the Oracle database before a hot backup, use SQL*Plus:

1. Connect to the Oracle database by typing the following command:

   sqlplus "/as sysdba"

2. Start the Oracle database by typing the following command:

   startup;

   The startup process displays status information about the Oracle instance.

   ```
   ORACLE instance started.
   Total System Global Area1 023410176 bytes
   Fixed Size 1223224 bytes
   Variable Size 234882504 bytes
   Database Buffers 784334848 bytes
   Redo Buffers 2969600 bytes
   Database mounted
   ```

Level-1 backup of a large database fails with a snapview timeout

A level-1 backup of a large (300 GB) database that you perform from Avamar Administrator fails with a snapview timeout. This issue is specific to Windows.

The log file contains the following error messages:

```
2014-04-03 16:04:26 avoracle Error <7011>: Unable to
successfully process snapview workorder because of timeout on
wait for snapview workorder MOD-1364973477725#0 (pid:3002-
Oracle).
Please increase subprocess timeout using
--[avoracle]subprocesstimeoutsecs option and try again.
2014-04-03 16:04:26 avoracle Info <7271>: Final summary
generated subwork 1, cancelled/aborted 0, snapview 24,
exitcode 0
```

To work around this issue, set the `--[avoracle]subprocesstimeoutsecs` option to 350:

1. In the **Backup Command Line Options** dialog box, click **More**.

   The dialog box expands to display the **Enter Attribute** and **Enter Attribute Value** fields.

2. Type **`--[avoracle]subprocesstimeoutsecs`** in the **Enter Attribute** field.
3. Type **350** in the **Enter Attribute Value** field.
4. Click **+**.
5. Click **OK**.

ORA-19870: error while restoring backup piece

The restore of a database that contains datafiles that uses the UTF-8 character set fails with the following error messages:

```
channel c0: ORA-19870: error while restoring backup piece

ORCL_0vnahoeh_1_1ORA-19504: failed to create file
"/home/oracle/app/oracle/oradata/orcl/home/oracle/app/oracle/
product/11.2.0/dbhome_1/home/oracle/app/oracle/product/11.2.0/
dbhome_1/home/oracle/app/oracle/product/11.2.0/dbhome_1.dbf"
```

```
ORA-27040: file create error, unable to create file

Solaris-AMD64 Error: 2: No such file or directory failover to
previous backup released channel: c0

RMAN-00571: ===========================================
RMAN-00569: ===== ERROR MESSAGE STACK FOLLOWS =====
RMAN-00571: ===========================================
RMAN-03002: failure of restore command at 05/09/2014 10:01:35
RMAN-06026: some targets not found - aborting restore
RMAN-06023: no backup or copy of datafile 3 found to restore
RMAN-06023: no backup or copy of datafile 2 found to restore
RMAN-06023: no backup or copy of datafile 1 found to restore
```

Oracle requires you to set the `NLS_LANG` environment variable to the correct language, territory, and character set when the following configuration settings are true:

- The operating system is in a locale other than English.
- The database contains datafiles that use the UTF-8 character set.

ORA-25153: Temporary Tablespace is Empty

If you encounter a `ORA-25153 Temporary Tablespace is Empty` message, you must manually re-create the temporary tablespace.

The *Oracle Database Backup and Recovery Advanced User's Guide* provides more information about creating tablespaces.

ORA-27211: Failed to load Media Management Library

While backing up or restoring from either Avamar Administrator or the command line, RMAN fails to load the Media Management Library. In both cases, RMAN writes output similar to the following in the log file:

```
RMAN-00571: ===============================================
RMAN-00569: ========== ERROR MESSAGE STACK FOLLOWS ===========
RMAN-00571: ===============================================
RMAN-03009: failure of allocate command on c1 channel at
2014-9-4 20:27:34
ORA-19554: error allocating device, device type: SBT_TAPE,
device name: ORA-27211: Failed to load Media Management Library
Additional information: 25
Recovery Manager complete.
```

Restore fails to complete successfully

In rare situations, the restore process for a full database fails to complete successfully because of the internal state of the database when the backup occurred. When this happens, additional manual recovery steps can be necessary.

To restore a database after an unsuccessful restore attempt:

1. Restore the control file. Restoring Oracle data with RMAN on page 102 provides more information.
2. Note the system change number (SCN) that corresponds to the backups that you need to restore.

3. Log in to Oracle RMAN by using the Oracle user ID and password.
4. Connect to the Oracle database to restore.
5. Type the following commands:

```
allocate channel c1 type sbt PARMS="SBT_LIBRARY=install-dir\
/lib/libobk_avamar.so" format '%d_%U';
send '"--flagfile=/oracle/my-avtar-flags.txt"\
"--bindir=install-dir/bin"';
restore database;
restore archivelog until scn scn;
release channel c1;
}
```

   where:

   - *install-dir* is the base installation directory for the platform (for example, `/usr/local/avamar` on Linux, `/opt/AVMRclnt` on Solaris, and `C:\Program Files\avs\bin` on Windows).
   - *scn* is an SCN value noted in step 2 on page 139.
6. Use Oracle documentation to perform other necessary recovery steps.

RMAN backup script fails with media management errors

An RMAN script that you create from the **Schedule Backup** page in the Oracle Enterprise Manager does not include the RMAN `send` command. For example, the following script was generated by using the Oracle Enterprise Manager user interface:

```
run {
allocate channel oem_sbt_bkup1 type 'SBT_TAPE' format '%U'
parms
'"SBT_LIBRARY=/usr/local/avamar/lib/libobk_avamar64.so"';
backup incremental level 1 cumulative database;
backup archivelog all not backed up;
}
allocate channel for maintenance device type 'SBT_TAPE' parms
'"SBT_LIBRARY=/usr/local/avamar/lib/libobk_avamar64.so"';
delete noprompt obsolete recovery window of 31 days device type
'SBT_TAPE';
```

The script is missing the RMAN `send` command.

To work around this problem, use the **Edit RMAN Script** button from the Oracle Enterprise Manager to add the appropriate RMAN `send` command. Backup and Restore with Oracle RMAN on page 93 provides more information about creating RMAN scripts.

RMAN backup script fails with ORA-19511

An RMAN script that backs up Oracle fails with ORA-19511. RMAN writes output similar to the following to the log file:

```
RMAN-00571: ===========================================================
RMAN-00569: =========== ERROR MESSAGE STACK FOLLOWS ===========
RMAN-00571: ===========================================================
RMAN-03009: failure of backup command on ORA_SBT_TAPE_1 channel
at 2014-9-4 16:02:37
```

```
ORA-19506: failed to create sequential file,
name="06jtv7ks_1_1", parms=""
ORA-27028: skgfqcre: sbtbackup returned error
ORA-19511: Error received from media manager layer, error text:
sbtbackup: avtar exited, trying to create 06jtv7ks_1_1
```

The following problems might cause the RMAN backup script to fail with the ORA-19511 error:

- The `/var/avamar` directory does not have correct permissions to start a backup.

  Use the `/var/avamar/clientlogs` directory instead of the `/var/avamar` directory.

- Either RMAN or `libobk` cannot locate `avtar`.
  The `allocate channel` command in the RMAN backup or restore script must include *Avamar-home*`/bin` as the `PATH` variable or include `bindir="/usr/local/avamar/bin"`.

- An Oracle instance is running as a nonstandard user or group.

  To determine if Oracle is installed as a nonstandard user or group, check the file permissions for the Oracle home directory. For example, use the following commands:

  ```
  cd /home/oracle/oracle/product/10.2.0/db_1/oradata
  ls -l
  ```

  The following output appears in the command shell:

  ```
  total 28
  drwxr-x--- 2 oracle oinstall 4096 Aug 26 2014 cataloged
  drwxr-x--- 2 oracle oinstall 4096 Mar 9 18:05 db2
  drwxr-xr-x 2 oracle oinstall 4096 Mar 30 17:21 orcl
  drwxr-xr-x 2 oracle oinstall 4096 Mar 30 16:26 orcl.w
  drwxr-xr-x 2 oracle oinstall 4096 Mar 10 15:50 plargedb
  drwxr-xr-x 2 oracle oinstall 4096 Feb 6 16:20 plargedb.w
  -rw-r--r-- 1 oracle oinstall 696 Dec 28 16:58 sqlnet.log
  ```

In the example, `oracle` is the user and `oinstall` is the group.

If a user other than oracle installs the Oracle database, the `avoracle` program must use the **`--storageapp_`*`username`*`=username`** option. For example, if the user named emc installs the Oracle database, *username* is emc.

RMAN-06056: could not access datafile n error on AIX

The `avoracle` program runs as root. If you encounter an `RMAN-06056: could not access datafile n` error, it means `avoracle` was unable to open the file for processing.

This error on IBM AIX systems occurs when the default `ulimit` is set to 2097151. This default setting limits the maximum file size that the root user can read to 1 GB.

To resolve this issue, change the `ulimit` setting for the root user to unlimited. This unlimited setting allows `avoracle` to process large files.

RMAN script fails with WriteFile failed error

When you specify `C:\Program Files\avs\bin` for the `--bindir` variable in an RMAN script, the script fails with the following errors:

```
RMAN-03009: failure of backup command on c1 channel at
10/20/2014 13:56:49
ORA-19502: write error on file "sample_1_1", blockno 1
(blocksize=512)
ORA-27030: skgfwrt: sbtwrite2 returned error
ORA-19511: Error received from media manager layer, error text:
stream->WriteFile failed
```

To resolve this issue, ensure that all variables in the RMAN script that specify the Windows installation directory use `Progra~1`, the short name for the `Program Files` folder. The parser cannot process spaces in folder names.

For example, the correct syntax for the `--bindir` variable is **`--bindir=C:\Progra~1\avs\bin`**.

Time-out errors when using multiple RMAN channels

Allocating too many channels from Avamar Administrator might lock out processes. The backup or restore can then fail with a time-out error. If a time-out error occurs, retry the operation by using fewer channels.

This problem does not occur when using RMAN scripts.

Unable to process snapview workorder

The Avamar Plug-in for Oracle is unable to process the snapview workorder because the wait time for the snapview workorder times out.

To work around this problem, increase the `[avoracle]subprocesstimeoutsecs` option in Avamar Administrator:

1. From the **Backup Command Line Options** dialog box, click the **More** button.

   The dialog box expands to display the **Enter Attribute** and **Enter Attribute Value** fields.
2. Type the `[avoracle]subprocesstimeoutsecs` option in the **Enter Attribute** field.
3. Type the number of seconds in the **Enter Attribute Value** field.
4. Click **+**.

   The option and value appear in the box below the **+** and **-** buttons.
5. Restart the backup.

Unable to send CTL message

A backup or restore fails with one of the following error messages:

```
avoracle Error <6629>: INTERNAL: Unable to send CTL message
(n=-1, retcode=1, errno=0)
avoracle Error <6629>: INTERNAL: Unable to send CTL message
(n=-1, retcode=3, errno=0)
```

These errors can occur when you allocate too many channels for a backup or restore from Avamar Administrator.

To resolve this issue, EMC recommends that you set the number of channels to no more than two times the number of processors. If the problem persists after making this change, further reduce the number of channels.

The **Number of RMAN Channels** option is available from the **Backup Command Line Options**, **Restore Command Line Options**, and **New Dataset** dialog boxes.

This problem does not apply to backups or restores started by an RMAN script.

Configuration problems and solutions

You can resolve common configuration problems with the following troubleshooting information.

Avamar client and Avamar Plug-in for Oracle registration

To back up or restore Oracle by using the Avamar Plug-in for Oracle, you must register the Avamar client with the Avamar server. The registration process can fail for either of the following conditions:

- The Avamar *plug-in*_catalog.xml does not support the Avamar Plug-in for Oracle version.
- An administrator disabled the Avamar Plug-in for Oracle.

After you register the Avamar client, Avamar Administrator lists the client in the Oracle databases. In addition, the avagent.log file (in the /var/avamar directory, by default) contains information that verifies a successful registration:

```
****** Current MCS name 'avamar-1.example.com' ******
2014-1-1 15:08:37 avagent Info <7452>: Registration of client
/clients/Oracle-client.example.com with MCS
avamar-1.example.com:28001 successful.
2014-1-1 15:08:37 avagent Info <5928>: Registration of plugin
1002 Oracle successful.
2014-1-1 15:08:37 avagent Info <5928>: Registration of plugin
1001 Unix successful.
2014-1-1 15:08:37 avagent Info <5619>: Registration of client
and plugins complete.
2014-1-1 15:08:37 avagent Info <7150>: first work request
delayed for 180 seconds.
2014-1-1 15:11:37 avagent Info <7151>: first work request delay
finished.
```

Bitwidth of Avamar Plug-in for Oracle and Oracle

The bitwidth of the Oracle software, the Avamar Plug-in for Oracle, and the platform must match.

Ensure you download the correct software packages for the platform and version of Oracle. System requirements on page 30 provides more information.

Note

64-bit operating systems do not support the 32-bit versions of Oracle 10g and later versions. You can find additional information about Oracle on the Oracle website.

To check the bitwidth of Oracle, change to the `$ORACLE_HOME/bin` directory and type the following command:

`file ~/oracle/product/`*`version`*`/`*`db-name`*`/bin/rman`

where:

- *version* is the version of Oracle.
- *db-name* is the name of the Oracle database.

The following output appears in the command shell:

```
/home/oracle/oracle/product/10.2.0/db_1/bin/rman: ELF 64-bit
LSB executable, AMD x86-64, version 1 (SYSV), for
GNU/Linux 2.4.0, dynamically linked (uses shared libs),
not stripped
```

To check the bitwidth of RMAN, change to the `$ORACLE_HOME/bin` directory and type the following command:

`file ~/oracle/product/`*`version`*`/`*`db-name`*`/bin/sqlplus`

where:

- *version* is the version of Oracle.
- *db-name* is the name of the Oracle database.

The following output appears in the command shell:

```
/home/oracle/oracle/product/10.2.0/db_1/bin/sqlplus: ELF 64-bit
LSB executable, AMD x86-64, version 1 (SYSV), for
GNU/Linux 2.4.0, dynamically linked (uses shared libs),
not stripped
```

The text string `ELF 64-bit LSB executable` in the command output confirms that both Oracle and RMAN are 64-bit.

Cluster Configuration Tool fails to start

Starting the Cluster Configuration Tool fails with the following error if the Windows system does not have Microsoft . NET Framework 4 installed:

```
To run this application, you must install one of the following
versions of the .NET Framework: v4.0.30319 Contact your
application publisher for instructions about obtaining the
appropriate version of the .NET Framework
```

The Cluster Configuration Tool requires Microsoft .NET Framework 4. You can download and install the .NET Framework 4 from the Microsoft Download Center.

Determining the version of Oracle

Use SQL*Plus to determine the version of Oracle:

1. Log in to the Oracle server.
2. Start SQL*Plus:

   sqlplus "/ as sysdba"
3. View version information by typing the following command:

   select * from v$version;

   Content similar to the following appears in the command shell:

   ```
   Oracle Database 11g Enterprise Edition Release 11.1.0.7.0 -
   Prod PL/SQL Release 11.1.0.7.0 - Production CORE 11.1.0.7.0
   Production TNS for Linux: Version 11.1.0.7.0 - Production
   NLSRTL Version 11.1.0.7.0 - Production
   ```

Disk space for the /var/avamar directory

The `/var/avamar` directory must have sufficient disk space for RMAN scripts and log files. Backups and restores fail if the `/var/avamar` directory does not have enough space.

Check the `/var/avamar` directory for free space by using the applicable method for the system. The following example shows output from the `df –h` command on a Red Hat Enterprise Linux system:

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

The RMAN scripts, RMAN log files, and the `avoracle` log files require a minimum of 100 MB of disk space.

Oracle RAC database failover

If the registered Oracle RAC node fails over to another node, you must manually start the `avagent` program on the other cluster nodes.

Run `avagent.d restart` to start the `avagent` program:

1. Log in to the failover node as root.
2. Change the directory by typing the following command:

   cd /usr/local/avamar/ora_rac/etc
3. Start `avagent` by typing the following command:

   ./avagent.d restart

   The following information appears in the command shell.

   ```
   avagent Info <5241>: Logging to
   /usr/local/avamar/ora_rac/var/avagent.log
   avagent Info <5174>: - Reading /usr/local/avamar/
   ora_rac/var/avagent.cmd
   avagent Info <5417>: daemonized as process id 15603
   avagent.d Info: Client Agent started.
   [OK]
   ```

Requirements for libobk_avamar.so and libobk_avamar.dll

The libobk_avamar.so file (on UNIX) and libobk_avamar.dll file (on Windows) implement the Oracle SBT interface specification, which Avamar Plug-in for Lotus Domino and RMAN require for successful backup and restore operations.

The following requirements apply to both files:

- They must provide read and execute access to the Oracle user.
- They must be in the *Avamar-home*/lib directory.
- They must be the same bitwidth as Oracle.

To verify that the correct libobk_avamar file is installed in the Avamar-home/lib directory on a UNIX platform, type the following commands:

```
cd Avamar-home/lib
file *
```

The text strings ELF 64-bit LSB shared object and ELF 32-bit LSB shared object in the following command output confirm that both 64-bit and 32-bit libraries are present:

```
libobk_avamar64.so: ELF 64-bit LSB shared object, AMD x86-64,
version 1 (SYSV), not stripped
libobk_avamar.so: ELF 32-bit LSB shared object, Intel 80386,
version 1 (SYSV), not stripped
```

RMAN executable file and Oracle versions

The RMAN executable file version must match the Oracle database version. For example, the ORACLE_HOME/bin directory contains the RMAN executable file. Linux systems use the default RMAN file in the /usr/X11R6/bin directory. An RMAN backup or restore script that uses the default RMAN executable file causes the backup or restore operation to fail.

For multiple versions of Oracle, RMAN executables must point to the correct ORACLE_HOME/bin directory.

To determine whether the default RMAN executable points to the correct RMAN executable in the ORACLE_HOME/bin directory, type the following commands:

```
which rman
/usr/X11R6/bin/rman
rpm -qf /usr/X11R6/bin/rman
xorg-x11-devel-6.8.2-1.EL.33
xorg-x11-devel-6.8.2-1.EL.33
more oratab
catalogdb:/home/oracle/oracle/product/10.2.0/db_1:N
largedb:/home/oracle/OraHome:N
orcl:/home/oracle/oracle/product/10.2.0/db_1:N
```

The sample output from the oratab file includes a database named largedb. This database has both Oracle 9i and Oracle 10g homes. Because largedb is an Oracle 9i instance, the correct RMAN executable is in /home/oracle/OraHome/bin/rman.

Set the PATH variable to the ORACLE_HOME/bin directory to ensure RMAN uses the correct executable file. Before running RMAN scripts, run /usr/local/bin/oraenv.

Stopping Avamar Administrator processes

Note

Only administrators, who understand the consequences of stopping Avamar Administrator processes, should perform the following procedure. Use this procedure for emergencies only.

The following procedure runs the UNIX kill command to stop avoracle processes, which were started by the Avamar Administrator interface. The avoracle processes are automatically started by Avamar Administrator for browse, backup, and restore operations. Stop these avoracle processes only when you determine that something is wrong with a browse, backup, or restore operation.

1. Log in to the Oracle server.
2. Show all Avamar processes by typing the following command:

   ps -ef|grep avoracle

   The command shell displays a list of active processes. Some of them are avoracle processes for the Avamar Plug-in for Oracle.
3. Locate the avoracle processes in the list and note the process ID numbers (PIDs).
4. Terminate the process by typing the following command:

   kill *pid*

   where *pid* is a process ID displayed in step 2.
5. Repeat step 4 until all avoracle processes are stopped.

Unable to browse Oracle databases with Avamar Administrator

The **Browse for Files, Folder, or Directories** option in Avamar Administrator does not display Oracle databases. To verify the browse problem, use the following command:

./avoracle --browse

When this browse problem exists, the output from the avoracle program contains the following message:

```
avoracle Info <7908>: browse returning with 0 items
```

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

- The Avamar client and Oracle databases use two separate NIC cards, each with different IP addresses and hostnames.
- The oratab file contains invalid entries.

Verifying the client and plug-in versions

For all supported platforms, install the Avamar client before installing the Avamar Plug-in for Oracle. The versions of the Avamar client and Avamar Plug-in for Oracle must be the same.

The following table includes methods to verify the installation of the Avamar client.

Table 9 Avamar client installation verification

Platform	Method
Microsoft Windows	Use the Windows Explorer to verify that the `C:\Program files\avs` folder exists and contains `libobk_avamar.dll`.
Oracle Linux, Red Hat Linux, or SUSE Linux	Use the `rpm` command: **`rpm -qa |grep -i avamar`**
HP-UX	Use the `swinstall` command: **`swinstall -list`**
IBM AIX	Use the `smitty` command to list all software or to search for the Avamar client software package.
Solaris	Use the `pkginfo` command: **`pkginfo|grep -i AVMRclnt`**

GLOSSARY

A

activation The process of passing the client ID (CID) back to the client, where it is stored in an encrypted file on the client file system.

See also client activation

administrator Person who normally installs, configures, and maintains software on network computers, and who adds users and defines user privileges.

archive logs Log files that contain a copy of one of the filled members of an online redo log group. The archiving process requires that the database be set to `ARCHIVELOG` mode. Oracle terminology refers to archive logs as archive redo logs.

Avamar Administrator A graphical management console software application that is used to remotely administer an Avamar system from a supported Windows or Linux client computer.

Avamar client A computer or workstation that runs Avamar software and accesses the Avamar server over a network connection. Avamar client software comprises a *client agent* and one or more *plug-ins*.

Avamar server The server component of the Avamar client/server system. Avamar server is a fault-tolerant, high-availability system that efficiently stores the backups from all protected clients. It also provides essential processes and services required for data restores, client access, and remote system administration. Avamar server runs as a distributed application across multiple networked storage nodes.

avtar The Avamar process that performs backups and restores.

B

backup A point-in-time copy of client data that can be restored as individual files, selected data, or as an entire backup.

browse The process of viewing data that is available for backup on a client computer or restore from the Avamar server.

C

client activation The process of passing the client ID (CID) back to the client, where it is stored in an encrypted file on the client file system.

See also activation

client agent A platform-specific software process that runs on the client and communicates with the Management Console Server (MCS) and with any plug-ins installed on that client.

client registration The process of establishing an identity with the Avamar server. When Avamar recognizes the client, it assigns a unique client ID (CID), which it passes back to the client during *client activation*.

See also registration

cluster Two or more independent network servers, usually with exact copies of the same software and data, that operate and appear to clients as if they are a single unit. A cluster configuration enables work to be shifted from one server to another, providing high availability, which allows application services to continue despite most hardware or software failures.

Cluster Configuration Tool Avamar configuration wizard to configure the cluster client.

cold backup A backup of database objects that you perform while the corresponding database or instance is shut down and unavailable to users. Also known as an offline backup.

D

database A collection of data arranged for ease and speed of update, search, and retrieval by computer software.

database files Oracle database files include datafiles, control files, and online redo logs.

Data Domain system Disk-based deduplication appliances and gateways that provide data protection and disaster recovery (DR) in the enterprise environment.

dataset A policy that defines a set of files, directories, and file systems for each supported platform that are included or excluded in backups across a group of clients. A dataset is a persistent and reusable Avamar policy that can be named and attached to multiple groups.

DD Boost The API that Avamar clients use to access a Data Domain system. The DD Boost API is installed automatically on the client computer when you install the Avamar client. It is also installed automatically on the Avamar server when you install Avamar.

disaster recovery Recovery from any disruptive situation, such as hardware failure or software corruption, in which ordinary data recovery procedures are not sufficient to restore a system and its data to normal day-to-day operations. A disaster recovery can be a *bare metal recovery*.

DNS Domain Name Server. A dynamic and distributed directory service for assigning domain names to specific IP addresses.

domain A feature in Avamar Administrator that is used to organize large numbers of clients into named areas of control and management.

F

file system Software interface used to save, retrieve, and manage files on storage media by providing directory structures, data transfer methods, and file association.

G

group A level of organization in Avamar Administrator for one or more Avamar clients. All clients in an Avamar group use the same group policies, which include the *dataset*, *schedule*, and *retention policy*.

group policy The *dataset*, *schedule*, and *retention policy* for all clients in an Avamar group.

L

LAN Local Area Network.

M

MCS Management console server. The server subsystem that provides centralized administration (scheduling, monitoring, and management) for the Avamar server. The MCS also runs the server-side processes used by *Avamar Administrator*.

Media Management Library (MML) A software library used by RMAN to back up data to tertiary storage. The MML for the Avamar Plug-in for Oracle is libobk_avamar.

Media Manager (MM) A third-party networked backup system. MM works with Recovery Manager so that database backups can be written directly to tertiary storage.

metadata Data about the backup, including information about the original database files, the backup types, the date and time of the backup, and other information necessary for restore.

O

Oracle instance A memory structure and a group of Oracle Server processes running on a node.

oratab file A text file that contains the system identifier and home directory of the Oracle database. A typical `oratab` entry is similar to the following: `ora91:/space/local/oracle/ora901`. The default location for the `oratab` file is `/var/opt/oracle` on Solaris and `/etc` on other systems.

P

plug-in Avamar client software that recognizes a particular kind of data resident on that client.

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

policy A set of rules for client backups that can be named and applied to multiple groups. Groups have dataset, schedule, and retention policies.

R

Recovery Manager (RMAN) A software application that provides a command line interface for hot and cold backups, as well as cold recovery of a supported Oracle database.

redirected restore The process of restoring a backup to a different location than the original location where the backup occurred.

registration The process of establishing an identity with the Avamar server. When Avamar recognizes the client, it assigns a unique client ID (CID), which it passes back to the client during *client activation*.

See also client registration

restore An operation that retrieves one or more file systems, directories, files, or data objects from a backup and writes the data to a designated location.

retention The time setting to automatically delete backups on an Avamar server. Retention can be set to permanent for backups that should not be deleted from an Avamar server. Retention is a persistent and reusable Avamar policy that can be named and attached to multiple groups.

S

schedule The ability to control the frequency and the start and end time each day for backups of clients in a group. A schedule is a persistent and reusable Avamar policy that can be named and attached to multiple groups.

System Backup to Tape An Oracle architecture that supports directly writing backups to tape (and reading them) by using the Media Management Library.

T

tablespace A logical storage unit in a database, which groups related logical structures together.

transaction logs A record of database transactions or list of changed files in a database, stored in a log file to execute quick restore and rollback transactions.

U

User Account Control (UAC) A Windows feature available in Windows 7, Windows Server 2008, Windows Server 2008 R2, Windows Vista. UAC helps prevent unauthorized changes to your computer. When functions that could potentially affect a computer's operation are made, UAC prompts the user for permission or for an administrator's password before continuing with the task.