ADSTAR Distributed Storage Manager

ADSMConnect Agent for Oracle Backup on Sun Solaris Installation and User's Guide

Version 2

IBM

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┌─ Note ──────────────────────────────────────────────────────────────────────┐
│                                                                              │
│  Before using this information and the product it supports, read the general information under "Notices" on page  v. │
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Third Edition (June 1998)

This edition applies to Version 2 of the ADSMConnect Agent for Oracle Backup on Sun Solaris, 5639–C69, and to any subsequent releases until otherwise indicated in new editions or technical newsletters. Make sure you are using the correct edition for the level of the product.

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About This Book

This book describes the installation and operation instructions for the system administrator and user. You should be familiar with your Sun** workstation, your operating system, and your file backup systems.

The following publications provide additional information.

Table 1. Related Books	
Title	**Order Number**
ADSTAR Distributed Storage Manager for Sun Solaris Quick Start	GC35-0262
ADSTAR Distributed Storage Manager: Using the Application Programming Interface Version 2	SH26-4002
ADSTAR Distributed Storage Manager Using the Application Program Interface Version 3	SH26-4081
ADSTAR Distributed Storage Manager: Installing the Clients Version 2	SH26-4049
ADSTAR Distributed Storage Manager Installing the Clients Version 3	SH26-4080
ADSTAR Distributed Storage Manager: Using the UNIX Backup-Archive Clients Version 2	SH26-4053
ADSTAR Distributed Storage Manager: Using the UNIX Backup-Archive Clients Version 3	SH26-4075
ADSTAR Distributed Storage Manager Using the UNIX Hierarchical Storage Management Clients Version 2	SH26-4030
ADSTAR Distributed Storage Manager Using the UNIX Hierarchical Storage Management Clients Version 3	SH26-4083
Using ADSM to Back Up Databases	SG24-4335
Enterprise Backup Utility Installation Guide for AIX, Release 2.0.10	A43148-1
Oracle7 Server Administrator's Guide	6694-70-1292
Oracle7 Enterprise Backup Utility Administrator's Guide, Release 2	A42580-2
Oracle SQL Net Administrator's Guide	—

Summary of Changes

This section summarizes changes made for this edition of the book.

Third Edition, July 1998

The updates include:

- The addition of a new chapter, Chapter 4, "Using the ADSM Central Scheduler Service to Automate Online Backups" on page 23, to provide information on using the ADSM scheduler to automate online backups.

- The addition of a new chapter, Chapter 5, "API Return Codes and Client Messages" on page 27, to provide information on the API return codes and client messages.

Second Edition, January 1998

The updates include:

- Changes made throughout the book to reflect the ADSMConnect Agent support of both Oracle7 and Oracle8 databases.

- Changes made to Chapter 2, "Installing the Oracle Backup Agent on Solaris" on page 5 to reflect updates to the installation procedure.

Chapter 1. Introducing the ADSMConnect Agent for Oracle Backup

This section provides a brief overview of ADSM and the ADSMConnect Agent.

Understanding ADSM

ADSTAR Distributed Storage Manager (ADSM) is a client/server program that provides storage management services in a multivendor, multiplatform computer environment.

ADSM:

- Reduces network complexity.

  ADSM reduces network complexity with interfaces and functions that span the network providing a consistent approach to implementing ADSM across different operating systems and hardware.

- Increases administrator productivity.

  ADSM can reduce the cost of network administration by allowing administrators to automate repetitive processes, schedule unmanned processes, and administer ADSM from anywhere in the network.

- Reduces the risk of data loss.

  While many users do not back up their data at all, others use stand-alone backup techniques with diskettes and tapes as the only protection for business data. Even when backups are performed regularly, the success of these backup systems is often evaluated only at recovery time, often with disappointing results. ADSM lets administrators schedule routine backups and lets users recover from accidental data deletion without administrator involvement.

- Optimizes existing storage resources.

  ADSM allows users to move infrequently used or large files from client file systems to ADSM storage. This saves space on client file systems and often eliminates the expense of upgrading client storage hardware.

  ADSM also provides services to ensure that clients do not run out of storage space. ADSM monitors client storage and moves files from client file systems to ADSM storage if an "out-of-space" condition threatens. This can also eliminate the expense of client hardware upgrades.

ADSM provides these services:

- Backup and restore services.

  Backup and restore services allow backup-archive clients to make backup copies of data at specified intervals and restore the data from those copies when required. These services provide protection from workstation or file server media failure, accidental file deletion, data corruption, data vandalism, and site-wide disasters.

- Archive and retrieve services.

  Archive and retrieve services provide backup-archive clients with point-in-time copies of data for long-term storage.

- Server hierarchical storage management services.

  Server storage is composed of storage pools. A storage pool is a named set of storage volumes that is used as the destination for client files. Server hierarchical storage management services optimize server storage by migrating client files from storage pools of more expensive media (disk, for example) to storage pools of less expensive media (tape, for example). Migration is started and stopped based on high and low thresholds that the administrator sets for each storage pool. Migration applies to all client files (backup and archive).

- Automation services.

  ADSM administrators can increase productivity by automating many day-to-day storage administration tasks by defining policies and scheduling services for backup.

- Administration services.

  Administration services provide ADSM administrators with support for day-to-day monitoring, administration, and accounting of ADSM. Administrators can manage the server from another system or the same system. The ADSM utilities allow the administrator set client and server options, define devices, format storage volumes, add additional clients, label tape volumes, and other tasks. ADSM monitors scheduled operations and maintains information about their status in the database. An administrator can export information to removable media. This data can be imported by another server, making the export and import features a handy utility for moving server information. The administrator can specify the accounting option, which is generated at the end of each client session.

- Security services.

  Security services prevent unauthorized access to ADSM-managed data, storage, policy definitions, and administrative commands. These security options allow the security administrator to control the limit or extent of a person's access to these resources.

- Disaster recovery services.

  Disaster recovery services assist the administrator with the implementation of a comprehensive backup and recovery procedure for important business applications, data, and records.

The ADSMConnect Agent for Oracle Backup

The ADSMConnect Agent for Oracle Backup is also referred to as the Oracle Backup Agent in this document. The Oracle Backup Agent on Sun Solaris supports these databases:

- Oracle7 databases with the Enterprise Backup Utility (**EBU**)
- Oracle8 databases with the Recovery Manager (**RMAN**)

The Oracle7 **EBU** and Oracle8 **RMAN** perform backups (online and offline) and restore (online and offline) of Oracle databases. After the Oracle7 **EBU** or Oracle8 **RMAN** initiates a backup or restore, the Oracle Backup Agent acts as the interface to ADSM. The ADSM server then applies its storage management functions to the data, which can be done while users are working, with minimal disruption.

The Oracle Backup Agent can work with any Version 2 or Version 3 ADSM server. The Oracle Backup Agent translates the Oracle7 or Oracle8 API commands into ADSM API calls for the ADSM server.

The Oracle Backup Agent runs on a workstation with the Sun Solaris operating system.

See Figure 1 for an understanding of how Oracle7 or Oracle8 works in conjunction with the Oracle Backup Agent and the ADSM server.
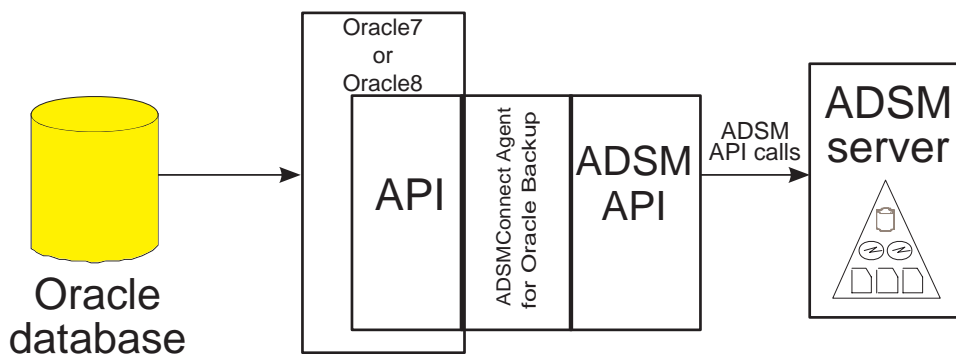

Figure 1. How Oracle7 or Oracle8 Interfaces with the Oracle Backup Agent

Chapter 2. Installing the Oracle Backup Agent on Solaris

The Oracle Backup Agent is ordered separately on a CD-ROM and has its own installation program. The CD-ROM also contains the ADSM API. The CD-ROM provides you with a permanent license to use the product.

The Solaris operating systems suppored are:

- Solaris 2.5.1
- Solaris 2.6

The ADSM API Version 3 is shipped with the Oracle Backup Agent. For Solaris 2.5.1, you need ADSM API Version 3 Release 1.4. For Solaris 2.6, you need ADSM API Version 3 Release 1.3. If you do not have this version of the API, you will have to install it.

Before you can install the Oracle Backup Agent, make sure that the ADSM Version 2 or Version 3 server is installed.

A root user must install the ADSM API and Oracle Backup Agent on a Solaris workstation.

Check the current **README.AOB** file for any changes to the installation procedures.

The steps for installing are:

- Step 1: Install the Oracle Backup Agent and ADSM API if necessary. See "Step 1: Installing the ADSM API and Oracle Backup Agent on Solaris" on page 6.
- Step 2: Define the environment variables. See "Step 2: Defining the Environment Variables" on page 9.
- Step 3: Edit the client options file. See "Step 3: Editing the Client Options Files" on page 11.
- Step 4: Register your workstation with the server. See "Step 4: Registering Your Workstation with the Server" on page 12.
- Step 5: Initialize the password. See "Step 5: Initializing the Password" on page 13.

Oracle Backup Agent Environment

This section contains client environment information and hardware and software requirements for installing the Oracle Backup Agent.

Space and Hardware Requirements

The space requirements are:

- A Sun Sparc workstation.
- Disk space for Solaris 2.5.1 and 2.6: 3 MB
- Memory: 32 MB

Software Requirements

For Solaris 2.5.1, you must have ADSM API 3.1.4. For Solaris 2.6, you must have ADSM API 3.1.3. Even if you have the ADSM API 3.1.3 installed on your system, you must install the ADSM API packaged with the Oracle Backup Agent CD-ROM.

Operating System

The operating system requirement is Solaris 2.5.1 or 2.6.

Software Support

The Oracle Backup Agent supports:

- Oracle7 Enterprise Backup Utility Version 2.1 or 2.2
- Oracle7 Version 7.3.2, 7.3.3, or 7.3.4
- Oracle8 Version 8.0.3 or 8.0.4

Communications Method

Table 2. Communication Software		
To use this communi-cation method:	**Install this on the workstation**	**To connect to these ADSM servers:**
TCP/IP	Standard with Solaris operating system	AIX, HP-UX, MVS, OS/2, OS/400, Sun, VM, Windows NT

Step 1: Installing the ADSM API and Oracle Backup Agent on Solaris

Follow the steps below to install the ADSM API and Oracle Backup Agent. This example assumes that your CD-ROM drive is **/cdrom**.

1. Insert the CD-ROM containing the client package into the CD-ROM drive.

2. Log in as the root user.

3. To install the ADSM API for Solaris 2.5.1, issue this command:

   ```
   $ pkgadd -d /cdrom/adsmorc/adsmAPI251.pkg
   ```

   To install the ADSM API for Solaris 2.6, issue this command:

   ```
   $ pkgadd -d /cdrom/adsmorc/adsmAPI26.pkg
   ```

4. To install the Oracle Backup Agent, issue this command:

   ```
   $ pkgadd -d /cdrom/adsmroc/adsmorc.pkg
   ```

5. The following is sample output from the Oracle Backup Agent installation:

```
The following packages are available:
   1  IBMDSMoba  ADSTAR Distributed Stroage Manager Oracle Backup Agent
       for Sun (sparc) Version 2 Release 1 Level 0.7

Select package(s) you wish to process (or 'all' to process all packages).
(default: all) [?,??,q]: all

Processing package instance <IBMDSMoba> from </cdrom/adsmorc/adsmorc.pkg>

ADSTAR Distributed Storage Manager Oracle Backup Agent for Sun
(sparc) Version 2 Release 1 Level 0.7
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Using </opt> as the package base directory.
## Processing package information.
## Processing system information.
   1 package pathname is already properly installed.
## 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 <IBMDSMoba> [y,n,?] y

Installing ADSTAR Distributed Storage Manager Oracle Backup Agent for Sun
as <IBMDSMoba>

## Executing preinstall script.

ADSMConnect Agent for Oracle Backup Preinstall Program
------------------------------------------------------
## Installing part 1 of 1.
/opt/IBMDSMoba/README.AOB
/opt/IBMDSMoba/agent.lic
/opt/IBMDSMoba/aobpswd
/opt/IBMDSMoba/libobk.so
[ verifying class <none>]
## Executing postinstall script.
```

```
ADSMConnect Agent for Oracle Backup Postinstall Program
-------------------------------------------------------
Creating symbolic links in /usr/lib
ADSMConnect Agent for Oracle Backup installation complete.

Installation of <IBMDSMoba> was successful.
```

ADSM API Files

The following files are included with the ADSM API and are installed in the
/opt/IBMadsm-a path.

Table 3. ADSM API Files	
File Name	**Description**
dsm.sys.smp	Sample client system options file
dsm.opt.smp	Sample client user options file
en_US/dsmclientV3.cat	Messages file
README.API	Readme file
libApiDS.so	ADSM API library file
libXApi.so	ADSM X/Open library file
dsmtca	Trusted Communication Agent file
sample/xxxxxxxx	ADSM API files for developers
xopen/xxxxxxxx	ADSM X/Open API files for developers

Note: Symbolic links are made to associate **libApiDS.so** with **/usr/lib/libApiDS.so**
and **libXApi.so** with **/usr/lib/libXApi.so**.

Oracle Backup Agent Files

The following files are included with the Oracle Backup Agent and are installed in the
/usr/adsmagent/oba path.

Table 4. Oracle Backup Agent Files	
File Name	**Description**
README.AOB	Last-minute updates and other special infor-mation
libobk.so	ADSMConnect Agent library file
aobpswd	Password management program
agent.lic	Permanent license

Note: A symbolic link is made to associate **libobk.so** with **/usr/lib/libobk.so**.

Step 2: Defining the Environment Variables

The API uses unique environment variables to locate files. This allows you to use different files for API applications from those that are used by the interactive client, if necessary.

Specify the following files that you want to use for the Oracle Backujp Agent:

- Client system options file (**dsm.sys**). The Oracle Backup Agent uses the DSMI_DIR environment variable to locate **dsm.sys**.
- Client user options file (**dsm.opt**). The Oracle Backup Agent uses the DSMI_CONFIG or DSMI_ORC_CONFIG environment variable to specify this file.
- API error log file (**dsierror.log**). The Oracle Backup Agent uses the DSMI_LOG environment variable to specify this file.

See below for examples of how to specify these environment variables.

DSMI_DIR   Points to the ADSM API installed path.

If this is not set, the Oracle Backup Agent uses the API default installed path of **/opt/IBMadsm-a**.

This environment variable needs to be defined only if the ADSM API is installed under a different path from the default path.

DSMI_CONFIG

Points to the user options file (**dsm.opt**).

It is not required to set this environment variable. If DSMI_ORC_CONFIG is set, the Oracle Backup Agent uses the value from DSMI_ORC_CONFIG. If DSMI_ORC_CONFIG is not set, and DSMI_CONFIG is set, the Oracle Backup Agent uses the DSMI_CONFIG value.

If none is set, the Oracle Backup Agent uses **/usr/sbin/dsm.opt** if it exists. If **/usr/sbin/dsm.opt** does not exist, the Oracle Backup Agent uses the first server stanza from **/opt/IBMadsm-c/dsm.sys**.

DSMI_LOG

Points to the directory that contains the API error log file (**dsierror.log**).

For error log files, create a directory for the error logs to be created in, and let the DSMI_LOG environment variable point to that directory.

If the error log directory is **/home/yourlogin/logdir**, use:

```
export DSMI_LOG=/home/yourlogin/logdir
```

DSMI_ORC_DIR

Points to the Oracle Backup Agent installed path. If this is not set, the Oracle Backup Agent uses the default installed path **/opt/IBMDSMoba**. This environment variable needs to be defined only if the Oracle Backup Agent is installed under a different path from the default path.

DSMI_ORC_CONFIG

Points to the user options file (**dsm.opt**). If the **dsm.opt** file is in your home directory, use this command:

```
export DSMI_ORC_CONFIG=/home/yourlogin/dsm.opt
```

If this is not set and DSMI_CONFIG is set, the Oracle Backup Agent uses the DSMI_CONFIG value. If both environment variables are not set, **/usr/sbin/dsm.opt** is used. If /usr/sbin/dsm.opt does not exist, the first server stanza from **/opt/IBMadsm-a/dsm.sys** is used.

DSMO_AVG_SIZE

The average size of objects in megabytes. This information is passed to the ADSM server where it is used to determine storage pool usage and device usage. The default is 50 MB.

> **Important:** Set this environment variable to a value in the approximate range of your database sizes so the ADSM server can determine device usage.

DSMO_FS The file space name on the ADSM server with a string of one to 1024 characters. When setting up this option, do not use / in front of the file system name. For example, if the file system name is **oracle**, then enter this:

```
export DSMO_FS=oracle
```

The default is **adsmorc**.

DSMO_NODE

The node name that contains a string of one to 64 characters. This environment variable is used to specify a unique node name for the Oracle Backup Agent. This prevents any confusion with an existing ADSM backup-archive client.

The default is the value that is returned by *gethostname*.

> **Note:** The Oracle Backup Agent does not use the nodename value from **dsm.opt** and **dsm.sys**.

DSMO_OWNER

A session name and object owner name that contains a string of from one to 64 characters. The default is a value that is returned by **getuid**.

> **Note:** We recommend that you do not use this environment variable. If necessary, however, it can be used to override the login user ID to restore an object that is backed up by another owner.

DSMO_PSWDPATH

This environment variable should point to the directory where your password file, **ADSMO.yourhostname** resides.

If you do not specify DSMO_PSWDPATH, the default is to search the installation directory.

If the password file is in **/opt/IBMDSMoba**, use:

```
export DSMO_PSWDPATH=/opt/IBMDSMoba
```

This environment variable needs to be defined only if the password file is not in **/opt/IBMDSMoba**.

Step 3: Editing the Client Options Files

ADSM uses the following options in the client system options file (**dsm.sys**):

- SERVERNAME option (to identify the ADSM server)
- COMMMETHOD option (to identify the communication method)
- TCPPORT option (to identify connection port)
- TCPSERVERADDRESS option (to identify the address of the machine that the ADSM server resides on)

ADSM uses a client options file that is called **dsm.opt** to specify the ADSM server.

These options are in effect for the entire ADSM session.

During the initial installation and set up of ADSM on your workstation, you are provided with a sample client system options file that is called **dsm.sys.smp**. The **dsm.sys.smp** file contains just the communication options and a sample *include-exclude* list. These basic options are the ones you need to get started quickly.

ADSM also provides a sample client user options file (**dsm.opt.smp**) to help you get started quickly.

The client options file resides in your ADSM API installation directory. The sample options files that are distributed with the ADSM API can be used for the Oracle Backup Agent.

Editing the Client System Options File

The root user should edit the **dsm.sys** file. It must refer to the correct ADSM server method and communication option method. Set the PASSWORDACCESS option to **prompt** in the client system options (**dsm.sys**) file. **Prompt** is the default if a parameter is not specified.

Specifying the ADSM Management Class

When you back up a database, the default management class for your node is used. You can override the default value with a different value that is specified in the Include option. This option is placed in the **Include-Exclude** options file. The file name of the **Include-Exclude** options file is placed in the client system's option file. See *ADSTAR Distributed Storage Manager Installing the Clients*.

To assign a management class name **orcbackup** to all of the Oracle backups with a default file space name of **adsmorc**:

1. Add the following entry under the server stanza that you will be using in the **dsm.sys** file where the ADSM API is installed:

   ```
   inclexcl /u01/oracle/include.def
   ```

2. Add the following entry in **/u01/oracle/include.def**:

   ```
   include /adsmorc/.../* orcbackup
   ```

All the files backed up with a default file space name of **adsmorc** will be assigned to management class **orcbackup**.

If you do not want to use the **inclexcl** option, you can create a new domain just for Oracle backups. You must then register your node with the new domain.

For the management class you use, define the backup copy group parameters **VERDELETED=0** and **RETONLY=0**. This aids in the clean up of files that the **ebutool** command deletes.

Step 4: Registering Your Workstation with the Server

Before you can begin requesting services from an ADSM server, the server must recognize your workstation. ADSM uses a node name and a password (if one is required) to identify each workstation. ADSM maintains a password for each node name. The process of setting up a node name and password is called *registration*.

Your ADSM administrator must register your workstation as a client with the server. You can then back up and restore documents from the server.

You need to provide the following information to your administrator:

- Your node name
- The initial password you want to use, if a password is required
- Contact information, such as your name, user ID, and phone number

Your administrator defines the following for you:

- The policy domain to which your client node belongs.

  A policy domain contains policy sets and management classes (that are defined by your ADSM administrator), that control how ADSM manages the objects you back up.

- Whether your application allows you to choose to compress objects before sending them to the server.

- Whether your application allows you to delete backup data from ADSM storage.

Note: If an ADSM client already exists on your workstation, it is recommended that you use a separate and unique node name for the ADSMConnect Agent on the same workstation.

Instruct the ADSM administrator to register your node with the server and to inform you of the password. The administrator should specify **BACKDELETE=yes** so that you can later delete old backups.

Step 5: Initializing the Password

Important: The root user **must** run the **aobpswd** program before using the Oracle
Backup Agent.

Follow the steps below to initialize the password.

1. Set **DSMO_PSWDPATH** to the path where the password file resides. If this is not
   specified, the password file will be created in the current working directory.

2. Start the **aobpswd** program. This sets up a connection with the server that you
   specified in the **dsm.opt** file. The following screen displays:

```
          ADSMConnect Agent for Oracle Backup
  Password file authorization/update program
  >> this must be run by the ROOT user if updating the value <<
```

3. Enter your current ADSM node password to start the file.

4. When the **Enter your new password** prompt displays, press **Enter** without
   entering a value. The following messages are displayed:

```
    Your password has been written to the file.
    Verify that the DBA has read access to the ADSMO.pigeon file.
```

The **aobpswd** program creates a file that is called **ADSMO.yourhostname** in the
directory that is specified by DSMO_PSWDPATH. Make sure that the user who
runs the ADSMConnect Agent for Oracle Backup has read permission to
ADSMO.yourhostname.

You can use the **aobpswd** program later to update the password. Update the
password before it expires on the ADSM server.

Chapter 3. Before Using the Oracle Backup Agent

Oracle7 and Oracle8 provides backup and restore functions for Oracle databases. You can perform full or partial, offline or online backups. Once you identify which database you want to back up, Oracle locates all of the necessary files and sends them to ADSM. The ADSMConnect Agent for Oracle Backup provides an interface between the Oracle API calls and the ADSM API routines. The ADSMConnect Agent translates the Oracle API calls into ADSM API calls.

Using Command Scripts in Oracle7

Use Oracle command scripts to define and start backup and restore operations, or to register information in the Backup Catalog. To start the operations, enter the **OBACKUP** command that is followed by the appropriate script name. For example, to register databases in the Backup Catalog, use an **OBACKUP** register script.

To back up a database, use the **OBACKUP** scripts that are customized to execute the following tasks:

- Full online backups (backup online database)
- Full offline backups (backup offline database)
- Partial online backups (backup online)
- Backup of archived redo logs.

To restore a database, use **OBACKUP** scripts that are customized to execute the following tasks:

- Full consistent restore (restore database-consistent)
- Partial restore of tablespaces and control files (restore)
- Full restore to a specific point-in-time (restore database)
- Partial restore of tablespaces to another directory (restore remap).

If a backup is interrupted, the operation starts from the beginning.

Using RMAN and the Oracle Backup Agent

To use **RMAN** with the Oracle Backup Agent:

1. Link **RMAN** with the Oracle Backup Agent. Before relinking, make sure that no other Oracle process is running. Shut down all the databases and listeners, and so forth. An example is shown below:

```
$ cd $ORACLE_HOME/rdbms/lib
$make -f ins_rdbms.mk ioracle LLIBMM=/usr/lib/libobk.so
```

This will relink the Oracle8 objects with the ADSMConnect Agent library. Make sure the relinking process finishes successfully.

2. Invoke **RMAN** for backup and restore of Oracle8 database. The following example assumes that the catalog database is set up and the target database is registered with the catalog database.

   Note: **RMAN** does not pick up the environment variables you specify from the shell. In other words, environment variables like DSMI_DIR and DSMI_CONFIG will not take effect in the **RMAN** sessions. You will have to use the **parm** option while allocating the **RMAN** channels.

   Invoke **RMAN** with the following command:

   ```
   $>  rman target xxx/yyy@target rcvcat rman/rman@catalog
     cmdfile bkdb.scr msglog bkdb.log
   ```

   This will start **RMAN** in the following sequence:

   ```
   target xxx/yyy@target: connect to target database
   using user xxx and password yyy with connect string target
   rcvcat rman/rman@catalog: connect to catalog database
   using user rman and password rman with connect string catalog
   cmdfile bkdb.scr:  run bkdb.scr script
   msglog bkdb.log:  log the output messages in bkdb.log
   bkdb.scr Script:
   run
   {
     #ENV is case sensitive
     allocate channel t1 type 'sbt_tape' parms
         'ENV=(DSMI_ORC_CONFIG=/home/oracle/dsm.opt,
               DSMO_AVG_SIZE=1000)';
     allocate channel t2 type 'sbt_tape' parms
         'ENV=(DSMI_ORC_CONFIG=/home/oracle/dsm.opt,
               DSMO_AVG_SIZE=1000)';
     backup
       filesperset 10
       format 'df_%t_%s_%p'
       (database);
   }
   ```

   This script allocates two parallel connections to the ADSM server with environment variables DSMI_ORC_CONFIG and DSMO_AVG_SIZE.

3. If you run the example above, **RMAN** creates a log file **bkdb.log** in the current working directory. If an error occurs, you will see the error stack in the log file.

4. To get an ADSM trace, add the following options to your **dsm.opt** file:

   ```
   tracefile  /home/oracle/adsmapi.trace
   traceflag api pid
   ```

   This will create the **/home/oracle/adsmapi.trace** file. Some other logs are available under **$ORACLE_HOME/rdbms/log**. Check **sbtio.log** for some of the ADSMConnect Agent messages.

Removing Old Backups

The ADSMConnect Agent for Oracle Backup uses the ADSM backup repository. Each database backup creates a new object with a new unique name. Since these have unique names, they always remain active and never expire. This happens so the Database Administrator (DBA) can control when copies are removed from the ADSM server and can coordinate this with the Oracle7 **EBU** and Oracle8 **RMAN**.

Removing Old Backups for Oracle7

Oracle7 ships a utility that is called **ebutool**. This utility should be used to delete old database backups that are no longer needed from the Backup Catalog. When backups are deleted from the Backup Catalog, **ebutool** sends *delete object* API calls to ADSM. ADSM then marks the objects inactive to ensure that they expire with the next ADSM file expiration process. For example, to delete backups that are older than 30 days, enter this command:

```
ebutool -db_name=xxxx -purgejobs=30
```

You can define **ebutool** commands as part of a script that is started from the ADSM central scheduler to automate the deletion process.

Removing Old Backups for Oracle8

To remove an old backup on Oracle8, issue this command from the **RMAN** prompt:

```
RMAN> allocate channel for delete type 'sbt_tape';
RMAN> change backuppiece 'name_of_backup_piece' delete;
```

See the Oracle **RMAN** manual for more information on the **change** command and its options.

Using the Management Class

Use parameters in the Management Class definition to control when the inactive object expires on the ADSM server.

For the backup copy group, use:

```
VERDELETED=0
RETONLY=0
```

This erases the inactive objects from the server after the next inventory expiration.

In order to delete backup objects, the ADSM administrator must register your node by specifying **BACKDELETE=yes**.

Using Hierarchical Storage Management (HSM) with Archive Log Files (Solaris 2.5.1)

This section is for users who are using Solaris 2.5.1.

Customers can take advantage of the HSM functions on the ADSM Solaris client by ordering the optional Space Management feature. The use of the HSM functions on the ADSM Solaris client can save space by archiving the redo log files to the ADSM server. This is a great benefit for an active database where the logs can get very large and become difficult to manage.

To use HSM with archive log files, the root user must perform the following tasks:

- Set up the environment variables
- Modify the **dsm.sys** file
- Modify the **dsm.opt** file
- Add space management to the file systems
- Edit the include-exclude file

Setting up Environment Variables

Specify the client system options file (**dsm.sys**) and the client user options file (**dsm.opt**) that you want to use for backups, using the DSM_CONFIG and DSM_DIR environment variables. See below for examples of how to specify these files.

DSM_CONFIG

Points to the client user options file (**dsm.opt**). It can be the same file that the DSMI_CONFIG variable points to. An example is:

```
export DSM_CONFIG=/opt/IBMadsm-c/dsm.opt
```

DSM_DIR Points to the ADSM client directory that contains the client system options file (**dsm.sys**). An example is:

```
export DSM_DIR=/opt/IBMadsm-c
```

Note: Do not place a slash (/) at the end of the directory path.

Modifying the dsm.sys File

The list below provides a brief description of some important space management options you can set in your **dsm.sys** file.

DEFAULTSERVER

Specifies the ADSM server to which ADSM backs up and archives files from local file systems by default. If the MIGRATESERVER option is not specified, DEFAULTSERVER is the ADSM server to which ADSM migrates files from local file systems.

The default is the server specified in the first stanza of the **dsm.sys** file. An example is:

```
defaultserver cougar
```

MIGRATESERVER

Specifies the ADSM server to which ADSM migrates files from your local file systems.

The default is the default server. An example is:

```
migrateserver pigeon
```

Modifying the dsm.opt File

The OPTIONFORMAT option determines whether users must enter space management commands using the standard format for options (similar to the format used for backup-archive commands), or the short format (similar to the format used for UNIX commands). The default is STANDARD.

Modify the **dsm.opt** file to suit your needs.

Adding Space Management to the File Systems

Because you only want to migrate archive log and control files, it is best to exclude space management services from all the files except the files you want to migrate. If you do not use include-exclude options, HSM might automatically migrate system files whenever the disk space is filled up to its high threshold mark (this will affect performance).

It is recommended that you should back up the files before migrating them. You can use a management class that requires backing up the files before migrating them to ensure this. If the default management class to the machine does not provide backups required before migration facility, use the include-exclude file to assign a management class to the files.

To add space management to a file system or to update space management settings for a file system, enter the **dsmmigfs** command:

```
dsmmigfs add  /u01
```

This command adds space management to file system **/u01**.

To meet the above requirements, use the **inclexcl** option, adding the following statement in a server stanza in your **dsm.sys** file:

```
inclexcl  /u01/oracle/include.def
```

Then, edit this file:

```
/u01/oracle/include.def
```

To edit the include-exclude file, enter these commands:

```
include /u01/oracle/dbs/arch
exclude.spacemgmt /.../u01/.../
include /u01/oracle/dbs/arch  migsel
```

The following is an explanation of these commands:

include.def
> Is parsed from the bottom to the top.

include /u01/oracle/dbs/arch* migsel
> Assigns the management class **migsel** to the **/u01/oracle/dbs/arch*** files.

exclude.spacemgmt /.../u01/.../*
> Means that all the files in the **/u01** directory are excluded for space management services.

include /u01/oracle/dbs/arch*
> Means that the fileset **/u01/oracle/dbs/arch*** is included for ADSM services.

If the migrated files are referenced while the database is in use, they are recalled automatically and will occupy the space again. In order to prevent being recalled every time they are referenced, use the **dsmattr** command to change the attribute of the files. for example:

```
dsmattr -recallmode=readwithoutrecall arch1_290.dbf
```

The **dsmattr** command changes the attribute of the **arch1_290.dbf** file to **readwithoutrecall**. The **readwithoutrecall** attribute prevents the file from being restored to the disk if referencing to the file is for read only.

For more information on HSM, see *ADSTAR Distributed Storage Manager Using the UNIX Hierarchical Storage Management Clients*.

Reporting Problems

If You Cannot Start ADSMConnect Agent for Oracle Backup

If you encounter a problem while using ADSMConnect Agent for Oracle Backup or if you cannot start ADSMConnect Agent for Oracle Backup, collect this information:

- The **dsm.sys** file
- The **dsm.opt** file
- The **dsmo.env** file that demonstrates your use of environment variables.

  To create this file, enter:

  ```
  set | grep DSMI > dsmo.env
  set | grep DSMO >> dsmo.env
  ```

- The node information on the ADSM server. To obtain this information, enter:

  ```
  query node <nodename> format=detail
  ```

If ADSMConnect Agent Starts and a Problem is Encountered

If you start ADSMConnect Agent for Oracle Backup successfully and then encounter a problem, collect this information:

- A problem description file that includes the command you used and the session output you received when the problem occurred.
- The **EBU** log file records text if it detects an error. A return code of 12 means it noticed some problems with the Media layer.

    Note: Future releases of **EBU** might show the actual return code from the Media layer rather than the number 12.

- **RMAN** logs the ADSMConnect Agent messages in **$ORACLE_HOME/rdbms/log/sbtio.log**.
- The ADSM API error log file (**dsierror.log**). The DSMI_LOG environment variable determines the location of this file.
- The **EBU** trace file. The trace option in the **OBACKUP** script file determines the creation and location of this file. If possible, recreate the backup problem with the trace flag turned on. To start tracing, declare an environment variable OBK_DEVDBG:

    ```
    export OBK_DEVDBG=0x80000409
    ```

- The ADSM server activity log. To obtain this information, enter this ADSM administrator command:

    ```
    query actlog
    ```

ADSM Service

If you need ADSM customer assistance, call this number: 1–800–237–5511. Inform the customer service representative of the following information to determine the problem:

- You are using the ADSMConnect Agent for Oracle Backup
- Your ADSM server operating system platform, version, and release
- Your ADSM server version and release. To determine this, enter the following command:

    ```
    q status
    ```

- Your ADSMConnect Agent operating system platform, version, and release
- Your ADSMConnect Agent version and release. You can locate this in the README file, or you can enter the **what libobk.a** command. Two strings are displayed with the ADSMConnect Agent library version number: information regarding the ADSM API and the ADSMConnect Agent.

Chapter 4. Using the ADSM Central Scheduler Service to Automate Online Backups

This section shows an example on how to use the ADSM Central Scheduler Service with the Oracle Backup Agent to automate online backups of Oracle server databases. This example illustrates the use of the ADSM Version 3 central scheduler client. You can also use the ADSM Version 2 scheduler client as well.

For more information on using the scheduler, see *Using the UNIX Backup-Archive Clients.*

Once the Oracle Backup Agent has been registered to an ADSM server and installed on the Oracle server, the procedure involves the following steps:

1. **On the ADSM server:**

    a. Define a schedule to execute an AIX command file in the policy domain to which the Oracle Backup Agent is registered.

    b. Associate the Oracle Backup Agent node to the defined schedule.

2. **On the Oracle Server where the Oracle Backup Agent is installed:**

    a. Create the **bkdb** script.
    b. Start the scheduler.

Example of Central Scheduler Service to Automate Backups

The example below uses the following assumptions:

- The Oracle Backup Agent is registered to an ADSM server with a node name of **rangoon** and a password of **rangoon** in policy domain **oracle**.

- The event to be scheduled is a daily backup of the online database. The backups are to begin between 9:00 and 9:15 pm.

This method is flexible because you can define a command file with any set of commands you choose.

On the ADSM server:

1. Enter the following command to define the schedule. You can enter this command on the server console or from an administrative client. The administrative client does not have to be running on the same system as the ADSM server.

   ```
   def sched oracle daily_orcbkup desc="07Daily Online DB Backup"
   action=command objects="/home/oracle/sched/bkdb"
   starttime=21:00 duration=15 duru=minutes period=1 perunits=day
   dayofweek=any
   ```

   ADSM displays this message:

   ```
   ANR2500I Schedule daily_orcbkup defined in policy domain oracle.
   ```

2. To associate the Oracle Backup Agent to this schedule, issue the following command:

   ```
   define association oracle daily_orcbkup rangoon
   ```

   ADSM displays this message:

   ```
   ANR2510I Node rangoon associated with schedule orc_dailybkup
            in policy domain oracle.
   ```

   At this point, a schedule has been defined on the ADSM server that runs a command file that is called **/home/oracle/sched/bkdb**. The schedule starts around 9:00 pm. The schedule is re-executed once a day and can start on any day of the week.

   Note: If you want to confirm that the schedule and association have been set correctly, you can use the **Query Schedule** and **Query Association** ADSM administrative commands.

On the Oracle Server:

This example assumes that you have installed the ADSM client on the Oracle Server.

1. Create the **bkdb** script. An example of the script is shown below:

```
#!/bin/ksh
export ORACLE_HOME=/orc7/app/oracle/product/734
export OBK_HOME=/orc7/app/oracle/product/734/obackup
export ORACLE_SID=t1
export DSMO_NODE=pigeon_orc7
export DSMI_ORC_CONFIG=/orc7db/dbs/t1/svtscripts/dsm.opt
ebu /orc7db/dbs/t1/svtscripts/bkoff.scr
```

   An example of the **bkoff.scr** file is shown below:

```
backup offline database
  db_name = "t1"
  parallel = 3
  trace = "/orc7db/dbs/t1/svtscripts/bkoff.a06-00.trace"
  log = "/orc7db/dbs/t1/svtscriipts/bkoff.a06-00.log"
```

2. Start the scheduler. Follow the steps below.

   Note: Only the root user can restore the backups done by the scheduler.

   a. Login as the root user.
   b. Define the following environment variable:

   ```
   $ export DSM_CONFIG=/orc7db/dbs/t1/svtscripts/dsm.opt
   ```

   c. Issue the following command:

   ```
   dsmc sched
   ```

Chapter 5. API Return Codes and Client Messages

This section describes the API return codes and client messages.

API Return Codes

This section describes what the return codes mean, and how you, as an application developer, should deal with them.

In this section, the return codes are listed in numerical order. For each return code, the following information is given:

return code number
: This number corresponds to the number in the header file **dsmrc.h**.

severity code
: This letter is an indication of the severity of the situation that caused the return code to be generated. The possible severity codes and their meanings are:

  S   Severe error. Processing could not continue.

  E   Error. Processing could not continue.

  W   Warning. Processing can continue, but problems might develop later. You should be cautious.

  I   Information. Processing continues. No user response necessary.

symbolic name
: This name corresponds to the definition in the header file, **dsmrc.h**.

  Note: You should always use the symbolic name for a return code in your application rather than the return code number.

explanation
: This field explains the circumstances under which this return code might be generated.

system action
: This field describes what action the ADSMConnect Agent is going to take in response to the return code.

user response
: This field explains what you should do in response to the system action.

Note: Many of the return codes describe errors that cause processing to stop. You might want to send a message to the end user that describes the problem and suggest some course of action. To identify different messages, you can use these return code values or develop your own numbering system.

2400 E   **DSM_RC_ALMGR_OPEN_FAIL**
Explanation: The license file was not found, or could not be opened because of permissions, or the file is corrupted.
System Action: The system returns to the calling procedure.
User Response: Check the permissions on the file. See if the license file is in the correct place.

2401 E   **DSM_RC_ALMGR_READ_FAIL**
Explanation: The license file was not found, or could not be opened because of permissions, or the file is corrupted.
System Action: The system returns to the calling procedure.
User Response: Check the permissions on the file. See if the license file is in the correct place.

2402 E   **DSM_RC_ALMGR_WRITE_FAIL**
Explanation: The license file was not found, or could not be opened because of permissions, or the file is corrupted.
System Action: The system returns to the calling procedure.
User Response: Check the permissions on the file. See if the license file is in the correct place.

2403 E   **DSM_RC_ALMGR_DATA_FMT**
Explanation: The license file is not valid.
System Action: The system returns to the calling procedure.
User Response: The user needs to obtain a new license.

2404 E   **DSM_RC_ALMGR_CKSUM_BAD**
Explanation: The registration string is not valid.
System Action: The system returns to the calling procedure.
User Response: The user needs to obtain a new license.

2405 E   **DSM_RC_ALMGR_TRIAL_EXPRD**
Explanation: The registration string is not valid.
System Action: The system returns to the calling procedure.
User Response: The user needs to obtain a new license.

2410 E   **DSM_RC_ORC_INVALID_MODE**
Explanation: Invalid mode passed by Oracle.
System Action: The system returns to the calling procedure.
User Response: Contact your system administrator.

2411 E   **DSM_RC_ORC_NULL_FILENAME**
Explanation: Null file name passed by Oracle.
System Action: The system returns to the calling procedure.
User Response: Contact your system administrator.

2412 E   **DSM_RC_ORC_WRONG_BLKSIZE**
Explanation: Wrong data block size.
System Action: The system returns to the calling procedure.
User Response: Contact your system administrator.

2413 E   **DSM_RC_ORC_OBJ_EXISTS**
Explanation: Backup or restore object already exists.
System Action: The system returns to the calling procedure.
User Response: If backing up an object, make sure you generate a unique object name.

2414 E   **DSM_RC_ORC_NOTSAME_HANDLE**
Explanation: The handle passed from Oracle is not the same handle that ADSM passed back.
System Action: The system returns to the calling procedure.
User Response: Contact your system administrator.

2415 E •2419 E

2415 E **DSM_RC_ORC_END_OF_FILE**
Explanation: End of file reached.
System Action: The system returns to
the calling procedure.
User Response: No action required.

2416 E **DSM_RC_ORC_WRONG_RDSTATE**
Explanation: The operation must be in
read state.
System Action: The system returns to
the calling procedure.
User Response: Contact IBM ADSM
support.

2417 E **DSM_RC_ORC_LOWER_APIVER**
Explanation: The run time API is lower
than the compile time API.
System Action: The system returns to
the calling procedure.
User Response: Use the **what** command
to find out the compile time API level.
Obtain the same or higher level of the API
library.

2418 E **DSM_RC_ORC_WRONG_WRTSTATE**
Explanation: The operation must be in
write state.
System Action: The system returns to
the calling procedure.
User Response: Contact IBM ADSM
support.

2419 E **DSM_RC_ORC_INVALID_FLAG**
Explanation: Invalid flag passed from
Oracle.
System Action: The system returns to
the calling procedure.
User Response: Contact your system
administrator.

Client Messages

This section describes what the client messages mean.

In this section, the client messages are listed in numerical order. For each client message, the following information is given:

message number
>This is the number of the message.

severity code
>This letter is an indication of the severity of the situation that caused the message to be generated. The possible severity codes and their meanings are:

>**S** Severe error. Processing could not continue.

>**E** Error. Processing could not continue.

>**W** Warning. Processing can continue, but problems might develop later. You should be cautious.

>**I** Information. Processing continues. No user response necessary.

message text
>This message is a brief indication of the cause of the message.

explanation
>This field explains the circumstances under which this message might be generated.

system action
>This field describes what action the ADSMConnect Agent is going to take in response to the message.

user response
>This field explains what you should do in response to the system action.

ANS0400E License file could not be opened.
Explanation: The license file was not found, or could not be opened because of permissions or the file is corrupted.
System Action: The system returns to the calling procedure.
User Response: Check the permissions on the file. See if the license file is in the correct place.

ANS0401E Read failure on the license file.
Explanation: The license file was not found, or could not be opened because of permissions, or the file is corrupted.
System Action: The system returns to the calling procedure.
User Response: Check the permissions on the file. See if the license file is in the correct place.

ANS0402E Write failure on the license file.
Explanation: The license file was not found, or could not be opened because of permissions or the file is corrupted.
System Action: The system returns to the calling procedure.
User Response: Check the permissions on the file. See if the license file is in the correct place.

ANS0403E Data in the license file is not in a valid format.
Explanation: The license file is not valid.
System Action: The system returns to the calling procedure.
User Response: The user needs to obtain a new license.

ANS0404E The checksum in the license file does not match the licenseregistration string.
Explanation: The registration string is not valid.
System Action: The system returns to the calling procedure.
User Response: The user needs to obtain a new license.

ANS0405E This is an expired try and buy license.
Explanation: The registration string is not valid.
System Action: The system returns to the calling procedure.
User Response: The user needs to obtain a new license.

ANS0410E Oracle passed invalid mode.
Explanation: Invalid mode passed by Oracle.
System Action: The system returns to the calling procedure.
User Response: Contact your system administrator.

ANS0411E Oracle passed null file name.
Explanation: Null file name passed by Oracle.
System Action: The system returns to the calling procedure.
User Response: Contact your system administrator.

ANS0412E Wrong data block size.
Explanation: Wrong data block size.
System Action: The system returns to the calling procedure.
User Response: Contact your system administrator.

ANS0413E Object exists.
Explanation: Backup or restore object already exists.
System Action: The system returns to the calling procedure.
User Response: If backing up an object, make sure you generate a unique object name.

ANS0414E Not same Oracle handle.
Explanation: The handle passed from Oracle is not the same handle that ADSM passed back.
System Action: The system returns to the calling procedure.
User Response: Contact your system administrator.

ANS0415E End of file reached.
Explanation: End of file reached.
System Action: The system returns to the calling procedure.
User Response: No action required.

ANS0416E Wrong Read State.
Explanation: The operation must be in **read** state.
System Action: The system returns to the calling procedure.
User Response: Contact IBM ADSM support.

ANS0417E Runtime API version is outdated.
Explanation: The run time API is lower than the compile time API.
System Action: The system returns to the calling procedure.
User Response: Use the **what** command to find out the compile time API level. Obtain the same or higher level of the API library.

ANS0418E	**Wrong write state.**		**ANS0419E**	**Invalid flag passed.**
	Explanation: The operation must be in **write** state.			**Explanation:** Invalid flag passed from Oracle.
	System Action: The system returns to the calling procedure.			**System Action:** The system returns to the calling procedure.
	User Response: Contact IBM ADSM support.			**User Response:** Contact your system administrator.

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