

IBM Spectrum Protect for Databases
Version 8.1.0

*Data Protection for Oracle
Installation and User's Guide
for Windows*



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Note:

Before you use this information and the product it supports, read the information in “Notices” on page 51.

This edition applies to version 8, release 1, modification 0 of IBM Spectrum Protect for Databases: Data Protection for Oracle for Windows (product number 5725-X01) and to all subsequent releases and modifications until otherwise indicated in new editions.

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Contents

About this publication	v
Who should read this guide	v
Publications	v

Data Protection for Oracle updates	
V8.1.0	vii

Chapter 1. Protection for Oracle Server databases	1
Overview of Data Protection for Oracle	1
RMAN and Data Protection for Oracle.	1
LAN-free data transfer	1
Migration and coexistence with Data Protection for Oracle	2
Automated failover for data recovery	2

Chapter 2. Data Protection for Oracle installation	5
Installing Data Protection for Oracle	5
Installation prerequisites	5
Installing for Windows	6
Installing in silent mode	6

Chapter 3. Configuring Data Protection for Oracle	11
Configuration with default settings	11
Configuring Data Protection for Oracle	12
Define Data Protection for Oracle options in the tdpopt file	13
Register the Data Protection for Oracle node to an IBM Spectrum Protect server	15
Define IBM Spectrum Protect options in the client options file	16
Define IBM Spectrum Protect policy requirements	20
Initialize the password with an IBM Spectrum Protect server.	21

Chapter 4. Protecting Oracle Server data	23
RMAN and Data Protection for Oracle	23
Starting RMAN	23
Editing RMAN scripts.	24
The Duplex Copy function	26
Removing old backups	28
Setting up a schedule example	28
Setting up a schedule on the IBM Spectrum Protect server.	29
Setting up a schedule on the workstation with the Oracle Server	30
Querying backup objects	33
Data deduplication with Data Protection for Oracle	34
Overview of data deduplication	34
Setting up for client-side data deduplication	34
Determining total data reduction	35

Chapter 5. Commands and utilities for Data Protection for Oracle	37
tdpoconf and tdposync utilities.	37
Command line syntax and characteristics	37
tdpoconf utility	38
tdposync utility	40

Appendix. Accessibility features for the IBM Spectrum Protect product family	49
---	-----------

Notices	51
----------------	-----------

Glossary	55
-----------------	-----------

Index	57
--------------	-----------

About this publication

This publication contains information about installing, configuring, administering, and using IBM® Spectrum Protect for Databases: Data Protection for Oracle.

Data Protection for Oracle runs online or offline backups of Oracle 11g databases to IBM Spectrum Protect storage. This integration with the RMAN Media Management API maximizes the protection of data, and provides a comprehensive storage management solution.

IBM Spectrum Protect is a client/server licensed product that provides storage management services in a multiplatform computer environment.

Who should read this guide

The target audience for this publication includes system installers, system users, Oracle database administrators, IBM Spectrum Protect administrators, and system administrators.

It is assumed that you have an understanding of the following applications:

- Oracle server
- IBM Spectrum Protect server
- IBM Spectrum Protect backup-archive client
- IBM Spectrum Protect application programming interface

It is assumed that you have an understanding of the Windows Server operating system on which your Oracle database is hosted.

Publications

The IBM Spectrum Protect™ product family includes IBM Spectrum Protect Snapshot, IBM Spectrum Protect for Space Management, IBM Spectrum Protect for Databases, and several other storage management products from IBM.

To view IBM product documentation, see IBM Knowledge Center.

Data Protection for Oracle updates V8.1.0

This document provides information about what's new or what has changed in Data Protection for Oracle version 8.1.0.

What's new

There are no new features in Data Protection for Oracle for this release.

What has changed

Changes to the `tdpo_enablescriptinput` option

With the `tdpo_enablescriptinput`, you can automate the maintenance of IBM Spectrum Protect without the need for user interaction. The `tdpoconf` utility is also modified to allow for the setting of a password.

For more information, see “Available Data Protection for Oracle options” on page 13.

Chapter 1. Protection for Oracle Server databases

A brief overview of IBM Spectrum Protect for Databases: Data Protection for Oracle is provided.

Overview of Data Protection for Oracle

Data Protection for Oracle interfaces with the Oracle Recovery Manager (RMAN) to send backup versions of Oracle databases to the IBM Spectrum Protect server.

Data Protection for Oracle currently supports Oracle 11g databases with the Oracle Recovery Manager. See Chapter 2, “Data Protection for Oracle installation,” on page 5 for specific levels of supported Oracle databases.

RMAN and Data Protection for Oracle

Oracle Recovery Manager (RMAN) provides consistent and secure backup, restore, and recovery performance for Oracle databases. While the Oracle RMAN initiates a backup or restore, Data Protection for Oracle acts as the interface to the IBM Spectrum Protect server. The IBM Spectrum Protect server then applies administrator-defined storage management policies to the data. Data Protection for Oracle implements the Oracle defined Media Management application programming interface (SBTAPI) 2.0. This SBTAPI communicates with RMAN and translates Oracle commands into IBM Spectrum Protect API calls to the IBM Spectrum Protect server.

You can use RMAN Data Protection for Oracle to run backup and restore functions that are listed.

- Full and incremental backup functions online or offline for:
 - Databases
 - Table spaces
 - Data files
 - Archive log files
 - Control files
- Full database restores while offline.
- Table space and data file restore online or offline.

LAN-free data transfer

Data Protection for Oracle supports backup and restore operations in a LAN-free environment. This environment shifts the movement of data from the communications network to a storage area network (SAN). Data moves over the SAN to a SAN-attached storage device by the IBM Spectrum Protect Storage Agent. Running Data Protection for Oracle in a LAN-free environment avoids constraints of the network. The load on the IBM Spectrum Protect server is decreased, allowing the server to support a greater number of simultaneous connections.

Data Protection for Oracle can be installed on a client with the Storage Agent (STA). The agents can be installed on a non-STA client. The backup data is sent over the LAN (TCP/IP) to the STA client. The STA client sends the data over the SAN LAN-free, directly to tape or disk.

In addition to specific LAN-free requirements, you must specify the following option:

lanfreetcpserveraddress

Specifies the TCP/IP address for an IBM Spectrum Protect Storage Agent.

Migration and coexistence with Data Protection for Oracle

The migration considerations to the new version of Data Protection for Oracle are provided.

- Existing backups that are created with a previous version of Data Protection for Oracle are restorable with Data Protection for Oracle 7.1.
- Backups that are created with Data Protection for Oracle 7.1 cannot be restored with previous versions of Data Protection for Oracle.

Related tasks:

Chapter 3, “Configuring Data Protection for Oracle,” on page 11

“Editing RMAN scripts” on page 24

Automated failover for data recovery

When there is an outage on the IBM Spectrum Protect server, Data Protection for Oracle can fail over to a secondary server for data recovery operations.

The IBM Spectrum Protect server that Data Protection for Oracle connects to for backup operations is called the *primary server*. When the primary server and the Data Protection for Oracle node are set up for node replication on the primary server, the node can be replicated to another IBM Spectrum Protect server, called the *secondary server*.

During normal operations, connection information for the secondary server is automatically sent to Data Protection for Oracle from the primary server. The secondary server information is saved to the client options file (dsm.opt) on the Data Protection for Oracle node. No manual intervention is required by you to add the information for the secondary server.

Each time Data Protection for Oracle logs on to the server for backup services, it attempts to contact the primary server. If the primary server is unavailable, Data Protection for Oracle automatically fails over to the secondary server. In failover mode, you can restore data that was replicated to the secondary server. When the primary server is online again, Data Protection for Oracle automatically fails back to the primary server the next time it connects to the server.

You can confirm that Data Protection for Oracle has failed over by looking for entries about the secondary server in the dserror.log file.

Requirements: To ensure that automated client failover can occur, Data Protection for Oracle must meet the following requirements:

- Data Protection for Oracle must be at the V7.1 level.
- The primary server and secondary server must be at the V7.1 level.
- The primary and secondary servers must be set up for node replication.
- The Data Protection for Oracle node must be configured for replication with the replstate=enabled option in the node definition on the server.
- Before the connection information for the secondary server can be sent to IBM Spectrum Protect Snapshot, the following processes must occur:
 - You must back up data at least one time to the primary server.

- The Data Protection for Oracle node on the primary server must be replicated at least one time to the secondary server.

Restriction: The following restrictions apply to Data Protection for Oracle during failover:

- Any operation that requires data to be stored on the IBM Spectrum Protect server, such as backup operations, are not available. You can use only data recovery functions, such as restore or query operations.
- Schedules are not replicated to the secondary server. Therefore, schedules are not run while the primary server is unavailable.
- If the primary server goes down before or during node replication, the most recent backup data is not successfully replicated to the secondary server. The replication status of the file space is not current. If you attempt to restore data in failover mode and the replication status is not current, the recovered data might not be usable. You must wait until the primary server comes back online before you can restore the data.

Chapter 2. Data Protection for Oracle installation

Install IBM Spectrum Protect for Databases: Data Protection for Oracle to protect your Oracle server databases.

Installing Data Protection for Oracle

Verify installation prerequisites and follow the instructions to install Data Protection for Oracle for Windows.

Before you begin

Hardware, software, and operating system requirements must be met before you attempt to install Data Protection for Oracle.

Installation prerequisites

Before you install Data Protection for Oracle, ensure that your system meets the minimum hardware, software, and operating system requirements.

The minimum hardware and software requirements for the Data Protection for Oracle release are available in the hardware and software requirements technote for each particular release. For current requirements, review the Hardware and Software Requirements technote for your version of Data Protection for Oracle. This technote is available in the *IBM Spectrum Protect for Databases - All Requirements Documents* website at <http://www.ibm.com/support/docview.wss?uid=swg21218747>. From the page, follow the link to the requirements technote for your specific release or update level.

Note:

- You cannot install the 32-bit version of Data Protection for Oracle on a 64-bit operating system.
- You must have administrative authority to install Data Protection for Oracle on a Windows server where the target database is stored.
- If Data Protection for Oracle was not previously installed on your system, you can install it to the IBM Spectrum Protect base directory. For best results, install all IBM Spectrum Protect products and components into the same base directory.
- The installation process does not overwrite the existing `dsm.opt` options file, `tdpo.opt` configuration file, or log files.

Minimum hardware requirements

Your system must meet the minimum hardware requirements for installing or operating Data Protection for Oracle in a Windows environment.

The minimum hardware requirements for the Data Protection for Oracle release are available in the hardware and software requirements technote for each particular release. For current requirements, review the Hardware and Software Requirements technote for your version of Data Protection for Oracle. This technote is available in the TSM for Databases - All Requirements Documents website at <http://www.ibm.com/support/docview.wss?uid=swg21218747>. From the page, follow the link to the requirements technote for your specific release or update level.

Minimum software and operating system requirements

Your system must meet the minimum software and operating requirements for using Data Protection for Oracle in a Windows environment.

Virtualization support

The minimum hardware and software requirements for the Data Protection for Oracle release are available in the hardware and software requirements technote for each particular release. For current requirements, review the *Hardware and Software Requirements* technote for your version of Data Protection for Oracle. This technote is available in the *TSM for Databases - All Requirements Documents* website at <http://www.ibm.com/support/docview.wss?uid=swg21218747>. From the page, follow the link to the requirements technote for your specific release or update level.

Information about the virtualization environments that can be used with Data Protection for Oracle is available in the *IBM Tivoli® Storage Manager guest support for virtual machines and virtualization* website at: <http://www.ibm.com/support/docview.wss?uid=swg21239546>.

Installing for Windows

Use these instructions to install Data Protection for Oracle.

Procedure

With the Data Protection for Oracle DVD in the DVD drive, Windows automatically starts the InstallShield wizard. If the wizard is not enabled, complete the following steps.

1. Run one of the following commands, where *x* is the DVD drive letter:

- (x86): *x*:\\oracle\\windows\\x32\\client\\setup\\spinstall.exe
- (x86_64): *x*:\\oracle\\windows\\x64\\client\\setup\\spinstall.exe

Click **OK** to start the installation program.

2. Accept the License Agreement and click **Finish** to complete the installation.

Installing in silent mode

You can install Data Protection for Oracle in silent mode. A silent installation runs independently without any intervention so that you are not required to monitor, or provide input.

About this task

This method is useful when you must install Data Protection for Oracle on a number of different computers with identical hardware. For example, a company might have 25 Oracle servers that are installed across 25 different sites. You can create an unattended installation package and make it available to the 25 sites. This method ensures a consistent configuration and avoids different people all entering Data Protection for Oracle parameters. The installation package can be placed on a DVD and sent to each site, or it can be placed on a file server for distribution.

You can install in silent mode with one of the following methods:

Setup Program

Use the **setup** command and specify silent installation options.

Microsoft Installer (MSI)

Use **msiexec.exe** to install the package.

The following options can be used with either silent installation method.

Table 1. Silent installation options

Option	Description
/i	Specifies the program to install the product.
/l*v	Specifies verbose logging.
/qn	Runs the installation quietly, without displaying windows.
/s	Specifies silent mode.
/v	<p>The setup passes the parameter string to the MSI executable program (msiexec.exe). The following syntax is required when you use the /v option:</p> <ul style="list-style-type: none">• Use a backslash (\) before quotation marks (" ") that are contained within existing quotation marks.• Do not include a space between the /v command-line option and its arguments.• Separate parameters that are entered with the /v command-line option with a space.• Create a log file by specifying the directory and file name after the command. The directory must exist before you start the installation process.
/x	Specifies that the program is to uninstall the product.
addlocal	Specifies features to install.
allusers	Specifies which users can use the installation package.
installdir	Specifies the directory where Data Protection for Oracle is to be installed.
reboot	<p>Specifies whether to prompt the user to restart the system after silent installation.</p> <p>Force Always prompts user to restart after an installation.</p> <p>Suppress Suppresses prompt to restart after an installation.</p> <p>ReallySuppress Suppresses all restart operations, and prompts the user to restart after an installation.</p>
rebootyesno	Specifies whether to restart the system after silent installation.

The following components are used in this procedure and are case-sensitive.

Table 2. Silent installation components (base client only)

Component	Description
Client	Data Protection for Oracle code
License_Paid	License file is used when paid versions of Data Protection for Oracle are installed

Installing in silent mode with the setup executable file

Use the setup program, by running the setup.exe file, to install Data Protection for Oracle in silent mode. When you install in silent mode, you do not need to monitor the process or provide input.

Before you begin

Install Data Protection for Oracle from an account that is a member of the local Administrators group for the computer where the Oracle server is running.

About this task

The following commands can be used for installing Data Protection for Oracle in silent mode.

Procedure

Run the following command to install Data Protection for Oracle in silent mode to the default installation directory:

```
setup.exe /s/v/qn
```

- Install Data Protection for Oracle in silent mode to the default installation directory with custom features by running the following command:

```
spinstall.exe /s /v"INSTALLDIR=\"c:\program files\tivoli\tsm\"  
ADDLOCAL=\"Client,License_Paid\"  
TRANSFORM=1033.mst /qn /l*v \"c:\temp\log.txt\""
```

In a custom installation, list all features after the **addlocal** option.

Installing in silent mode with MSI

You can install Data Protection for Oracle in silent mode by using the Microsoft Installer program (MSI), and the msixec.exe file.

Before you begin

Prepare to install Data Protection for Oracle from an account that is a member of the local Administrator group for the computer where the Oracle server is running.

About this task

Important: Data Protection for Oracle installs the Microsoft Visual C++ 2012 Redistributable Package as a setup prerequisite. If you are installing the product with the msixec.exe file, you must separately install the Microsoft Visual C++ 2012 Redistributable Package. The files are included in the installable packages:

- For Windows 64 bit, install the following file:

```
In the path to the Data Protection for Oracle files: \ISSetupPrerequisites\  
"{3A3AF437-A9CD-472f-9BC9-8EEDD7505A02} \"vc redistrib_x64.exe
```

Procedure

The following example silently installs to a directory other than the default installation directory and includes custom features:

```
msiexec /i<path to msi file>\IBM Tivoli Storage Manager for Databases - Oracle.msi"  
RebootYesNo="No" Reboot="Suppress" ALLUSERS=1  
INSTALLDIR="c:\program files\tivoli\tsm"  
ADDLOCAL="Client,License_Paid"  
TRANSFORM=1033.mst /norestart /qn /l*v "c:\temp\log.txt"
```

Capturing a log of the installation

Capture a log of the installation of Data Protection for Oracle using the following procedure.

About this task

The following environmental information can be helpful:

Gather a detailed log of the installation procedure in a file called `setup.log`. To gather the information, run the setup program as follows:

```
setup /v"/l*v setup.log"
```

Creating an installation package

You have a choice of making the Data Protection for Oracle installation package available for distribution on a DVD or on a server.

About this task

You can burn a DVD or place the package in a shared directory on a server. The package contains the Data Protection for Oracle code distribution files for installing the product.

Creating a package for installing in silent mode:

Use these instructions to create a silent installation package.

Before you begin

Before you create the package, decide where you are going to store the package. If you are burning a DVD, use a staging directory. If you are placing the package on a file server, you can use a staging directory or you can build the package directly on the file server.

Procedure

1. Run the following command to create the `tdpdpkg` staging directory:

```
mkdir c:\tdpdpkg
```
2. From the command line, navigate to the staging directory `cd /d c:\tdpdpkg`
3. Copy the Data Protection for Oracle DVD distribution files to the staging directory: `xcopy g:*.* . /s`
4. Replace the existing `setup.bat` with the one created in the previous step: `copy c:\setup.bat`

What to do next

The installation package can be placed on a DVD or made available from a shared directory.

Playing back the installation package in silent mode

You can run an installation package from a DVD or a shared directory. This process is called *playing back* the installation.

About this task

No visual cues exist to inform you when the installation finishes, although you can add visual cues to the batch file. Therefore, ensure that you allow enough time for the installation to complete.

Procedure

- If autostart is enabled, the silent installation begins as soon as the DVD is inserted into the drive.
- If the installation package is in a shared directory, a user can run the command as follows: From a staging directory that is called `tdpdpkg` at `\\machine1\d$`, the command `net use x: \\machine1\d$` can be run from a different computer to share the drive as drive `x`.

Creating batch files for installing in silent mode

You can create a batch file to install Data Protection for Oracle in silent mode, with the parameters that you want.

About this task

The following example shows a sample script that includes specific installation options.

```
@echo off
rem =====
rem sample silent install script
rem
rem /s /v"INSTALLDIR="X:\Install Path\" /qn"
rem =====
rem Code can be added after the
rem installation completes to
rem customize the dsm.opt files
rem if needed.
rem =====
```

Chapter 3. Configuring Data Protection for Oracle

Use these instructions to configure Data Protection for Oracle for backup and restore operations.

Before you begin

Data Protection for Oracle must be installed on your system and an IBM Spectrum Protect server must be available to communicate with Data Protection for Oracle.

About this task

Review all configuration information before you run any configuration tasks.

Configuration with default settings

Use the Data Protection for Oracle quick configuration option to quickly configure with default settings and minimal configuration tasks. Setup time is minimized and you proceed quickly to a state where you can begin backing up your Oracle databases.

Before you begin

Install Data Protection for Oracle. For detailed installation instructions, see Chapter 2, “Data Protection for Oracle installation,” on page 5.

About this task

Use the instructions to configure Data Protection for Oracle. Change the listed installation paths and library extensions according to the operating system you are using.

See “Configuring Data Protection for Oracle” on page 12 for detailed instructions on how to customize Data Protection for Oracle for your environment and processing needs.

Procedure

1. Depending on your operating system, change to one of the following directories:
 - AIX® 64-bit operating system: /usr/tivoli/tsm/client/oracle/bin64
 - Linux operating system: /opt/tivoli/tsm/client/oracle/bin64
 - Windows 64-bit Server system: C:\Program Files\Tivoli\TSM\Agent0BA64
2. Copy the `tdpo.opt.smp` file to `tdpo.opt`.
3. For Windows, these instructions use a 64-bit Windows Server system as the example operating system.

```
dsmi_orc_config C:\Program Files\Tivoli\TSM\Agent0BA64\dsm.opt  
dsmi_log C:\Program Files\Tivoli\TSM\Agent0BA64
```

For more information about these options, see “Available Data Protection for Oracle options” on page 13.

4. Register the node to the IBM Spectrum Protect server with the following command:
`REG nodename NodeA1 hostname_oracle password maxnummp=n`
 Where *hostname* is the name of the system that Data Protection for Oracle is installed, *password* is the password for this node, and *n* is equal to the number of channels that you are planning to use.
5. Make sure that the <oracle user> has the following permissions:
 - Read and Write permissions to the following directories:
 - C:\Program Files\Tivoli\TSM\Agent0BA64 directory
 - `tdpoerror.log` and the directory where it is stored
6. Run the **tdpoconf password** command as the <oracle user> to generate the password file.
 For more information about this command, see “**password** command” on page 38. Enter the password from Step 4 three times.
7. Run the **tdpoconf showenvironment** command to view and confirm your configuration.
 For more information about this command, see “**showenvironment** command” on page 39.
8. As <oracle user>, run the RMAN backup script with the **ENV=(TDPO_OPTFILE=C:\Program Files\Tivoli\TSM\Agent0BA64\tdpo.opt)** parameter specified. For example:

```
run
{
  allocate channel t1 type 'sbt_tape' parms
    'ENV=(TDPO_OPTFILE=C:\Program Files\Tivoli\TSM\Agent0BA64\tdpo.opt)';

  backup
    filesperset 5
    format 'df_%t_%s_%p'
    (database);
}
```

Note, the `allocate channel` entry is divided on two lines after the `parms` option is specified to accommodate page formatting.

For more information about RMAN backup scripts, see “RMAN and Data Protection for Oracle” on page 23.

Configuring Data Protection for Oracle

After Data Protection for Oracle is successfully installed, you must complete the configuration tasks.

Procedure

1. Define Data Protection for Oracle options in the `tdpo.opt` file.
2. Register the Data Protection for Oracle node to an IBM Spectrum Protect server.
3. Define IBM Spectrum Protect options in the `dsm.opt` file.
4. Define IBM Spectrum Protect policy requirements.
5. Initialize the password with an IBM Spectrum Protect server.

Results

If you would like to configure Data Protection for Oracle using default settings, see “Configuration with default settings” on page 11 for instructions.

Define Data Protection for Oracle options in the `tdpo.opt` file

You must define options to control the way Data Protection for Oracle backs up and restores data.

About this task

The Data Protection for Oracle options file, `tdpo.opt`, contains options that determine the behavior and performance of Data Protection for Oracle. The only environment variable Data Protection for Oracle recognizes within an RMAN script is the fully qualified path name to the `tdpo.opt` file. Therefore, some RMAN scripts must be edited to use **TDPO_OPTFILE**=fully qualified path and file name of options file variable in place of other environment variables. For example:

```
allocate channel t1 type 'sbt_tape' parms
'ENV=(TDPO_OPTFILE=C:\RMAN\scripts\tdpo.opt)'
```

For further information about RMAN scripts, see “Editing RMAN scripts” on page 24 for further information. Note, the `allocate channel` entry is divided on two lines after the `parms` option to accommodate page formatting.

If the **TDPO_OPTFILE** variable is not provided, Data Protection for Oracle uses the `tdpo.opt` file in the Data Protection for Oracle default installation directory. If this file does not exist, Data Protection for Oracle fails.

Though it is possible to change values in the options file, you cannot change the `dsmi` options until you restart Data Protection for Oracle. Data Protection for Oracle loads these values from the default `tdpo.opt` file into the default installation directory when the Oracle service is started.

Note:

- For best results, use the `tdpo.opt` file exclusively instead of default parameters.
- RMAN and the `tdpoconf` and `tdposync` utilities use the options that are defined in the `tdpo.opt` file.
- By default, the `tdpo.opt` file is in the directory where Data Protection for Oracle is installed.
- You can specify options in the `tdpo.opt` file in both uppercase or lowercase type.

Available Data Protection for Oracle options

The options that can be set in the `tdpo.opt` file for Data Protection for Oracle are described.

The following options can be set in the `tdpo.opt` file:

dsmi_log

Specify the directory that contains the Data Protection for Oracle error log file `tdpoerror.log`.

dsmi_orc_config

Specify the complete path to the IBM Spectrum Protect client user options file `dsm.opt` used during the Data Protection for Oracle session. If you do not specify this option, Data Protection for Oracle looks for the options file in the Data Protection for Oracle installation directory. You must specify this option if your IBM Spectrum Protect client user options file is in a directory other than the Data Protection for Oracle installation directory.

tdpo_enablescriptinput

You can automate the maintenance of IBM Spectrum Protect Data

Protection for Oracle without the need for user interaction. You can set the `tdpo_enablescriptinput` option to allow the **tdposync** utility to receive input from a script or batch file.

You can specify the following options:

- Yes** The **tdposync** utility can receive redirected input that allows the utility to run in batch mode.
- No** The **tdposync** utility must be run in interactive mode and requires user input to complete its run. This option is the default.

Attention: If you run the **tdposync** command interactively and the `tdpo_enablescriptinput` is set to Yes, the input for the Oracle password is shown in plain text. To obfuscate the password, set the `tdpo_enablescriptinput` to No.

tdpo_fs

Specify a file space name on the IBM Spectrum Protect server for Data Protection for Oracle backup, delete, and restore operations. The file space name can contain a string of 1-1024 characters.

- The default file space name is `adsmorc`.
- When you have more than one Oracle database, use this option to back up each Oracle target database to its own file space on the IBM Spectrum Protect server.
- The file space name in the `include/exclude` statement must match the file space name that is specified in the `tdpo_fs` option for `include/exclude` processing to function correctly.

tdpo_date_fmt

This option specifies the format that you want to use to display dates.

You can specify a number, 1 - 5. The default value is 1.

- 1 MM/DD/YYYY (Default value)
- 2 DD-MM-YYYY
- 3 YYYY-MM-DD
- 4 DD.MM.YYYY
- 5 YYYY.MM.DD

tdpo_num_fmt

This option specifies the format that you want to use to display numbers.

You can specify a number, 1 - 6. The default value is 1.

- 1 1,000.00 (Default value)
- 2 1,000,00
- 3 1 000,00
- 4 1 000.00
- 5 1.000,00
- 6 1'000,00

tdpo_time_fmt

This option specifies the format that you want to use to display time.

You can specify a number, 1 - 4. The default value is 1.

- 1 23:00:00 (Default value)
- 2 23,00,00
- 3 23.00.00

tdpo_mgmt_class_2

This option specifies the second management class that is used for copy 2 in the RMAN duplex copy command.

tdpo_mgmt_class_3

This option specifies the third management class that is used for copy 3 in the RMAN duplex copy command.

tdpo_mgmt_class_4

This option specifies the fourth management class that is used for copy 4 in the RMAN duplex copy command. Four copies is the maximum that is allowed by RMAN.

Note: See “The Duplex Copy function” on page 26 for specific details on using management class options.

Register the Data Protection for Oracle node to an IBM Spectrum Protect server

The Data Protection for Oracle node name and password when required must be registered to the IBM Spectrum Protect server before you can begin requesting backup and restore services. The process of setting up a node name and password with the IBM Spectrum Protect server is called registration.

About this task

The following information is needed to register Data Protection for Oracle with the IBM Spectrum Protect server:

- Data Protection for Oracle node name:
The node name identifies the instance on which Data Protection for Oracle is installed. Use a separate and unique node name for Data Protection for Oracle. This prevents any confusion with an existing IBM Spectrum Protect backup-archive client on the same workstation.
- Initial password:
Specify the password that you want to use, if a password is required.

The following information is defined by the IBM Spectrum Protect administrator:

- The policy domain to which your client node belongs.
A policy domain contains policy sets and management classes that control how IBM Spectrum Protect manages the objects you back up. Rather than binding Data Protection for Oracle backups to a different management class, define a unique policy domain for Data Protection for Oracle node names. These backups can be bound to the default management class within this unique policy domain. Rather than binding a different management class for Oracle backups, specify a different domain for the backups with a separate management class.
- The authority to enable compression.
The IBM Spectrum Protect administrator can specify the server to compress files. If the IBM Spectrum Protect administrator specifies that the compression decision belongs to the client **compressionclient**, you must specify **compressionyes** in the client user options file `dsm.opt` so that the Data Protection for Oracle node is able to compress objects before it sends them to the IBM Spectrum Protect server.
- The authority to delete backup data from IBM Spectrum Protect storage.

The Data Protection for Oracle node can only delete backed up data from IBM Spectrum Protect storage if the IBM Spectrum Protect administrator registers the node with backdelete authority. Specify the following option to allow backdelete authority:

`backdelete yes`

Note, when backdelete no is specified and a deletion request is made, the request fails and an error message displays. Therefore, specify backdelete yes for the object to be immediately removed from the IBM Spectrum Protect server when the next inventory expiration occurs. This expiration also makes the previously used storage space available for new use.

Define IBM Spectrum Protect options in the client options file

You must define some IBM Spectrum Protect options after the Data Protection for Oracle node is registered to the IBM Spectrum Protect server:

About this task

- These options are defined in the IBM Spectrum Protect client user options file `dsm.opt` by default.
- Note, the IBM Spectrum Protect client user options file `dsm.opt` by default, that you must edit for Data Protection for Oracle is in the directory that is specified by the `dsmi_orc_config` option. If this option is not specified, Data Protection for Oracle looks for this options file in the Data Protection for Oracle installation directory.
- Data Protection for Oracle provides sample IBM Spectrum Protect options files that you can modify for this purpose. These sample files are in the Data Protection for Oracle installation directory.
- The IBM Spectrum Protect administrator can provide you with the TCP server address **tcpserveraddress** and communication method **commethod** for connecting Data Protection for Oracle to the IBM Spectrum Protect server.

Required options

You must set required IBM Spectrum Protect client options to operate Data Protection for Oracle.

Specify the required options in the IBM Spectrum Protect client user options file `dsm.opt` by default, in the directory that is specified by the `dsmi_orc_config` option.

nodename

Specify the Data Protection for Oracle node name that is used during operations with the IBM Spectrum Protect server. The node name can contain a string of 1 - 64 characters.

To restore data from one Oracle server to another with Data Protection for Oracle, make sure that the value of the `nodename` option in the `dsm.opt` file on the target Oracle server equals the value of the `nodename` option in the `dsm.opt` file on the source Oracle server. Data Protection for Oracle, the IBM Spectrum Protect backup-archive client, and the IBM Spectrum Protect API must be at the same levels on both the source Oracle server and the target Oracle server. If there is a password that is associated with the `nodename` option in the `dsm.opt` file on the target Oracle server, use the `tdpoconf` utility to generate the local password file when the value of the `nodename` option changes.

passwordaccess

Specify passwordaccess generate. This option allows the IBM Spectrum Protect API to manage all password actions after the password is created with the **tdpoconf password** command. The IBM Spectrum Protect API saves the current encrypted password in the Windows registry and automatically generates a new password when the current password expires. This method of password management is useful when you are running unattended scheduled backups because it ensures that the backup never fails with an expired password.

tcpserveraddress

Specify the TCP/IP address for the IBM Spectrum Protect server to be used for Oracle backups.

commmethod

Specify the communication method for Data Protection for Oracle to communicate with the IBM Spectrum Protect server. Note, this option requires other IBM Spectrum Protect options, depending on the communication method you specify.

Other configuration options to consider

There are other IBM Spectrum Protect client options that you can use when you are configuring Data Protection for Oracle.

You can specify other options in the IBM Spectrum Protect client user options file `dsm.opt`.

compression

Specify whether the IBM Spectrum Protect API compresses data before it sends it to the IBM Spectrum Protect server. You can specify yes or no. The default value is No. The value of the compression option for Data Protection for Oracle is allowed only if the IBM Spectrum Protect administrator leaves the compression decision to the node. Enabling compression affects performance in three ways:

- Processor usage is higher on the system on which Data Protection for Oracle is running.
- Network bandwidth usage is reduced because fewer bytes are transmitted.
- Storage usage on the IBM Spectrum Protect server is reduced.

When any of the following conditions exist, you should specify yes:

- The network adapter has a data overload.
- Communications between Data Protection for Oracle and the IBM Spectrum Protect server are over a low-bandwidth connection.
- There is heavy network traffic.

When any of the following conditions exist, you should specify no:

- The system that is running Data Protection for Oracle has a processor overload. The added processor usage as a result of enabling compression can impact other applications, including the Oracle server.

You can monitor processor and network resource usage with the Performance Monitor program that is shipped with Windows.

- You are not constrained by network bandwidth. In this case, you can achieve the best performance by specifying **compression no** and enabling hardware compaction on the tape drive, which also reduces storage requirements.

- Hardware compression is in use for the media where Data Protection for Oracle data is stored.

After a completed backup operation, view the throughput rate and the compression status for a backup object in the IBM Spectrum Protect server activity log file. Run the IBM Spectrum Protect server **QUERY ACTLOG** command in the IBM Spectrum Protect server administrative client window. The throughput rate and the compression status are not written to the activity log when activity logging is disabled on the IBM Spectrum Protect server. See the **SET ACTLOGRETENTION** command in the *IBM Spectrum Protect Administrator's Reference* for complete activity logging information.

You can also determine whether objects were compressed by running the **tdposync query** command.

deduplication

Specify whether the IBM Spectrum Protect API deduplicates data before it sends it to the IBM Spectrum Protect server. You can specify Yes or No. The default value is No. The value of the deduplication option for Data Protection for Oracle applies only if the IBM Spectrum Protect administrator allows client-side data deduplication.

You can determine if objects are deduplicated by running the **tdposync query** command or by examining the IBM Spectrum Protect server activity log file.

The deduplication and enablelanfree options are mutually exclusive. Therefore, you must use either one option or the other, but not both options together.

The deduplication and enableclientencryptkey options are also mutually exclusive. Therefore, you must use either one option or the other, but not both options together.

enablelanfree

Specify whether you run backup or restore operations in a LAN-free environment if you are equipped to do so. You can specify yes or no. The default value is no. You can avoid network constraints by shifting the movement of data to a storage area network (SAN). After a completed backup operation, view the LAN-free status for a backup object in the IBM Spectrum Protect server activity log file. For more information, see the appropriate Storage Agent User's Guide.

The enablelanfree and deduplication options are mutually exclusive. Therefore, you must use either one option or the other, but not both options together.

include

When a management class other than the default management class is defined within an existing policy domain, add an include statement to the client options file that is used by the Oracle node.

You must add an include statement to the `dsm.opt` file.

This include statement binds the Oracle backup objects to the management class that is defined for managing these objects. The include statement uses the following naming convention:

```
\FilespaceName\orcnt\ObjectName
```

The **FORMAT** parameter in the RMAN script can also be used to assist with object naming. For example, if the **FORMAT** parameters (in the RMAN script) specified the following values for databases and logs:

```
format 'DB_%u_%p_%c'  
format 'LOG_%u_%p_%c'
```

The **include** statement in the `dsm.opt` file, which is used by the Oracle node, would be as follows:

```
INCLUDE \FilespaceName\orcnt\DB* mgmtclassname  
INCLUDE \FilespaceName\orcnt\LOG* mgmtclassname
```

Make sure that the **FORMAT** parameter specifies a unique name for the backup. If the object name exists on the IBM Spectrum Protect server, the backup might fail with an RC=8 error that is recorded in the `sbtio.log` file.

enableclientencryptkey

When `enableclientencryptkey` is set to yes, Data Protection for Oracle provides 128-bit transparent encryption of Oracle databases during backup and restore processing. One random encryption key is generated per session and is stored on the IBM Spectrum Protect server with the object in the server database. Although IBM Spectrum Protect manages the key, a valid database must be available to restore an encrypted object.

Important: The `enableclientencryptkey` and deduplication options are mutually exclusive because encrypted files cannot be deduplicated. Therefore, you can use only one or the other option, but not both options together.

You can specify the databases that you want encrypted by adding an **include** statement with the `include.encrypt` option in the client user options file `dsm.opt`.

For example, to enable transparent encryption, do the following steps:

1. Edit the client user options file, `dsm.opt`.
2. Specify `enableclientencryptkey yes`.
3. Specify `encryptiontype AES128`, or `AES256`.
4. Specify the objects to encrypt. This example encrypts all data:

```
include.encrypt      \adsmorc\...\*
```

Thus, the encryption options would be as follows in this client user options file, `dsm.opt`:

```
enableclientencryptkey yes  
encryptiontype aes128  
include.encrypt      \adsmorc\...\*
```

See *IBM Spectrum Protect Using the Application Programming Interface* for more details about the `enableclientencryptkey` option.

You can determine whether objects were encrypted by running the **tdposync query** command.

Related concepts:

“LAN-free data transfer” on page 1

Define IBM Spectrum Protect policy requirements

Data Protection for Oracle requires special IBM Spectrum Protect policy domain settings.

About this task

RMAN uses the **format** parameter in the RMAN script to generate unique backup file names. Because all backup objects inserted into the IBM Spectrum Protect backup storage pool have unique file names, they never expire on the IBM Spectrum Protect server. As a result, Data Protection for Oracle requires the following IBM Spectrum Protect policy domain settings:

Backup copy group values

Data Protection for Oracle provides the `tdposync` utility to remove unwanted backup objects from the IBM Spectrum Protect server. Set the following IBM Spectrum Protect backup copy group options:

- `verdeleted 0`
- `retonly 0`

When Data Protection for Oracle marks a backup object inactive, that object is deleted from the IBM Spectrum Protect server the next time expiration processing occurs. A backup object is marked for immediate expiration when you delete it through RMAN with the Data Protection for Oracle interface or with the `tdposync` utility. Note, an inactive backup object cannot be restored through RMAN with the Data Protection for Oracle interface.

Note:

1. The IBM Spectrum Protect administrator must also register your node by specifying `backdelete yes` in order for backup objects to be deleted. However, be aware that a backup object is marked for immediate expiration when `backdelete yes` and you delete it through RMAN with the Data Protection for Oracle interface or with the `tdposync` utility. Note, when `backdelete no` is specified and a deletion request is made, the request fails and an error message displays.
2. The following backup copy group options are not applicable to Data Protection for Oracle:
 - `frequency`
 - `verexists`
 - `retextra`
 - `mode`
 - `serialization`

Data Protection for Oracle accepts default values for these options.

3. An archive copy group is not required (although it can exist) because Data Protection for Oracle stores all objects as backup objects on IBM Spectrum Protect.

Management class

IBM Spectrum Protect uses management classes to manage backups on the IBM Spectrum Protect server. When you back up a database, the default management class for your node is used. Because the policy requirements for Data Protection for Oracle might be different from the wanted settings for the regular IBM Spectrum Protect backup-archive clients, you must have a different management class that is defined for Data Protection for

Oracle. You must define a separate policy domain where the default management class has the required settings. Then, register all Data Protection for Oracle nodes to that domain.

If you choose to define a new management class within an existing policy domain, not the default management class for that domain, then you must add an `include` statement to the Data Protection for Oracle options file to bind all objects to that management class.

The following steps assign a management class name `orcbkup` to all Oracle backups with a default file space name `adsmorc`:

1. Add this `incl excl` entry under the server stanza you use in the `dsm.opt` file:

```
incl excl C:\myfile\include.def
```

- 2.

Add the following `include` entry to the `C:\myfile\include.def` file:

```
include \adsmorc\...\* orcbkup
```

Note: The file space name in the `include/exclude` statement must match the file space name that is defined with the `tdpo_fs` option. If a file space name other than the default value `adsmorc` is used:

- a. You must specify the file space name with the `tdpo_fs` option.
- b. You must specify the file space name that is defined in the `tdpo_fs` option in the `include/exclude` statement.

All the files that are backed up with a default file space name of `adsmorc` are assigned to management class *orcbkup*.

Note: Data Protection for Oracle stores all objects as backup objects on IBM Spectrum Protect storage, so an archive copy group is not required, although it can exist.

See your IBM Spectrum Protect administrator or see the *IBM Spectrum Protect Administrator's Guide* for more information about defining or updating IBM Spectrum Protect policy domains and copy groups.

Initialize the password with an IBM Spectrum Protect server

The administrator must run the `tdpoconf` utility program to set the password before you use Data Protection for Oracle.

Related reference:

"`tdpoconf` utility" on page 38

Chapter 4. Protecting Oracle Server data

Use Data Protection for Oracle to back up and restore Oracle Server data.

Before you begin

Data Protection for Oracle must be installed and configured on your system and an Oracle Server must be available.

RMAN and Data Protection for Oracle

You can run full or partial, offline, or online backups with Oracle. When you identify which database to back up, Oracle locates all necessary files and sends them to the IBM Spectrum Protect server through Data Protection for Oracle.

About this task

Data Protection for Oracle provides an interface between Oracle Media Management API calls and IBM Spectrum Protect API routines.

Starting RMAN

Use RMAN to back up and restore an Oracle database.

About this task

In this example, the catalog database contains a registered target database. Start an RMAN session with this command:

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

RMAN starts in the sequence shown.

```
target xxx/yyy@target: connect to target database  
using user xxx and password yyy with connect string target  
rcvcat aaa/bbb@catalog: connect to catalog database  
using user aaa and password bbb with connect string catalog  
cmdfile bkdb.scr: run bkdb.scr script  
msglog bkdb.log: log the output messages in bkdb.log
```

Tip: In the example, RMAN creates a log file, bkdb.log, in the current working directory. If an error occurs, the error stack is logged to the log file.

After a completed backup or restore operation, view the throughput rate and encryption status for a backup object in the IBM Spectrum Protect server activity log file. Run the IBM Spectrum Protect server **QUERY ACTLOG** command in the IBM Spectrum Protect server administrative client window. A message similar to the following is displayed:

```

08/03/11
16:23:08
ANE4991I (Session: 67, Node: MACHINE_ORC) DP Oracle Win64 ANU0599 TDP for Oracle:
(5508): =>()
ANU2526I Backup details for backup piece \adsmorc\orcnt\df_727444762_116_1
(database "orcl").
Total bytes processed: 9961472. Deduplicated: Yes. Bytes after deduplication: 2272805.
Deduplication reduction: 77.18%. Compressed: Yes. Bytes after compression: 52253.
Compressed by: 97.70%. Encryption: None. LAN-Free: No. Total bytes sent: 52253.
Total data reduction: 99.48%. Total processing time: 00:00:01.
Throughput rate: 9728.00Kb/Sec. (SESSION: 67)

```

Editing RMAN scripts

You must edit existing RMAN scripts to use **TDPO_OPTFILE**=*fully qualified path and file name of options file* variable in place of other environment variables.

About this task

Sending options with the send command

Use the Oracle RMAN **send** command in an RMAN script to pass IBM Spectrum Protect options to the IBM Spectrum Protect API.

Before you begin

To send options from the IBM Spectrum Protect to the IBM Spectrum Protect API, you must specify the **send** command in an RMAN script.

About this task

Use the **send** command to set IBM Spectrum Protect options such as TCPServeraddress and TCPport to the IBM Spectrum Protect API. You can customize the actions that the script takes without updating the existing Data Protection for Oracle or IBM Spectrum Protect API options files. Any option that is sent through the **send** command overrides the option that is specified in the Data Protection for Oracle or IBM Spectrum Protect API options files.

- You can specify multiple IBM Spectrum Protect API options in the same **send** command.
- The ENABLELANFREE and DEDUPLICATION options are mutually exclusive. If both options are defined, client-side data deduplication does not occur.
- The ENABLECLIENTENCRYPTKEY and DEDUPLICATION options are also mutually exclusive. If both options are defined, client-side data deduplication does not occur.
- You can specify any IBM Spectrum Protect API option with the **send** command.

Procedure

Specify the **send** command in an RMAN script. You can specify one or more IBM Spectrum Protect options in a **send** command string. The **send** command string can contain up to 512 bytes. To back up an Oracle database to the IBM Spectrum Protect server named halley at TCP/IP port 1601, and to enable the cache for client-side data deduplication for only channel t1, specify the following statements in an RMAN script:

```

allocate channel t1 type 'SBT_TAPE';
SEND channel 't1' '-TCPSEVER=halley -TCPPOINT=1601 -ENABLEDEDUPCACHE=YES';

```

Results

Data Protection for Oracle passes the command string to the IBM Spectrum Protect API. The IBM Spectrum Protect API validates the contents of the string. If an invalid entry is detected, the API issues an ANS****E message to Data Protection for Oracle. The message returns an error condition to Oracle RMAN and stops processing.

Related tasks:

“RMAN script examples”

RMAN script examples

Sample RMAN scripts illustrate how to create parallel backup streams to IBM Spectrum Protect server storage.

Example

In these examples, to back up to IBM Spectrum Protect by using Data Protection for Oracle, you must specify type 'sbt_tape' in the RMAN script or within the global RMAN configuration settings.

Example 1:

When the IBM Spectrum Protect server and Oracle system have multiple network cards, you can back up your data with multiple network paths to improve network throughput. Your environment is set up as follows:

- The Oracle system has two network cards with two addresses, A and B.
- The IBM Spectrum Protect server also has two network cards with two addresses, C and D.
- Paths exist between A and C, B and D, but not between A and D or B and C.

Create two backup streams or Oracle channels, without using two separate options files to point to different two different addresses. Channel t1 goes to address C, channel t2 goes to address D. Be careful not to send parts of your backup to two different IBM Spectrum Protect servers because it cannot be restored.

You can maintain one Data Protection for Oracle options file and change the IBM Spectrum Protect server specification in an RMAN script in the following manner:

```
run
{
    allocate channel t1 type 'sbt_tape';
        SEND channel t1 '-TCPSEVER=<C>';
    allocate channel t2 type 'sbt_tape';
        SEND channel t2 '-TCPSEVER=<D>';

    backup
        filesperset 5
        format 'df_%t_%s_%p'
        (database);
    release channel t2;
    release channel t1;
}
```

Example 2:

This backup script allocates two parallel connections to the IBM Spectrum Protect server. The IBM Spectrum Protect server views these connections as two separate sessions:

```

run
{
    allocate channel t1 type 'sbt_tape' parms
        'ENV=(TDPO_OPTFILE=C:\oracle\scripts\tdpo.opt)';
    allocate channel t2 type 'sbt_tape' parms
        'ENV=(TDPO_OPTFILE=C:\oracle\scripts\tdpo.opt)';

    backup
        filesperset 5
        format 'df_%t_%s_%p'
        (database);

}

```

Example 3:

This restore script allocates one parallel connection to the IBM Spectrum Protect server:

```

run
{
    allocate channel t1 type 'sbt_tape' parms
        'ENV=(TDPO_OPTFILE=C:\oracle\scripts\tdpo.opt)';
    restore database;
    recover database;
    alter database open;
}

```

Note:

1. The allocate channel entry is divided on two lines after the parms option to accommodate page formatting.
2. The Oracle database must be in mount mode for the restore to succeed.

The Duplex Copy function

With Data Protection for Oracle, you can use the Oracle Server Duplex backup feature to make up to four exact duplicate copies of a backup. The backup can then be stored on different backup media.

About this task

A different management class is required for each backup copy. By default, the primary management class is the default management class on the policy domain that is defined for the Data Protection for Oracle node.

Note: It might be necessary to define the Oracle parameter value (BACKUP_TAPE_IO_SLAVES=TRUE) in the `init.ora` file of the target database for Data Protection for Oracle to use the duplex copy feature. Refer to your Oracle documentation about the use of this Oracle parameter.

For example, to create four backup copies:

Procedure

1. Specify the following option in the RMAN backup script:

```
set duplex=4
```
2. Define the following options in the `tdpo.opt` file:
 - `tdpo_mgmt_class_2`
 - `tdpo_mgmt_class_3`
 - `tdpo_mgmt_class_4`

3. Run the RMAN backup script.

Results

The following backup behavior occurs:

- The first backup copy is bound to the default management class to which the node is registered.
- The second backup copy is bound to the management class defined by the `tdpo_mgmt_class_2` option.
- The third backup copy is bound to the management class defined by the `tdpo_mgmt_class_3` option.
- The fourth backup copy is bound to the management class defined by the `tdpo_mgmt_class_4` option.

Note: Take note of the considerations provided:

- The duplex copy feature does not use *include* statements. It uses the management classes that are specified in the `tdpo.opt` file.
- You receive an error message if you specify **set duplex =4** in the RMAN backup script and do not define enough `tdpo_mgmt_class` options in the `tdpo.opt` file.
- To place duplicate copies on different media:
 - Make sure that the storage pool information for each backup copy group within the management classes is not the same.
 - Make sure that backups from these different storage pools are not moved to the same storage pool later.
- Duplicate data is sent across the network.
- If you specify **set duplex =4** and allocate one channel in the RMAN backup script, RMAN will start four sessions to the IBM Spectrum Protect server. Likewise, if you specify **set duplex =4** and allocate two channels in the RMAN backup script, RMAN will start eight sessions to the IBM Spectrum Protect server.
- The duplex copy feature sends the backup copies simultaneously. If the backup destination is tape, the number of sessions is a multiple of the duplex value. As a result, make sure that RMAN does not start more sessions than the maximum mount points allowed by the IBM Spectrum Protect server. The node definition option on the IBM Spectrum Protect server **maxnummp** determines the maximum number of mount points a client node can use on the IBM Spectrum Protect server during a backup operation. View the maximum mount points that are allowed by the IBM Spectrum Protect server for a particular node by entering the **query node** command from an IBM Spectrum Protect Administrative Client prompt:
q node f=d

See the appropriate *IBM Spectrum Protect Administrator's Reference* for more information about this option.

Review your current Oracle documentation about the duplex backup function.

Removing old backups

Data Protection for Oracle uses the IBM Spectrum Protect backup repository. Each database backup creates an object with a unique name. Since these objects have unique names, they always remain active and never expire. The database administrator (DBA) can control and coordinate copies that are removed from the IBM Spectrum Protect server with RMAN.

Before you begin

Ensure that **backdelete=yes** is specified by the IBM Spectrum Protect administrator during registration of your node. Specifying this parameter gives you permissions to delete backup objects.

About this task

Note: Make sure to use the same `tdpo.opt` file that was used for the original backup. Using this file enables the backup objects to be found on the IBM Spectrum Protect server.

Removing a backup example

A sample script for removing an old backup is provided.

About this task

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

```
run
{
    allocate channel for delete type 'sbt_tape' parms
        'ENV=(TDPO_OPTFILE=C:\oracle\scripts\tdpo.opt)';

    change backupset backupset number delete;
}
```

Refer to the Oracle RMAN manual for more information about the **change** command and its options.

Setting up a schedule example

This example illustrates how to set up a schedule to automatically back up Oracle server databases.

About this task

For consistency, this procedure uses specific information. However, you can define a command file with any set of commands you choose. You can then use the same command file to define schedules on other IBM Spectrum Protect servers. All command information is presented as command-line interface entries.

This schedule in this procedure contains the following settings:

- The Data Protection for Oracle node name is `NodeA1`.
- The password for node name `NodeA1` is `PasswordA1`.
- The policy domain to which node name `NodeA1` is registered is `PolicyA1`.
- The schedule is a daily backup of an online Oracle database.
- The scheduled backup begins between 9:00 and 9:15 PM.

Setting up a schedule on the IBM Spectrum Protect server

Define a schedule on the IBM Spectrum Protect server to automatically run online backups of Oracle server databases.

Before you begin

Ensure that your system meets the minimum hardware, software, and operating system requirements. For more information, see Chapter 2, “Data Protection for Oracle installation,” on page 5

On a Solaris SPARC operating system or on a 64-bit version of HP-UX Itanium operating system, use the latest compatible version of the IBM Spectrum Protect BA client along with the latest versions of Data Protection for Oracle and IBM Spectrum Protect API.

Procedure

To set up a schedule on the IBM Spectrum Protect server:

1. Define the following schedule on the IBM Spectrum Protect server. You can enter the command on the IBM Spectrum Protect server console or on an administrative client. The administrative client does not have to be running on the same system as the IBM Spectrum Protect server.

```
define schedule PolicyA1 daily_orcbkup description="07Daily Online DB Backup"
action=command objects="C:\Program Files\Tivoli\TSM\Agent0BA64\sched
\orcsched.cmd"
starttime=21:00 duration=15 durunits=minutes period=1 perunits=day
dayofweek=any
```

The following message must display before you proceed to the next step:

```
ANR2500I Schedule daily_orcbkup defined in policy domain PolicyA1.
```

2. Issue the following command to associate the Data Protection for Oracle node to the backup schedule defined in step 1:

```
define association PolicyA1 daily_orcbkup NodeA1
```

Results

- A backup schedule is now defined on the IBM Spectrum Protect server.
- The backup schedule runs the command file orcsched.cmd, in the C:\Program Files\Tivoli\TSM\Agent0BA64\sched\ or c:\progra~1\tivoli\tsm\agentoba64\sched\ directory.
- The backup runs daily around 9:00 PM.
- The backup schedule can start on any day of the week.
- You can run the IBM Spectrum Protect **query schedule** and **query association** commands to confirm that the schedule and node association are set correctly.

Setting up a schedule on the workstation with the Oracle Server

Use this procedure to define a schedule on the workstation with the Oracle Server.

About this task

This example assumes the following setup:

- The IBM Spectrum Protect backup archive client is installed on the Oracle Server in the following directory:
C:\Program Files\Tivoli\TSM\baclient
- The Data Protection for Oracle for the Oracle server is installed in the following directory:
C:\Program Files\Tivoli\TSM\Agent0BA64
- The options files in each of these directories are updated so that the communication parameters point to the IBM Spectrum Protect server.

Procedure

To set up a schedule on the workstation with the Oracle Server:

1. Log in with a Windows account that has administrative privileges.
2. Change to the backup archive client installation directory with this command:
C:\>cd \Program Files\Tivoli\TSM\baclient
3. Use the IBM Spectrum Protect Client Service Configuration Utility `dsmcutil` to install the IBM Spectrum Protect Scheduler Service. Type in the command from your current location in the backup archive client installation directory. For example:

```
dsmcutil inst /name:"TSM Oracle Bkup Scheduler"  
/node:nodeal /password:passwordal /autostart:yes  
/clientdir:"C:\Program Files\Tivoli\TSM\baclient"  
/optfile:"C:\Program Files\Tivoli\TSM\Agent0BA64\dsm.opt"  
/validate:yes
```

You can modify the command to contain options specific to your schedule.

This example shows the output:

```
TSM Windows NT Client Service Configuration Utility  
Command Line Interface - Version 8, Release 1, Level 0  
(C) Copyright IBM Corporation, 1990, 2016, All Rights Reserved.
```

```
TSM Api Version 8.1.0
```

```
Command: Install TSM Client Service  
Machine: ABC-ARTXNC(Local Machine)
```

Installing TSM Client Service:

```
Machine           : ABC-ARTXNC  
Service Name      : TSM Oracle Bkup Scheduler  
Client Directory  : C:\Program Files\Tivoli\TSM\baclient  
Automatic Start   : yes  
Logon Account     : LocalSystem
```

The service was successfully installed.

Creating Registry Keys ...


```
Updated registry value 'ImagePath' .
Updated registry value 'EventMessageFile' .
Updated registry value 'TypesSupported' .
Updated registry value 'TSM Oracle Bkup Scheduler' .
Updated registry value 'ADSMClientKey' .
Updated registry value 'OptionsFile' .
Updated registry value 'EventLogging' .
Updated registry value 'ClientNodeName' .
```

```
Generating registry password ...
Authenticating TSM password for node NODEA1 ...
```

```
Connecting to TSM Server via client options file
'C:\Program Files\Tivoli\TSM\Agent0BA64\dsm.opt' ...
```

Password authentication successful.

The registry password for TSM node NODEA1 has been updated.

Starting the 'TSM Oracle Bkup Scheduler' service

The service was successfully started.

The options file that is defined for Data Protection for Oracle is used by the scheduler when it validates the node and password. The options file is also used when contacting the IBM Spectrum Protect server for schedule information. This example assumes that the dsm.opt file is updated so that the communication parameters point to the IBM Spectrum Protect server to which the Oracle databases are to be backed up.

If this message displays:

```
A communications error occurred connecting to the IBM Spectrum Protect
server
```

Ensure that the dsm.opt file contains entries that point to the correct IBM Spectrum Protect server. Also, ensure that the IBM Spectrum Protect server is running. If you must make a correction, enter the following command:

```
dsmcutil remove /name:"TSM Oracle Bkup Scheduler"
```

Then enter the command that is given at the beginning of this step.

4. Ensure that Data Protection for Oracle is running under the Oracle Site Services account so that it can access the Oracle backup API. The Data Protection for Oracle scheduler service must log on with that account. The scheduler service account information can be specified through the services applet in the control panel.
5. Create a batch file that is called orcsched.cmd and place it in the following location:

```
C:\Program Files\Tivoli\TSM\Agent0BA64\sched\orcsched.cmd
```

Note: The scheduler service runs from the Windows system directory, so it is important that complete paths are specified for all file names and non-system commands. The scheduler service checks the Windows system directory for input and produces its output by default.

The following is an example of the orcsched.cmd file:

```
rem orcsched.cmd
rem =====

rem =====
rem setting oracle sid
rem =====
```

```

set oracle_sid=ilr

rem =====
rem set orc executable binary
rem =====
set ora_exe=c:\oracle\bin\rman.exe

%ora_exe% cmdfile 'C:\rman\bkdb.rmn'

```

The following is an example of the bkdb.rmn file:

```

connect target agnttest/agttest
run
{
allocate channel ch1 type 'SBT_TAPE' parms
'ENV=(TDPO_OPTFILE=C:\oracle\tdpo.opt)';
allocate channel ch2 type 'SBT_TAPE' parms
'ENV=(TDPO_OPTFILE=C:\oracle\tdpo.opt)';
allocate channel ch3 type 'SBT_TAPE' parms
'ENV=(TDPO_OPTFILE=C:\oracle\tdpo.opt)';
allocate channel ch4 type 'SBT_TAPE' parms
'ENV=(TDPO_OPTFILE=C:\oracle\tdpo.opt)';
backup (database);
release channel ch1;
release channel ch2;
release channel ch3;
release channel ch4;
}

```

Note: The allocate channel entry for each channel is divided on two lines after the parms option to accommodate page formatting. The bkdb.rmn file must have the allocate channel entry for each channel specified on one line of text.

6. The scheduler service is now installed, but is not yet started. To start the service, issue the following command:

```
net start "TSM Oracle Bkup Scheduler"
```

A message is displayed indicating that the Scheduler is starting up.

Note, because **autostart**=yes is specified, the IBM Spectrum Protect scheduling service is automatically started each time the Windows system is restarted.

Your system is now ready to run automatic daily online database backups.

Results

Note: If you want to use the IBM Spectrum Protect server scheduling mode:

1. Ensure that the Data Protection for Oracle options file has the **tcpclientaddress** and **tcpclientport** options specified. If you want to run more than one scheduler service, use the same **tcpclientaddress**. However, you must use different values for **tcpclientport** in addition to the different node names. Scheduling Data Protection for Oracle with the regular Windows backup archive client is an example of running more than one scheduler service.

Server-prompted scheduling is supported only when TCP/IP communication is being used. By default, Data Protection for Oracle uses the polling schedule mode.

2. If any changes that affect the scheduler service are made to the Data Protection for Oracle options file, the scheduler service must be restarted to pick up the changes. For example, changes to the IBM Spectrum Protect server address, schedule mode, or the TCP/IP address or port. The restart is done by entering these commands:

```

net stop "TSM Oracle Bkup Scheduler"
net start "TSM Oracle Bkup Scheduler"

```

3. The file named `dsmsched.log` contains status information for the IBM Spectrum Protect scheduler service. Though the default directory is `\Tivoli\TSM\baclient\sched\dsmsched.log`, you can specify a different directory, such as `\Tivoli\TSM\Agent0BA64\sched\dsmsched.log` with the **schedlogname** option in the Data Protection for Oracle options file.
4. If an IBM Spectrum Protect scheduler service is already installed on your workstation for the regular backups of the Windows system, you must install another with a unique name to run the schedules that are defined for Data Protection for Oracle. The IBM Spectrum Protect scheduler service needs a different node name than the regular IBM Spectrum Protect backup archive client. If the path you want to use has a space in it, for example `C:\Program Files\Tivoli\TSM\baclient`, you can place quotation marks around the section of the path name that contains a space `C:\"Program Files"`. You can also use the short form of the path name. The short form of a path name is made up of the first six characters in the path, followed by a tilde (~) and the unique identifier. The following is an example of the short form of the path name:
`C:\Progr~1\Tivoli\TSM\baclient`

The `orcsched.cmd` file must contain these variables with the following values:

oracle_sid

Specify the Oracle system identifier for the instance to be used in the scheduled backup. A value of `ilr` is used in the example.

ora_exe

Specify the complete path and file name of the Oracle RMAN executable file. A value of `c:\oracle\ora91\bin\rman.exe` is used in the example.

cmdfile

Specify the complete path and file name of the Oracle command file. A value of `C:\rman\bkdb.rmn` is used in the example.

Querying backup objects

Use the **tdposync query** command to query the IBM Spectrum Protect server for information about objects that are backed up.

About this task

When you issue the **tdposync query** command, information about a backup object is displayed. Information is listed including the size and date of the backup, and whether the object is compressed, encrypted, or deduplicated by the IBM Spectrum Protect during the backup operation.

Related tasks:

“Data deduplication with Data Protection for Oracle” on page 34

Related reference:

“Query command” on page 46

Data deduplication with Data Protection for Oracle

You can use data deduplication with Data Protection for Oracle to reduce the amount of redundant data that is backed up to the IBM Spectrum Protect server.

Overview of data deduplication

Data deduplication is a method of reducing storage needs by eliminating redundant data.

Two types of data deduplication are available with IBM Spectrum Protect: client-side data deduplication and server side data deduplication.

Client-side data deduplication is a data deduplication technique that is used on the IBM Spectrum Protect API to remove redundant data during backup processing before the data is transferred to the IBM Spectrum Protect server. Using client-side data deduplication can reduce the amount of data that is sent over a local area network.

Server side data deduplication is a data deduplication technique that is done by the server. The IBM Spectrum Protect server administrator can specify the data deduplication location on either the client or server to use with the **DEDUP** parameter on the **REGISTER NODE**, or **UPDATE NODE** server command.

Setting up for client-side data deduplication

You must edit the client options file before Data Protection for Oracle can use client-side data deduplication through the IBM Spectrum Protect API.

About this task

You can turn on client-side data deduplication by adding **DEDUPLICATION YES** to the **dsm.opt** file and by making sure that the deduplication prerequisites are met.

The IBM Spectrum Protect server administrator must enable data deduplication for the Data Protection for Oracle with the appropriate server command. For example:

```
UPDATE NODE ORACLE_NODE DEDUPLICATION=CLIENTORSERVER
```

The IBM Spectrum Protect server administrator must enable data deduplication on the storage pool where the Oracle data is stored with the following server command:

```
UPDATE STGPPOOL BACKUP_POOL DEDUPLICATION=YES
```

Results

After you created backups with client-side data deduplication enabled, you can use the **tdposync query** command to verify that client deduplication occurred during the backup operation. For detailed statistics, you can also query the IBM Spectrum Protect server activity log for the total data reduction.

You can also use the performance monitor feature in the IBM Spectrum Protect server to verify the percentage of data that has been deduplicated. The performance monitor feature is part of the IBM Spectrum Protect Administration Center. The data deduplication statistics are displayed graphically in the Performance GUI in the Administration Center.

Considerations:

- The **deduplication** and **enablelanfree** options are mutually exclusive. Therefore, you can use either one option or the other, but not both options together.
- The **deduplication** and **enableclientencryptkey** options are also mutually exclusive. Therefore, you can use either one option or the other, but not both options together.
- A local deduplication cache is an optimization that can reduce network traffic between the IBM Spectrum Protect server and the client. Client-side data deduplication can occur with or without it. Do not use the deduplication cache with Data Protection for Oracle for the following reasons:
 - The cache cannot be used when multiple processes, such as concurrent backups or IBM Spectrum Protect API applications, transfer content concurrently. Data Protection for Oracle backup operations that use multiple channels use multiple processes.
 - It is possible that the client deduplication cache can become out of sync with the server-deduplicated disk storage pool. This state can be the result of object expiration, file space deletion, and overflow to an associated tape storage pool. When the client cache contains entries that are no longer in the IBM Spectrum Protect server deduplicated pool, the cache is reset and the backup operations fails. The IBM Spectrum Protect API does not attempt the backup again.
- When IBM Spectrum Protect server expiration or a similar process that removes deduplicated data extents runs concurrently with a deduplicated backup, the backup might fail. Backup operations with client-side deduplication enabled fails with the following messages:
 - Return code=254
 - Error message: ANS7899E The client referenced a deduplicated extent that does not exist on the TSM server.

Related tasks:

“Determining total data reduction”

Related reference:

“Query command” on page 46

Determining total data reduction

You can determine the percentage of total data reduction by querying the IBM Spectrum Protect server activity log.

About this task

Look for message number ANU2526I, which displays the data deduplication statistics, as shown in the following example:

```
ANE4991I (Session: 67, Node: HALLEY_ORC) DP Oracle Win64 ANU0599 TDP for Oracle: (5508): =>()
ANU2526I Backup details for backup piece \adsmorc\orcnt\df_727444762_116_1 (database "orcl").
Total bytes processed: 9961472. Deduplicated: Yes. Bytes after deduplication: 2272805.
Deduplication reduction: 77.18%. Compressed: Yes. Bytes after compression: 52253. Compressed by: 97.70%.
Encryption: None. LAN-Free: No. Total bytes sent: 52253. Total data reduction: 99.48%.
Total processing time: 00:00:01. Throughput rate: 9728.00Kb/Sec. (SESSION: 67)
```

In the following example, the Oracle database backup piece size is 9,961,472 bytes. Then, it was deduplicated and the number of bytes after deduplication is 2,272,805.

The total data reduction is calculated as follows:

- The percentage of data that is deduplicated is as follows:

$\text{Deduplication reduction} = (1 - 2272805 / 9961472) = 0.7718$

- After data deduplication, the object was compressed. The number of bytes before compression is the number of bytes after deduplication. The data was compressed to 52,253 bytes. Therefore,
 $\text{Compressed by} = (1 - 52253 / 2272805) = 0.9770$
- The total bytes sent to the server equals the number of bytes after compression. The formula for total data reduction is as follows:
 $\text{Total data reduction} = (1 - \text{bytes after compression} / \text{bytes processed})$
 $= (1 - 52253 / 9961472) = 0.9948$

Results

If there is no deduplication, the number of bytes after deduplication equals the number of bytes processed. If there is no compression, the number of bytes after compression equals the number of bytes after deduplication.

If you want to find out data reduction across multiple backup pieces, you can add up the numbers and calculate the ratios.

You can also use the performance monitor feature in the IBM Spectrum Protect server to verify the percentage of data that has been deduplicated. The performance monitor feature is part of the IBM Spectrum Protect Administration Center. The data deduplication statistics are displayed graphically in the Performance GUI in the Administration Center.

Chapter 5. Commands and utilities for Data Protection for Oracle

The Data Protection for Oracle commands and utilities are used to protect Oracle Server data.

tdpoconf and tdposync utilities

Set up and maintain Data Protection for Oracle with the tdpoconf and tdposync utilities. Find the utilities in the directory where Data Protection for Oracle is installed.

Use the Data Protection for Oracle utilities to do the following tasks:

- Set up and maintain Data Protection for Oracle with the tdpoconf utility. The utility is also used for password maintenance.
- Synchronize the RMAN catalog and Oracle control file by using tdposync. The utility is used to delete Oracle backups that are stored on the IBM Spectrum Protect.
- Query objects that are backed up on the IBM Spectrum Protect by using the tdposync utility.

Command line syntax and characteristics

Guidelines for the command line syntax for the Data Protection for Oracle utilities.

The Data Protection for Oracle utilities use the following command line syntax:

tdpoconf command 0 or more optional parameters

tdposync command 0 or more optional parameters

The command-line parameters have the following characteristics:

- Minimum abbreviations for keywords are indicated in uppercase.
- Optional parameters begin with a dash (-).
- Optional parameters can display in any order.
- Some keyword parameters require a value that is separated by the equal sign (=).
- If a parameter requires more than one value, the values are separated with commas.
- A space separates the invocation from the command and the command from any optional parameters.
- Each parameter is separated from others by a space.
- If a parameter value includes spaces, the entire parameter must be enclosed in double quotation marks.

tdpoconf utility

The `tdpoconf` utility provides setup tasks for configuring Data Protection for Oracle. The utility uses the `tdpo.opt` file that is stored in the installation directory to centralize information for setup purposes.

Use the following commands with the `tdpoconf` utility:

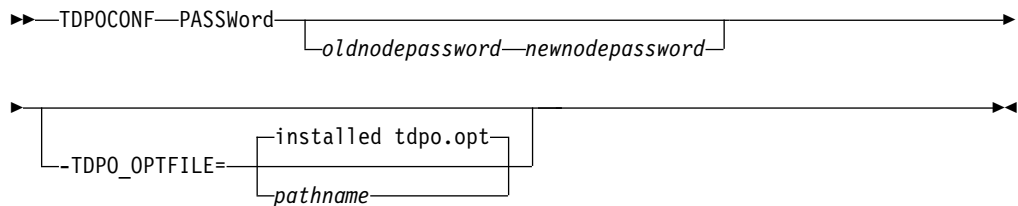
- **PASSWord**
- **SHOWENVironment**

password command

Use the **password** command to create a password or change an existing password on the IBM Spectrum Protect server.

You are prompted to enter both the old and new passwords, if you do not provide them, when you use this utility to change the password.

Syntax



Optional parameters

oldnodepassword

Specifies the current (old) password you want to change.

newnodepassword

Specifies the new password.

The password is not case-sensitive and can be composed of 1 to 63 of the following characters:

```
a b c d e f g h i j k l m n o p q r s t u v w x y z
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
0 1 2 3 4 5 6 7 8 9
~ ! @ # $ % ^ & * _ - + = ` | ( ) { } [ ] : ; < > , . ? /
```

Enclose all parameters that contain one or more special characters in quotation marks. Without quotation marks, the special characters can be interpreted as shell escape characters, file redirection characters, or other characters that have significance to the operating system.

-TDPO_OPTFILE=pathname

This parameter specifies the fully qualified path name to the `tdpo.opt` file. If you choose not to specify this option, the default path is used.

Example

An output example of the **tdpoconf password oldnodepassword newnodepassword** command is provided:

```
*****
* IBM Spectrum Protect for Databases Utility          *
* Password file initialization/update program          *
```



```
*
*****
```

ANU0260I Password successfully changed.

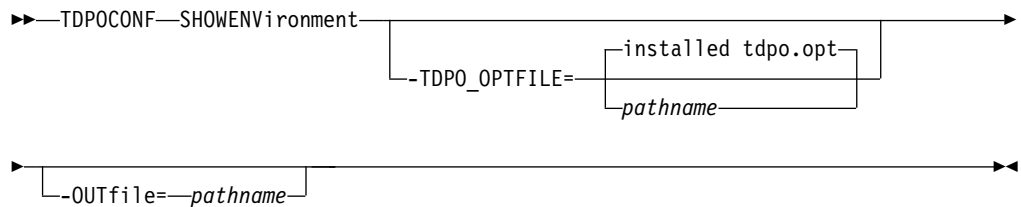
showenvironment command

Use the **showenvironment** command to query the IBM Spectrum Protect server with the options that are set in **-TDPO_OPTFILE**, the **tdpo.opt** file in the default installation directory, or the default values set by Data Protection for Oracle.

The screen output displays information about the IBM Spectrum Protect API and IBM Spectrum Protect server. This command is useful if you are troubleshooting setup errors for Data Protection for Oracle. If the password file is not initialized properly, the output of the **tdpoconf showenvironment** command reports the error.

Tip: To ensure that the environment is set up correctly before you use RMAN, direct the setup output to a file with the **-outfile** option.

Syntax



Optional parameters

-TDPO_OPTFILE=pathname

This parameter specifies the fully qualified path name to the **tdpo.opt** file. The options file is used by the utilities and the Data Protection for Oracle library.

-outfile=pathname

This parameter specifies the fully qualified path name to the output file. The formatted text of this file is the same content that in the output on screen.

Example

The following example shows the output of the **tdpoconf showenvironment** command:

```

IBM Spectrum Protect for Databases:
Data Protection for Oracle
Version 8, Release 1, Level 0
(C) Copyright IBM Corporation 1997, 2016. All rights reserved.

```

```

Data Protection for Oracle Information
Version:      8
Release:      1
Level:        0
Sublevel:     0
Platform:     64bit TDP Oracle SUN
IBM Spectrum Protect Server Information
Server Name:   TMSERVER_ORACLE
Server Address: TMSERVER
Server Type:   Windows
Server Port:   1500
Communication Method: TCP/IP

```

```

Session Information
Node Name:          NODE_oracle
Node Type:          TDP Oracle SUN
DSMI_DIR:           /opt/tivoli/tsm/client/api/bin64
DSMI_ORC_CONFIG:    /opt/tivoli/tsm/client/oracle/bin64/dsm.opt
TDPO_OPTFILE:       /opt/tivoli/tsm/client/oracle/bin64/tdpo.opt
Password Directory: /opt/tivoli/tsm/client/oracle/bin64
Compression:        FALSE
License Information: License file exists and contains valid license data.

```

tdposync utility

The **tdposync** utility checks for items on the IBM Spectrum Protect server that are not in the RMAN catalog or Oracle control file. With this utility, you can repair these discrepancies by removing unwanted objects from the IBM Spectrum Protect, and reclaim space on the server.

Attention: Deleted files and inactive files cannot be restored.

When you are using this utility to delete files, ensure that you do not log in to the wrong node name. You might query a different database than intended, and delete files in error. Ensure that the node name in the PICK window is the one you need. See “Optional parameters” on page 43 and “PICK window” on page 45 for further details.

When you run an RMAN deletion script, entries are deleted in the RMAN recovery catalog or Oracle control file before confirmation from the IBM Spectrum Protect server. In cases where objects are not found on the IBM Spectrum Protect server, RMAN tries to delete backup sets from the IBM Spectrum Protect server and fails. However, the entries in the RMAN catalog or control file for these objects are still removed. When they are deleted, RMAN can no longer identify these backups through the catalog or control file even though the file exists on the IBM Spectrum Protect server. Therefore, this utility synchronizes the contents of the servers.

When the RMAN catalog or control file contains backups that are marked as expired, RMAN still considers these objects as existing. If you run the **tdposync** utility against these objects, it recognizes these objects in the RMAN catalog or control file and on the IBM Spectrum Protect server and considers them to be in sync. Therefore, you must delete these objects from the RMAN catalog or control file for them to be deleted from the IBM Spectrum Protect server. Use the Oracle **crosscheck** command to verify whether the backups exist. Then, use the Oracle **delete expired** command to remove their record from the RMAN catalog or control file.

When you start **tdposync**, the following processing takes place:

1. Prompts you for the RMAN catalog owner ID or the Oracle database user name, password, and connect string.
2. Gathers information for the Oracle servers.
3. Queries the Oracle backup catalog and the IBM Spectrum Protect server.
4. Displays a list of files that exist on the IBM Spectrum Protect server but not in the RMAN catalog or Oracle control file.
5. Prompts you to take one of the following actions:
 - Delete any files found causing the discrepancy.
 - Delete all files.

- Exit the program without deleting files from the IBM Spectrum Protect server.

You can automate the maintenance of IBM Spectrum Protect Data Protection for Oracle without the need for user interaction. You can use an input file to allow the **tdposync** utility to receive input from a script or batch file.

For example, `tdposync syncdb < input.txt`

The `input.txt` file contains the required responses to the prompts for information as in the following example:

```
06/01/2016
06/07/2016
rman
rman
orcl
+
o
y
```

The description of each line of the `input.txt` file is listed in the following table:

06/01/2016	# from date
06/07/2016	# to date
rman	# RMAN user
rman	# RMAN password
orcl	# Oracle connection string
+	# pick windows selection, + selects all objects
o	# proceed with the operation
y	# confirm

tdposync considerations

To run the **tdposync** utility successfully, resynchronize the Oracle catalogs with the target databases. If you are using multiple Oracle catalogs, use the **numcatalogs** parameter. Each Oracle database must be backed up to the IBM Spectrum Protect server.

The following information must be considered before you use the **tdposync** command:

- Resynchronize Oracle catalogs with the target databases before you run the **tdposync syncdb** command. First, connect to the target database and the catalog database. The following is an example:

```
$ rman target xxx/yyy@targetdb rcvcat xxx/yyy@catalogdb
```

When you are connected to both databases, type `resync catalog` at the RMAN prompt.

- By default, Data Protection for Oracle prompts you to synchronize with one Oracle catalog at a time. If you use multiple Oracle catalogs to back up multiple target databases to the same file space, the same node name, and the same owner name on the same IBM Spectrum Protect server, you must use **-numcatalogs=number**. This action is necessary so that **tdposync** has all the information to correctly query both Oracle and the IBM Spectrum Protect.

Similarly, if you use Oracle control files to back up multiple target databases to the same file space, the same node name, and the same owner name on the same, you must use **-numorinstances=number**.

If, for example, you back up only one target database by using two catalogs, do not specify this option. However, if you back up two target databases by using two catalogs, one catalog for each, to the same under the same file space, node name, and owner name, you must specify **numcatalogs**. If you fail to provide information for the second target database by not specifying two catalogs, that database is displayed as eligible for deletion.

Restriction: Failure to provide all pertinent and correct information can result in erroneous output. To prevent the erroneous output, see the next consideration.

- If you have more than one Oracle database, back up each Oracle target database to its own file space on the IBM Spectrum Protect server. To back up each Oracle target database to its own file space, use the `tdpo_fs` option in the `tdpo.opt` file. For best results, use a separate Data Protection for Oracle options file for each database that you back up to IBM Spectrum Protect. In this way, it is only necessary to synchronize one catalog at a time, one for each target database. The possibility of showing wrong information in the PICK window is minimized.

Tip: Make sure to use the same `tdpo.opt` file that was used for the original backup.

- If the information for **sqlplus** that you provide to `tdposync` is incorrect, such as logon, password, or connect string information, **sqlplus** stops at its logon screen. You must log on again at the prompt by using the RMAN catalog owner ID, password, and connect string. For example:

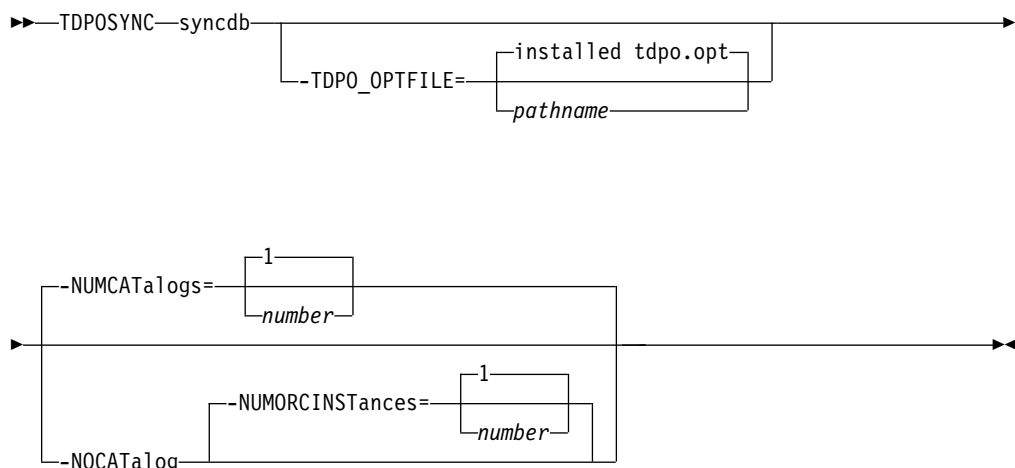
```
login/password@connectstring
```

where `connectstring` represents the Oracle database in which to connect. The `connectstring` is also sometimes referred to as the Transparent Network Substrate (TNS) alias. When the correct input is entered, **tdposync** proceeds.

syncdb command

The **syncdb** command synchronizes Oracle catalog databases or the Oracle control file with the IBM Spectrum Protect server.

Syntax



Optional parameters

-TDPO_OPTFILE=pathname

This parameter specifies the fully qualified path name to the `tdpo.opt` file. This file is the options file that is used by the utilities and the Data Protection for Oracle library. This file contains the information for the IBM Spectrum Protect server name and address that **tdposync** needs for synchronizing.

Note: For **syncdb TDPO_OPTFILE**, you must specify the same options file values that were used to do the original backup operations.

-NUMCATalogs=number

This parameter specifies the number of Oracle catalog databases that you want to synchronize and prompts you for information for each catalog.

Specify this option only when you use multiple Oracle catalogs to back up multiple target databases to the same IBM Spectrum Protect server under the same file space, node name, and owner name.

According to the number you specify for **-numcatalogs**, you are prompted for the user name, password, and connect string for each. If you do not specify **-numcatalogs**, the default is 1, and you are prompted only once.

You are prompted for start and end dates for your query. Then you are prompted for the following information for each catalog:

- Catalog # User Name:
- Catalog # Password:
- Catalog # Connect String:

You are also prompted for the following date information to narrow your search:

- From Date: MM/DD/YYYY
- To Date: MM/DD/YYYY

If no dates are specified, Data Protection for Oracle displays all objects that are not in sync.

-NOCATalog

This parameter specifies that the **tdposync** utility uses the backup history information that is stored in the Oracle control file rather than a catalog database to reconcile the IBM Spectrum Protect database with the RMAN backup history.

-NUMORCINSTances=number

This parameter specifies the number of Oracle instances that you want to synchronize and prompts you for information for each instance.

Specify this option only when you use multiple Oracle instances to back up multiple target databases to the same IBM Spectrum Protect server under the same file space, node name, and owner name.

According to the number you specify for **-numorcinstances**, you are prompted for the user name, password, and connect string for each instance. If you do not specify a value for **-numorcinstances**, the default is 1, and you are prompted only once.

For each Oracle instance, the following information is requested:

- Oracle Database # User Name
- Oracle Database # Password

- Oracle Database # Connect String

You are also prompted for the following date information to narrow your search:

- From Date: MM/DD/YYYY
- To Date: MM/DD/YYYY

If no dates are specified, Data Protection for Oracle shows all objects that are not in sync.

Example

Synchronize the IBM Spectrum Protect database with the RMAN backup history and the Oracle control file using the **tdposync syncdb** command. The following output is displayed:

Command: TDPOSYNC syncdb -nocatalog -numorcinstances=2

Output:

```
IBM Spectrum Protect for Databases:
Data Protection for Oracle
Version 8, Release 1, Level 0.0
(C) Copyright IBM Corporation 1997, 2016. All rights reserved.
From Date (01/01/1990): 10/20/2016
To Date (10/28/2016): 10/28/2016
```

```
Oracle Database 1 User Name: OrcUser1
Oracle database 1 Password: OrcUser1pw
Oracle database 1 Connect String: Oracle_DB_A
```

```
Oracle Database 2 User Name: OrcYser2
Oracle database 2 Password: OrcUser2pw
Oracle database 2 Connect String: Oracle_DB_B
```

When you specify the **syncdb -numcatalogs** parameter, you are prompted for input for each catalog on the node. This example assumes two separate RMAN catalogs, rman and rman2:

C:\Tivoli\Tsm\Agent0ba>tdposync syncdb -numcatalogs=2 -TDPO_OPTFILE=c:\RMAN\scripts\tdpo.opt

Output:

```
IBM Spectrum Protect for Databases:
Data Protection for Oracle
Version 8, Release 1, Level 0
(C) Copyright IBM Corporation 1997, 2014. All rights reserved.
```

```
From Date (01/01/1990): 10/20/2016
To Date (10/28/2016): 10/28/2016
```

```
Catalog 1 User Name: rman
Catalog 1 Password: rman
Catalog 1 Connect String: rman
```

```
Catalog 2 User Name: rman2
Catalog 2 Password: rman2
Catalog 2 Connect String: rman2
```

Note: **From Date** implicitly searches from time=00:00:01 and **To Date** implicitly searches to time=23:59:59 of the same day.

PICK window:

The PICK window provides information to help you decide if the files that are displayed are out of synchronization with the Oracle catalog or control file.

The following information is provided:

- The node with which you are querying the IBM Spectrum Protect server
- The date of the file backup
- The size of the backup
- The backup name \h1\orcnt\11

Attention: Use caution when you are selecting files for deletion. If you are unsure that the files in question are out of synchronization, do further research before you delete them. Deleted files cannot be restored.

Example

The PICK window shows the node names, and names the files that are backed up. The following example shows the output that is displayed for a node called AGENT_NODE:

```
Synchronize utility PICK Window
Node Name:          AGENT_NODE

      Backup Date          Size          Backup Name
-----
1. 01/09/2014 09:19:59    50.35MB    \adsmorc\orcnt\1kc2cnfv_1_1
2. 01/02/2014 11:36:20    427.08MB    \adsmorc\orcnt\4kc3cnfv_1_1
3. 01/02/2014 07:14:30    508.00MB    \adsmorc\orcnt\4qcgdhfr_1_1
4. 01/02/2014 07:21:38    763.94MB    \adsmorc\orcnt\4ocf8999_1_1
5. 01/09/2014 11:00:11     69.12MB    \adsmorc\orcnt\4ocf8999_1_2
6. 01/09/2014 11:00:12    950.09MB    \adsmorc\orcnt\4ocf8999_1_3
7. 01/09/2014 11:00:13    656.69MB    \adsmorc\orcnt\4rch25jk_1_1
8. 01/09/2014 11:00:14    135.36MB    \adsmorc\orcnt\4rch25jk_1_2
9. 01/09/2014 11:00:15    298.01MB    \adsmorc\orcnt\4rch25jk_1_30

0-----10-----20-----30-----40-----50-----60-----70
<U>=Up <D>=Down <T>=Top <B>=Bottom <R#>=Right <L#>=Left
<G#>=Goto Line # <#>=Toggle Entry <+>=Select All<->=Deselect All
<#:#+>=Select A Range <#:#->=Deselect A Range <O>=Ok <C>=Cancel
pick>
```

Files that are selected for deletion are marked by a plus (+). To delete selected files:

1. Enter **OK** at the PICK prompt.

A warning message is shown confirming the deletion of the selected files.

2. Enter **Yes** to delete the selected files from the IBM Spectrum Protect server.

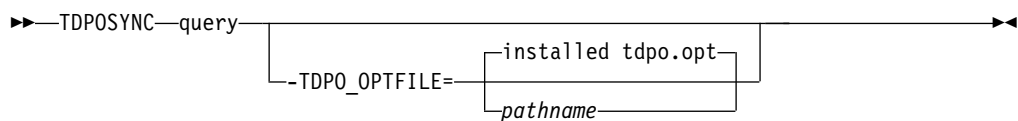
Query command

Use this command to query the IBM Spectrum Protect server for information about objects that are backed up. You can obtain information such as whether an object is compressed, encrypted, or deduplicated by the client during a backup operation.

The **query** command uses the options that are set in the **-TDPO_OPTFILE** parameter, the `tdpo.opt` file in the default installation directory, or the default values set by Data Protection for Oracle to query the IBM Spectrum Protect server.

When you issue the **tdposync query** command, you are prompted to enter date range for the query. The screen output displays information about the objects that were backed up to the IBM Spectrum Protect server between the start and end dates that you specified.

Syntax



Optional parameters

-TDPO_OPTFILE *=pathname*

This parameter specifies the fully qualified path name to the `tdpo.opt` file. This file is the options file that is used by the utilities and the Data Protection for Oracle library. The file contains the information for the IBM Spectrum Protect server and the server address that **tdposync** command must use for synchronizing.

When you specify the **query TDPO_OPTFILE** command, you must specify the same options file values that were used for the original backup operations. If you do not specify the **TDPO_OPTFILE** path, the default value in the default Oracle installation path (`/Program Files/Tivoli/TSM/Agent0BA64/tdpo.opt`) is used.

Description of the output fields

Name Object name on the IBM Spectrum Protect server; for instance, `/fs/h1/11`.

Owner

The name of the user who backed up the object.

Size The size of the object size on the IBM Spectrum Protect server.

Creation Date / Time

The date and time the object was backed up.

Compressed

Lists whether an object was compressed during the backup operation.

Encryption Type

Lists the type of encryption that was used during the backup operation. The possible values are as follows:

None The object was not encrypted.

AES-128

The object was encrypted by using AES-128 encryption.

AES-256

The object was encrypted by using AES-256 encryption.

Client-deduplicated

Lists whether an object underwent client-side data deduplication.

Examples

Use the `tdposync query` command to find information about backed up objects, encryption type and data deduplication.

Query the IBM Spectrum Protect server for information about objects that are backed up

The command to be run is `tdposync query`.

The following output is displayed:

```
IBM Spectrum Protect for Databases:
Data Protection for Oracle
Version 8, Release 1, Level 0
(C) Copyright IBM Corporation 1997, 2016. All rights reserved.

From Date (01/01/2016):

To Date (07/02/2016):

Backup Object Information
-----

Name ..... \adsmorc\orcnt\df_722435657_35_1
Owner.....
Size ..... 2,010 KB
Creation Date / Time ..... 07/02/2014 10:08:20
Compressed ..... Yes
Encryption Type ..... None
Client-deduplicated ..... No

Backup Object Information
-----

...
```

Finding the encryption type

When you issue the **`tdposync query`** command, the entire list of backup object information is printed to the command prompt window without page separators, scrolling, or canceling capability. Redirect the output of the query to a file and find out the encryption type that was used for the backups from the previous week.

Command: `echo from_date > in.txt & echo to_date >> in.txt & tdposync query < in.txt > out.txt`

Open the file `out.txt` with a text editor and search for Encryption Type to determine the type of encryption that was used.

Finding data deduplication information

Determine the data deduplication reduction for a particular node by querying the IBM Spectrum Protect server activity log for the ANU2526I message.

Appendix. Accessibility features for the IBM Spectrum Protect product family

Accessibility features assist users who have a disability, such as restricted mobility or limited vision, to use information technology content successfully.

Overview

The IBM Spectrum Protect family of products includes the following major accessibility features:

- Keyboard-only operation
- Operations that use a screen reader

The IBM Spectrum Protect family of products uses the latest W3C Standard, WAI-ARIA 1.0, to ensure compliance with US Section 508 and Web Content Accessibility Guidelines (WCAG) 2.0. To take advantage of accessibility features, use the latest release of your screen reader and the latest web browser that is supported by the product.

The product documentation in IBM Knowledge Center is enabled for accessibility. The accessibility features of IBM Knowledge Center are described in the Accessibility section of the IBM Knowledge Center help .

Keyboard navigation

This product uses standard navigation keys.

Interface information

User interfaces do not have content that flashes 2 - 55 times per second.

Web user interfaces rely on cascading style sheets to render content properly and to provide a usable experience. The application provides an equivalent way for low-vision users to use system display settings, including high-contrast mode. You can control font size by using the device or web browser settings.

Web user interfaces include WAI-ARIA navigational landmarks that you can use to quickly navigate to functional areas in the application.

Vendor software

The IBM Spectrum Protect product family includes certain vendor software that is not covered under the IBM license agreement. IBM makes no representation about the accessibility features of these products. Contact the vendor for accessibility information about its products.

Related accessibility information

In addition to standard IBM help desk and support websites, IBM has a TTY telephone service for use by deaf or hard of hearing customers to access sales and support services:

TTY service
800-IBM-3383 (800-426-3383)
(within North America)

For more information about the commitment that IBM has to accessibility, see IBM Accessibility.

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Glossary

A glossary is available with terms and definitions for the IBM Spectrum Protect family of products.

See the IBM Spectrum Protect glossary.

To view glossaries for other IBM products, see IBM Terminology.

Index

A

- About this publication v
- accessibility features 49
- AIX 6.1
 - options 13
- archive copy group 20
- automated 2
- autostart 30

B

- backdelete
 - and Data Protection for Oracle node 16
 - and IBM Spectrum Protect policy 20
- backup copy group values 20
- backups
 - removing 28
- bkdb.log 23
- bkdb.scr
 - and the IBM Spectrum Protect scheduler 29

C

- command line syntax
 - characteristics 37
- commands
 - IBM Spectrum Protect server
 - query association 29
 - query node 27
 - query schedule 29
 - Oracle
 - change 28
 - tdpoconf password 38
 - tdpoconf showenvironment 39
 - tdposync
 - query 46
 - syncdb 42
- commmethod
 - description 17
- compression 17
- configure
 - Quick configuration 11
 - with default settings 11
- configuring
 - Data Protection for Oracle 11
- configuring Data Protection for Oracle 12
- control file 40, 42

D

- data deduplication
 - overview 34
 - using 34
- data deduplication reduction
 - determining 35
- Data Protection for Oracle 42
 - and Oracle databases 23
 - configuring 11, 16
 - creating an installation package 9

- Data Protection for Oracle (*continued*)
 - creating an installation package on DVD or file server 9
 - IBM Spectrum Protect policy requirements 20
 - installing 5, 6
 - overview 1
 - protecting data 23
 - Recovery Manager (RMAN) 1
 - reference 37
 - silent installation 6
 - silent installation with batch file 10
 - silent installation with msixexec.exe 8
 - silent installation with setup.exe 8
 - supported Oracle versions 1
 - updates vii
 - version migration 2
- Data Protection for Oracle installing in silent mode
 - installation
 - capturing a log of the installation 9
 - installing
 - capturing a log 9
- Data Protection for Oracle silent installation
 - playing back the installation 10
- Data Protection for Oracle utilities
 - using 37
- deduplication
 - using 34
- defining a schedule
 - on the IBM Spectrum Protect server 29
 - on the workstation with the Oracle Server 30
- disability 49
- dsm.opt
 - description 16
 - recommended options 17
 - required options 16
- dsmi_log 13
- dsmi_orc_config 13
- dsmsched.log 30
- duplex copy
 - considerations 27
 - overview 26

E

- enablelanfree 18
- example
 - tdposync query command 46
- examples
 - duplex copy 26
 - IBM Spectrum Protect scheduler 28
 - include/exclude 20
 - invoking RMAN 23
 - removing backups 28
 - RMAN script
 - send command 25
 - RMAN scripts 25
 - tdpoconf password command 38
 - tdpoconf showenvironment command 39
 - tdposync syncdb command 42
 - pick window 45
- expiration of objects 20

F

failover
 Data Protection for Oracle 2
 overview 2

I

IBM Knowledge Center v
IBM Spectrum Protect
 management class 20
 policy requirements 20
includ
 and IBM Spectrum Protect policy 20
include
 and duplex copy 27
 and IBM Spectrum Protect policy 20
 description 18
installation
 instructions
 node name registration 15
 prerequisites 5
installing
 creating an installation package 9
 creating an installation package on DVD or file server 9
 Data Protection for Oracle 5
 silently 6
 silently with batch file 10
 silently with msixec.exe 8
 silently with setup.exe 8
installing Data Protection for Oracle 6

K

keyboard 49
Knowledge Center v

L

LAN-free data transfer
 options 18

M

management class
 for automatic expiration 20
maxnummp 27
migration considerations 2
Minimum software requirements 6

N

New in this version vii
nocatalog
 and tdposync syncdb command 42
node name
 registration 15
nodename 16
numcatalogs
 and tdposync syncdb command 42
numorcintstances
 and tdposync syncdb command 42

O

operating system requirements 6
options 13
Oracle RMAN send command
 using 24
orcsched.cmd file 30
outfile
 and tdpoconf showenvironment command 39
overview
 data deduplication 34
 Data Protection for Oracle 1

P

passwordaccess 17
pick window 45
policy domain 20
prerequisites 5
protecting data
 Data Protection for Oracle 23
publications v

Q

querying backup objects 33

R

reference
 Data Protection for Oracle 37
retonly
 and IBM Spectrum Protect policy 20
RMAN
 description 1
 invoking 23
 scripts 24
 send command 24

S

schedlogname 30
scripts 24
send command
 in an RMAN script 24
 sample script 25
 using 24
set duplex 27

T

tcpclientaddress 30
tcpclientport 30
tcpserveraddress 17
tdpo_date_fmt 14
tdpo_enablescriptinput 13
tdpo_fs 14
tdpo_mgmt_class_2 15
tdpo_mgmt_class_3 15
tdpo_mgmt_class_4 15
tdpo_num_fmt 14
TDPO_OPTFILE
 and tdpoconf password command 38
 and tdpoconf showenvironment command 39
 and tdposync syncdb command 42, 46

- TDPO_OPTFILE *(continued)*
 - example 13
- tdpo_time_fmt 14
- tdpo.opt
 - and version migration 2
 - description 13
- tdpoconf 37
 - and password initialization 21
 - and tdpo.opt 13
 - description 38
 - password command 38
 - example 38
 - syntax diagram 38
 - TDPO_OPTFILE 38
 - showenvironment command 39
 - example 39
 - outfile 39
 - syntax diagram 39
 - TDPO_OPTFILE 39
 - tdpoconf utility 38
- tdpoerror.log
 - how to specify 13
- tdposync 37
 - and tdpo.opt 13
 - considerations 41
 - description 40
 - query command 46
 - example 46
 - syntax diagram 46
 - TDPO_OPTFILE 46
 - syncdb command 42
 - example 42
 - nocatalog 42
 - numcatalogs 42
 - numorcintstances 42
 - pick window 45
 - syntax diagram 42
 - TDPO_OPTFILE 42
- tdposync syncdb command
 - pick window 45

U

- using data deduplication 34

V

- verdeleted
 - and IBM Spectrum Protect policy 20
- Virtualization support 6

W

- Windows x86
 - hardware 5
- Windows x86_64
 - hardware 5



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