Oracle® Cloud
Using Oracle Database Backup Cloud Service

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Oracle Cloud Using Oracle Database Backup Cloud Service,

E54730-22

Contents

Preface

This document describes how to use Oracle Database Backup Cloud Service to back up Oracle databases to Oracle Cloud.

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Audience

This document is intended for administrators who want to use Oracle Database Backup Cloud Service to back up Oracle databases to Oracle Cloud.

It is assumed you know the following:

- Oracle Database concepts and basic database administration
- Recovery Manager (RMAN) concepts, usage, tasks, and commands
- The operating system environment under which you run Oracle Database
- Basic concepts of using Oracle Cloud Infrastructure, as described in [Learn about Oracle Cloud basics](#)

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Access to Oracle Support

Oracle customers that have purchased support have access to electronic support through My Oracle Support. For information, visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or visit http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs if you are hearing impaired.

Related Resources

For more information, see these Oracle resources:

- Database Backup on the Oracle Cloud website

    https://cloud.oracle.com/database_backup

- Oracle Database Backup Cloud Service FAQ (My Oracle Support Doc ID 1640149.1)

    http://support.oracle.com

- *Getting Started with Oracle Cloud*

- Oracle Cloud Infrastructure Object Storage

- *Using Oracle Database Cloud Service*

- *Migrating Oracle Database Backup Cloud Service Backups to Oracle Cloud Infrastructure*

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

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Getting Started with Oracle Database Backup Cloud Service

Oracle Database Backup Cloud Service is a cloud storage solution for storing Oracle Database backups. Here's what you need to know to get started.

> ⓘ **Note**
>
> The information provided in this guide applies to Oracle Database 19c Release 26 (19.26) and earlier releases.
>
> For Oracle Database 19c Release Update 27 (19.27) or later and Oracle AI Database 26ai Release Update 23.8 or later, Oracle recommends that you use the simplified procedure to set up the Oracle Database Backup Cloud Service, as described in the Backup and Recovery User's Guide.

Topics

*   [About Oracle Database Backup Cloud Service](#)
*   [About Backup and Recovery Using Oracle Database Backup Cloud Service](#)
*   [About the Oracle Database Cloud Backup Module for OCI](#)
*   [About the Oracle Database Cloud Backup Module for OCI Classic](#)
*   [Important Information About Oracle Database Backup Cloud Service Subscriptions](#)
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*   [About Oracle Database Backup Cloud Service](#)
    Oracle Database Backup Cloud Service is a secure, scalable, on-demand storage solution for backing up Oracle databases to Oracle Cloud. The service complements your existing backup strategy by providing an off-site storage location in the public cloud.

*   [About Backup and Recovery Using Oracle Database Backup Cloud Service](#)
    Oracle databases can be backed to Oracle Cloud using Oracle Database Backup Cloud Service. When required, database restore and recovery can be performed using the backups stored in Oracle Cloud.

*   [About the Oracle Database Cloud Backup Module for OCI](#)
    The Oracle Database Cloud Backup Module for OCI makes it possible to perform backups and restores with Oracle Cloud Infrastructure. Backups are stored in Oracle Cloud Infrastructure Object Storage.

*   [About the Oracle Database Cloud Backup Module for OCI Classic](#)
    The Oracle Database Cloud Backup Module for OCI Classic makes it possible to perform cloud backups and restores with Oracle Cloud Infrastructure Classic. Backups are stored in Oracle Cloud Infrastructure Object Storage Classic.

- [Important Information About Oracle Database Backup Cloud Service Subscriptions](#)
  When you request a trial of Oracle Database Backup Cloud Service, you actually get a trial of Oracle Storage Cloud Service. Oracle Database Backup Cloud Service uses Oracle Storage Cloud Service to store cloud backups.

- [How to Begin with Oracle Database Backup Cloud Service Subscriptions](#)
  Here's how to get started with Oracle Database Backup Cloud Service subscriptions.

- [Frequently Asked Questions for Oracle Database Backup Cloud Service](#)
  For answers to frequently asked questions (FAQs), see the Oracle Database Backup Cloud Service FAQ on My Oracle Support:

- [Management Interfaces for Cloud Backups](#)
  You can use any of the following options to manage cloud backup operations.

- [Typical Workflow for Administering Oracle Database Backup Cloud Service](#)
  To administer Oracle Database Backup Cloud Service, refer to the following task workflow.

About Oracle Database Backup Cloud Service

Oracle Database Backup Cloud Service is a secure, scalable, on-demand storage solution for backing up Oracle databases to Oracle Cloud. The service complements your existing backup strategy by providing an off-site storage location in the public cloud.

To use Oracle Database Backup Cloud Service you'll subscribe to the service, install the Oracle Database Cloud Backup Module, and configure your environment to send backups to the cloud. You can then use familiar Recovery Manager (RMAN) commands to perform backup, restore, recovery, and maintenance operations. You can also use other tools for your cloud backups. See [Management Interfaces for Cloud Backups](#).

With Oracle Database Backup Cloud Service, cloud backups are always accessible over the Internet and are immediately available for recovery when needed. Data is replicated across multiple storage nodes, which protects against hardware failure and data corruption.

Oracle Database Backup Cloud Service is used to store Oracle Database backups only. To store other types of data, use Oracle Cloud Infrastructure Object Storage.

Oracle Database Backup Cloud Service can also be used to back up and restore Oracle Exadata Database Service on Dedicated Infrastructure deployments.

For instances created using the Oracle Database Cloud Service - Virtual Image service level, download the Oracle Database Cloud Backup Module and perform tasks as described in this document.

For Database Cloud Service (non-Virtual Image) and Exadata Cloud Service instances, instance images come with the backup module already installed, so you don't need to install the module, configure RMAN, and so on. For information about backup and recovery in this case, see Backing Up and Restoring Databases on Database Cloud Service in *Using Oracle Database Cloud Service*. For information about billing, see relevant details in How to Begin with Database Cloud Service Subscriptions in *Using Oracle Database Cloud Service*. For Exadata Cloud Service, see Backing Up and Restoring Databases on Exadata Cloud Service in *Using Oracle Database Exadata Cloud Service*.

About Backup and Recovery Using Oracle Database Backup Cloud Service

Oracle databases can be backed to Oracle Cloud using Oracle Database Backup Cloud Service. When required, database restore and recovery can be performed using the backups stored in Oracle Cloud.

Oracle Database Backup Cloud Service can perform backup and recovery with the following:

*   Oracle Cloud Infrastructure

    To create backups to Oracle Cloud Infrastructure, you must have a subscription to an Oracle Cloud Service and install the Oracle Database Cloud Backup Module for OCI.

*   Oracle Cloud Infrastructure Classic

    To create backups to Oracle Cloud Infrastructure Classic, you must have a subscription to an Oracle Cloud Service and install the Oracle Database Cloud Backup Module for OCI Classic.

Oracle Database Optimizations Supported by Oracle Database Backup Cloud Service

Oracle Database Backup Cloud Service supports the following Oracle Database optimizations:

*   RMAN backup encryption

    Using RMAN encryption, your data is encrypted at the source, securely transmitted to the cloud, and securely stored in the cloud. The keys are kept at your site, not in the cloud.

*   All RMAN backup compression algorithms

    Using RMAN backup compression, you can conserve bandwidth and improve performance by reducing the size of backups before they're sent to the cloud for storage.

For licensing information about these optimizations, see Oracle Database Backup Cloud Service in *Oracle Database Licensing Information User Manual*.

About the Oracle Database Cloud Backup Module for OCI

The Oracle Database Cloud Backup Module for OCI makes it possible to perform backups and restores with Oracle Cloud Infrastructure. Backups are stored in Oracle Cloud Infrastructure Object Storage.

Oracle Database Cloud Backup Module for OCI is a system backup to tape (SBT) interface that is integrated with Recovery Manager (RMAN). You can use standard RMAN commands to perform backup, restore, recovery, and maintenance operations.

You'll download the Oracle Database Cloud Backup Module for OCI from Oracle Technology Network (OTN) and install it on your database server. Multiple database versions and operating systems are supported. For more information about the module, see Installing the Oracle Database Cloud Backup Module for OCI.

Installing and using the module requires your Oracle Cloud credentials. After the module is installed, the authentication keys are stored securely in the Oracle wallet and are used to authenticate the module's interactions with Oracle Cloud Infrastructure Object Storage.

About the Oracle Database Cloud Backup Module for OCI Classic

The Oracle Database Cloud Backup Module for OCI Classic makes it possible to perform cloud backups and restores with Oracle Cloud Infrastructure Classic. Backups are stored in Oracle Cloud Infrastructure Object Storage Classic.

Oracle Database Cloud Backup Module for OCI Classic is a system backup to tape (SBT) interface that's tightly integrated with Recovery Manager (RMAN), which means you don't need to learn new tools or commands. You can continue to use standard RMAN commands for all backup, restore, recovery, and maintenance operations.

You'll download the backup module from Oracle Technology Network (OTN) and install it on your database server. Multiple database versions and operating systems are supported. For more information about the module, see Installing the Oracle Database Cloud Backup Module for OCI Classic.

Important Information About Oracle Database Backup Cloud Service Subscriptions

When you request a trial of Oracle Database Backup Cloud Service, you actually get a trial of Oracle Storage Cloud Service. Oracle Database Backup Cloud Service uses Oracle Storage Cloud Service to store cloud backups.

To try Oracle Database Backup Cloud Service, go to `cloud.oracle.com/database_backup` or `cloud.oracle.com/database` and click **Try For Free**.

For trials and paid subscriptions to Oracle Database Backup Cloud Service, the service is listed as Oracle Storage Cloud Service in Cloud Portal. Email from Oracle references Oracle Storage Cloud Service.

How to Begin with Oracle Database Backup Cloud Service Subscriptions

Here's how to get started with Oracle Database Backup Cloud Service subscriptions.

1. Request a trial or purchase a subscription using any of the following methods:

    • Request a trial subscription to Oracle Database Backup Cloud Service. See Request and Manage Free Oracle Cloud Promotions in *Getting Started with Oracle Cloud*.

    • Purchase a paid subscription to Oracle Database Backup Cloud Service. See Buy a Nonmetered Subscription to an Oracle Cloud Service in *Getting Started with Oracle Cloud* or How Do I Sign Up? in *Getting Started with Oracle Cloud* for information about universal credits.

    Oracle Database Backup Cloud Service trials and paid subscriptions appear as Oracle Storage Cloud Service subscriptions. See Important Information About Oracle Database Backup Cloud Service Subscriptions.

2. Activate and verify the service. See Activate Your Order in *Getting Started with Oracle Cloud*.

3. Verify activation. See Verify That Your Services are Ready in *Getting Started with Oracle Cloud*.

4. **Important Step:** Select a data center for your service. See, *Using Oracle Cloud Infrastructure Object Storage Classic*.

   You don't need to create a storage container as mentioned in the procedure. A default storage container is created for you automatically when you install the backup module used by Oracle Database Backup Cloud Service.

   If you enable georeplication, you will be billed for the capacity utilized in both the source and target data centers.

   The replication policy must be set before you run the backup module installer. Otherwise you'll get errors such as `Could not authenticate to Oracle Database Cloud Backup Module` or `403 Forbidden`. Set the replication policy and wait at least 10 minutes for synchronization to complete before you retry the installation.

5. Create accounts for your users and assign them appropriate privileges and roles. See Managing User Accounts and Managing User Roles in *Managing and Monitoring Oracle Cloud*.

> ⓘ **Note**
>
> For Oracle Database Public Cloud Services subscriptions, users must have either the Storage Administrator or Database Backup Administrator role to back up to the cloud.

Frequently Asked Questions for Oracle Database Backup Cloud Service

For answers to frequently asked questions (FAQs), see the Oracle Database Backup Cloud Service FAQ on My Oracle Support:

Doc ID 1640149.1 at http://support.oracle.com

Management Interfaces for Cloud Backups

You can use any of the following options to manage cloud backup operations.

- RMAN interface

  Use the RMAN command-line interface to run familiar commands and perform backups on demand. You can also create automated backup jobs using the cron utility.

- Oracle Enterprise Manager Cloud Control 13c

  Use Oracle Enterprise Manager Cloud Control 13c to configure the backup module and perform backup and recovery operations.

- Third-party tools

  Use third-party tools such as CloudBerry Lab's cloud backup solution. See https://www.cloudberrylab.com/backup.aspx.

Typical Workflow for Administering Oracle Database Backup Cloud Service

To administer Oracle Database Backup Cloud Service, refer to the following task workflow.

Task	Description	More Information
Request a trial or purchase a subscription	Sign up for a free trial or purchase a subscription. Then activate your subscription, create accounts for your users, and assign them appropriate privileges and roles.	How to Begin with Oracle Database Backup Cloud Service Subscriptions
Download the backup module	Download the Oracle Database Cloud Backup Module installer from Oracle Technology Network (OTN).	• Downloading and Installing the Oracle Database Cloud Backup Module for OCI to use Oracle Cloud Infrastructure. • Downloading and Installing the Oracle Database Cloud Backup Module for OCI Classic to use Oracle Cloud Infrastructure Classic.
Install the required backup module	Depending on the destination for your backups, run required backup module installer.	• Installing the Oracle Database Cloud Backup Module for OCI • Installing the Oracle Database Cloud Backup Module for OCI Classic
Configure Recovery Manager (RMAN) settings	Configure RMAN to send backups to Oracle Database Backup Cloud Service.	Configuring Recovery Manager (RMAN) Settings
Configure RMAN encryption	Configure RMAN encryption. Backups must be encrypted before they can be sent to the cloud.	Configuring Encryption for Backups
Configure compression	Configure optional compression to reduce the size of backups before they're sent to the cloud.	Configuring Compression for Backups
Configure backup archival	Configure optional archival for backups that are rarely used but need to be retained for long periods.	• Configuring Automatic Archival to Oracle Cloud Infrastructure • Configuring Automatic Archival to Oracle Cloud Infrastructure Classic
Perform backup and recovery	Connect to the target database and configure an RMAN channel, then issue standard RMAN backup, restore, and recovery commands.	Backing Up to Oracle Database Backup Cloud Service Restoring Backups from Oracle Database Backup Cloud Service
Monitor the service	Check on the day-to-day operation of your service, monitor performance, and review important notifications.	Managing and Monitoring Oracle Cloud Services in *Managing and Monitoring Oracle Cloud* Also see Monitoring Your Storage Capacity

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Installing the Backup Module for Oracle Database Backup Cloud Service

To use Oracle Database Backup Cloud Service for Oracle database backups, you'll need to install the appropriate backup module needed for cloud backups.

> ⓘ **Note**
>
> The information provided in this section applies to Oracle Database 19c Release 26 (19.26) and earlier releases.
>
> For Oracle Database 19c Release 27 (19.27) or later and Oracle AI Database 26ai Release Update 23.8 or later, Oracle recommends that you use the simplified procedure to set up the Oracle Database Backup Cloud Service, as described in the Backup and Recovery User's Guide.

The backup module used depends on your backup destination, Oracle Cloud Infrastructure or Oracle Cloud Infrastructure Classic.

Topics

- [Supported Databases and Operating Systems](#)

- [Installing the Oracle Database Cloud Backup Module for OCI](#)

- [Installing the Oracle Database Cloud Backup Module for OCI Classic](#)

- [Supported Databases and Operating Systems](#)
  You can back up Oracle Database 11g Release 2 (11.2.0.4) and later to Oracle Database Backup Cloud Service.

- [Installing the Oracle Database Cloud Backup Module for OCI](#)
  To back up to Oracle Cloud Infrastructure, you first need to install the Oracle Database Cloud Backup Module for OCI. You'll download the module from Oracle Technology Network (OTN) and install it on your database server.

- [Installing the Oracle Database Cloud Backup Module for OCI Classic](#)
  To back up to Oracle Cloud Infrastructure Classic, you first need to install the Oracle Database Cloud Backup Module for OCI Classic. You'll download the module from Oracle Technology Network (OTN) and install it on your database server.

Supported Databases and Operating Systems

You can back up Oracle Database 11g Release 2 (11.2.0.4) and later to Oracle Database Backup Cloud Service.

The following table lists supported database versions and operating systems for operations with Oracle Cloud Infrastructure and Oracle Cloud Infrastructure Classic. It also lists supported Recovery Manager (RMAN) compression and encryption options. For information about these optimizations, see [About Oracle Database Backup Cloud Service](#).

System	Supported Versions
Oracle Database*	**Enterprise Edition:** 11g Release 2 (11.2.0.4) and later
	Standard Edition (SE, SE1, SE2): 11g Release 2 (11.2.0.4) and later
	* Unsupported Oracle Database versions are in deprecated mode. See My Oracle Support Doc ID 1640149.1 at <u>http://support.oracle.com</u> for the latest support matrix.
Operating system (64 bits)	Linux, Solaris x86-64, SPARC, Windows, AIX, HP-UX, zLinux
RMAN compression	HIGH, MEDIUM, BASIC, LOW
RMAN encryption	**Enterprise Edition:** Password, Transparent Data Encryption (TDE), dual mode.
	Standard Edition: Password, TDE, dual mode. Requires a patch. Refer to My Oracle Support Doc ID 1640149.1 at <u>http://support.oracle.com</u>.

Installing the Oracle Database Cloud Backup Module for OCI

To back up to Oracle Cloud Infrastructure, you first need to install the Oracle Database Cloud Backup Module for OCI. You'll download the module from Oracle Technology Network (OTN) and install it on your database server.

> ⓘ **Note**
>
> For Oracle Database 19c Release Update 26 (19.26) and earlier versions, download the operating system-specific cloud backup modules from My Oracle Support Patch Number 37855779. Run the backup module installer to set up the authentication required for RMAN to access the cloud storage. You must use the SBT library included with the patch instead of downloading the library while running the installer.

Topics

- Before You Begin Installing Oracle Database Cloud Backup Module for OCI

- Supported Databases and Operating Systems

- Parameters to Run the Oracle Database Cloud Backup Module for OCI

- Downloading and Installing the Oracle Database Cloud Backup Module for OCI

- Files Created when Oracle Database Cloud Backup Module for OCI is Installed

- Before You Begin Installing Oracle Database Cloud Backup Module for OCI
  Before you install the Oracle Database Cloud Backup Module for OCI, make sure you have what you need:

- Parameters to Run the Oracle Database Cloud Backup Module for OCI
  You must specify parameters and their values when you run the Oracle Database Cloud Backup Module for OCI installer. It's best to compile this information before you run the installer.

- [Downloading and Installing the Oracle Database Cloud Backup Module for OCI](#)
  Download and install the Oracle Database Cloud Backup Module for OCI on your database server.

- [Files Created when Oracle Database Cloud Backup Module for OCI is Installed](#)
  After you run the installer for the Oracle Database Cloud Backup Module for OCI, make sure the required files are on your system.

Before You Begin Installing Oracle Database Cloud Backup Module for OCI

Before you install the Oracle Database Cloud Backup Module for OCI, make sure you have what you need:

- A supported Oracle Database version and operating system

- An Oracle Technology Network (OTN) account or Oracle.com account

  If you don't have an OTN account, create one by registering at `http://www.oracle.com/technetwork/index.html`.

- An Oracle Cloud account with access to Oracle Cloud Infrastructure Object Storage

  See [Overview of Object Storage](#) in the *Oracle Cloud Infrastructure Documentation*.

- Oracle Cloud Infrastructure API signing keys, tenant OCID, and user OCID

  You may specify a compartment ID. However, if the compartment ID is not specified, the tenant ID is used as the compartment ID.

  See [Required Keys and OCIDs](#).

- Java SE Development Kit (JDK)

  Default JDK version supported by the target Oracle Database release.

- The required patch if you're using the Standard Edition of Oracle Database

  See My Oracle Support Doc ID 1640149.1 at `http://support.oracle.com`.

- Values for the parameters required to run the installer for Oracle Database Cloud Backup Module for OCI

  It's best to compile this information before you run the installer. See [Parameters to Run the Oracle Database Cloud Backup Module for OCI](#).

> ⓘ **Note**
>
> If your database server has multiple Oracle homes, the Oracle Database Cloud Backup Module for OCI must be installed into each `ORACLE_HOME`. Alternatively, you can copy the library file (`libopc.so` or `oraopc.dll`, depending on your operating system) to other Oracle home library locations, along with the `opcSID.ora` configuration file (assuming you're using the same cloud credentials for backing up all databases in the database server).
>
> Copy and rename the `opcSID.ora` file for each database instance you are backing up to the cloud, where `SID` matches the SID for the database instance.

Parameters to Run the Oracle Database Cloud Backup Module for OCI

You must specify parameters and their values when you run the Oracle Database Cloud Backup Module for OCI installer. It's best to compile this information before you run the installer.

Parameters include the host name for the Oracle Cloud Infrastructure account and the private key used to sign Oracle Cloud Infrastructure API requests. Parameters can also be displayed by running the following command from the directory that contains the `oci_install.jar` installer file:

```
java -jar oci_install.jar
```

The following example shows what you'll need to provide:

```
java -jar oci_install.jar
-host https://objectstorage.us-phoenix-1.oraclecloud.com
-pvtKeyFile oci_private_key -pubFingerPrint oci_public_fingerprint
-uOCID user_ocid -tOCID tenancy_ocid
-walletDir /wallet_directory -libDir /library_directory
```

The following table lists the required and optional parameters.

Parameter	Description	Required or Optional
-host	End point of the Oracle Cloud Infrastructure account. For information about finding the Native Oracle Cloud Service Object Storage API endpoints for your account, see the Object Storage FAQs in the Oracle Cloud Infrastructure documentation.	Required
-pvtKeyFile	File that contains the private key used to authenticate Oracle Cloud Infrastructure API requests. The key file must be in PEM format. See Required Keys and OCIDs in *Oracle Cloud Infrastructure Documentation* for information about generating API signing keys. This private key is never transmitted outside of the computer where the installer is run.	Required
-pubFingerPrint	Finger print of the public key paired with the specified private key. The finger print tells Oracle Cloud Infrastructure which private and public key pair is used to authenticate the API requests	Required

Parameter	Description	Required or Optional
`-tOCID`	Tenancy OCID for the Oracle Cloud Infrastructure account. See [Required Keys and OCIDs](#) in *Oracle Cloud Infrastructure Documentation* for information about obtaining the `tOCID` and `uOCID`.	Required
`-uOCID`	User OCID for the Oracle Cloud Infrastructure account.	Required
`-bucket`	Name of the bucket in which backups are stored. If this bucket does not exist, then the installer creates it. When this parameter is omitted, a default bucket is automatically created to store backups.	Optional
`-cOCID`	Resource compartment ID for the Oracle Cloud Infrastructure account. The default value is the tenancy OCID if not specified.	Optional
`-newRSAKeyPair`	Set up a new pair of public and private RSA keys for authentication. If specified, the installer generates a random RSA private and public key pair of 2048 bits and stores them in the specified Oracle wallet directory.	Optional
`-walletDir`	Directory in which Oracle Cloud Infrastructure Object Storage credentials are stored. Suggested location on Linux and UNIX systems: `ORACLE_HOME`/dbs/opc_wallet Suggested location on Windows systems: `ORACLE_HOME`\database\opc_wallet If the specified wallet directory does not exist (for example, `opc_wallet`), the installer creates it.	Required

Parameter	Description	Required or Optional
-libDir	Directory in which the system backup to tape (SBT) library used for backups and restores with Oracle Cloud Infrastructure is stored.	Required only if you want to download the SBT library
	If omitted, the library is not downloaded. In most cases, you should specify this parameter and download the library. An exception might be if you're using the installer to regenerate the wallet and configuration file in an Oracle home directory where the Oracle Database Cloud Backup Module for OCI was previously installed.	
	Suggested location on Linux and UNIX systems:	
	ORACLE_HOME/lib	
	Suggested location on Windows systems:	
	ORACLE_HOME\bin	
	If the specified directory does not exist, you are prompted to create it and then run the installer again.	
	For Oracle Database 19c Release 27 (19.27) or later and Oracle AI Database 26ai Release Update 23.8 or later, Oracle recommends that you use the database release version specific native SBT library available in the $ORACLE_HOME directory after you install the database. In this case, skip the -libDir parameter. oracle.oci is the predefined alias name for the native SBT library that corresponds to the Backup Cloud Service module. After installing the database, you can configure the RMAN SBT channel using the library alias name oracle.oci. This creates a persistent configuration for RMAN while performing backup and restores to Oracle Cloud.	
	See, Configuring Channels for Backup and Recovery Operations to learn more about configuring RMAN channels.	
	See, Configuring RMAN to Use a Native SBT Media Library in the *Backup and Recovery User's Guide* to learn more about native SBT libraries.	

Parameter	Description	Required or Optional
-libPlatform	Operating system for the SBT library used for backups and restores. In most cases, you don't need to specify this parameter because the installer automatically determines the correct operating system. Exceptions might be if you see error messages indicating your operating system can't be identified or if you need to download the library for use on a different system. Supported values for this parameter: • `linux64` • `windows64` • `solaris_sparc64` • `solaris_x64` • `zlinux64` • `hpux_ia64` • `aix_ppc64` For information about supported operating systems, see [Supported Databases and Operating Systems.]().	Optional
-lib-download-only	Downloads only the SBT library. Use this parameter to update the library without making changes to the configuration file and the wallet. For Oracle Database 19c Release 27 (19.27) or later and Oracle AI Database 26ai Release Update 23.8 or later, Oracle recommends that you use the database release version specific native SBT library available in the `$ORACLE_HOME/lib` directory after you install the database. You no longer have to download the latest SBT library. See, [Configuring Channels for Backup and Recovery Operations]() to learn more about configuring RMAN channels. See, Configuring RMAN to Use a Native SBT Media Library in the *Backup and Recovery User's Guide* to learn more about native SBT libraries.	Optional

Parameter	Description	Required or Optional
`-configFile`	Directory in which the Oracle Database Cloud Backup Module for OCI configuration file is stored. If omitted, the configuration file is stored in a default location. Default location on Linux and UNIX systems: *ORACLE_HOME*/dbs Default location on Windows systems: *ORACLE_HOME*\database The file name is opc*SID*.ora, where *SID* is the system identifier of the Oracle database being backed up to Oracle Cloud Infrastructure Object Storage Service.	Optional
`-trustedCerts`	Comma-separated list of SSL certificates that must be added to the wallet. If the installer is unable to retrieve the certificates required for the SSL connection from local Java truststore, this SSL certificates specified by this parameter are imported. All SSL certificates must be in the PEM format.	Optional
`-import-all-trustcerts`	Import all X509 certificates from the Java truststore.	Optional
`-proxyHost`	HTTP proxy server host name	Optional
`-proxyPort`	HTTP proxy server port number	Optional
`-proxyId`	HTTP proxy server user name, if needed.	Optional
`-proxyPass`	HTTP proxy server password, if needed.	Optional

Parameter	Description	Required or Optional

`-argFile`	Indicates that parameters should be read from the specified file. For example, a file named `arguments.txt` might contain the following:
	
	`-opcID 'myAccount@myCompany.com'`
	`-opcPass 'abc123$'`
	`-host https://objectstorage.us-phoenix-1.oraclecloud.com`
	`-libDir /home/oracle/OPC/lib`
	`-walletDir /home/oracle/OPC/wallet`
	
	For this example, the following command installs the Oracle Database Cloud Backup Module for OCI using the parameters specified in the file:
	`java -jar oci_install.jar -argFile arguments.txt`
		Optional

`-enableArchiving`	Whether backups must be automatically moved from standard Object Storage buckets to Archive Storage. The default value is FALSE. Set this parameter to TRUE to enable automatic archival of backups. Backups are automatically moved to Archive Storage if they meet the criteria set by the object lifecycle policy rule that is associated with the bucket containing the backups. The installer creates an appropriate lifecycle policy rule using the values of the `archiveAfterBackup` and `retainAfterRestore` parameters. Do not modify this policy rule. To enable archiving of backups, the Object Storage service in the region must be granted permission to manage objects. See Using Object Lifecycle Management in the *Oracle Cloud Infrastructure Documentation*.	Optional

Parameter	Description	Required or Optional

`-archiveAfterBackup`	Period of time, in days or years, after which backups are moved from standard Object Storage to Archive Storage. The default is 0 days. This means that the backups are moved to Archive Storage any time between 0 and 24 hours from the time they were created. Examples:
	
	`-archiveAfterBackup "25 days"`
	`-archiveAfterBackup "1 year"`
		Optional

`-retainAfterRestore`	Period of time, in hours, for which backups that were restored from Archive Storage to standard Object Storage are retained in the Object Storage bucket. The default is 48 hours. Example: `-retainAfterRestore "24 hours"` While restoring using archived backups, the backups must first be recalled from Archive Storage. Recalled backups are retained in Object Storage for the time specified by `retainAfterRestore`. After the specified time elapses, the backups return to Archive Storage.	Optional

Downloading and Installing the Oracle Database Cloud Backup Module for OCI

Download and install the Oracle Database Cloud Backup Module for OCI on your database server.

First, make sure you're ready. See Before You Begin Installing Oracle Database Cloud Backup Module for OCI.

To download and install the Oracle Database Cloud Backup Module for OCI:

1. Download the Oracle Database Cloud Backup Module for OCI from Oracle Technology Network (OTN):

    `https://www.oracle.com/database/technologies/oracle-cloud-backup-downloads.html`

Accept the license agreement, click **All Supported Platforms**, and provide your OTN user name and password when prompted. Then download the ZIP file that contains the installer (`opc_installer.zip`) to your system.

2. Extract the contents of the zip file.

    The file contains two directories, `oci_installer` and `opc_installer`, and a README file.

3. (Optional) To configure automatic movement of backups from standard Object Storage to Archive Storage, authorize the Object Storage service to move backups to Archive Storage. See *Service Permissions* in the [Required IAM Policies](#) section of the Oracle Cloud Infrastructure documentation.

4. Run the installer, `oci_install.jar`, from the `oci_installer` directory. Provide the required parameters in one line, with each parameter preceded by a hyphen and followed by its value. For information about required parameters, see [Parameters to Run the Oracle Database Cloud Backup Module for OCI](#).

Example 2-1   Installing the Oracle Database Cloud Backup Module for OCI

The following is an example run of the installer. This example shows how the installer automatically downloads the Oracle Database Cloud Backup Module for OCI for your operating system, creates a wallet that contains Oracle Database Backup Cloud Service identifiers and credentials, creates the backup module configuration file, and downloads the library necessary for backups and restores to Oracle Cloud Infrastructure.

```
% java -jar oci_install.jar -host https://objectstorage.us-phoenix-1.oraclecloud.com
  -pvtKeyFile /oracle/dbs/oci_wallet/oci_pvt
  -pubFingerPrint e5:10:06:b1:fb:24:ef:db:46:21:16:20:46:jk:th:35
  -uOCID ocid1.user.oc1..aaaaaaaasd754pijuwheaq67t7tninefkn7z7aibtusj7jqac5lpm7wm37va
  -tOCID ocid1.tenancy.oc1..aaaaaaaavjhvwf4c7q2ozzyduh7njrft58i6ts3ryjk7v83w7q4wdr2ka
  -walletDir /oracle/dbs/oci_wallet
  -libDir /oracle/lib
  -bucket db_backups
Oracle Database Cloud Backup Module Install Tool, build 2018-12-11
Oracle Database Cloud Backup Module credentials are valid.
Backups would be sent to bucket db_backups.
Oracle Database Cloud Backup Module wallet created in directory /oracle/dbs/oci_wallet.
Oracle Database Cloud Backup Module initialization file /oracle/dbs/opcb18test.ora
created.
Downloading Oracle Database Cloud Backup Module Software Library from file
opc_linux64.zip.
Download complete.
```

Example 2-2   Enabling Automatic Archival of Backups When Installing the Oracle Database Cloud Backup Module for OCI

This example installs the Oracle Database Cloud Backup Module for OCI and creates a standard bucket named `backup_archival_60`, with archiving enabled. Backups stored in this bucket are automatically moved from standard Object Storage to Archive Storage 60 days after they are created. During a restore operation, backups recalled from Archive Storage are retained in the Object Storage bucket for 72 hours. An object lifecycle policy is created and associated with the bucket `backup_archival_60`. The information specified in the `-archiveAfterBackup` and `-retainAfterRestore` parameters are stored in this object lifecycle policy.

Before you run the installer, ensure that you authorize the Object Storage service to move backups to Archive Storage, as described in Step 3.

```
%java -jar oci_install.jar
  -host https://objectstorage.us-phoenix-1.oraclecloud.com
```

```
  -pvtKeyFile /home/database/oci_wallet/oci_pvt
  -pubFingerPrint fe:13:f2:dc:2f:81:5c:df:86:2d:64:58:cd:8h:98:24
  -tOCID
ocid1.tenancy.oc1..aaaaaaaafrhvkt6s8z2ozzyjth9njwq3img95ivsd3vcmj3v53k7q5yhc8l
e
  -uOCID
ocid1.user.oc1..aaaaaaaarg468pilujhpaj45t1mjsesurg5z7sapuedm5jqax47pm2cx7lva
  -cOCID
ocid1.compartment.oc1..aaaaaaaasgtffvkghd7w9rgtsky3mkozabkdl3y2u3ymluresxk4spq
63smq
  -libDir $ORACLE_HOME/lib -walletDir /database/dbs/oci_wallet
  -enableArchiving true
  -archiveAfterBackup "60 days" -retainAfterRestore "72 hours"
  -bucket backup_archival_60
  -configFile $ORACLE_HOME/oci_config.ora
Oracle Database Cloud Backup Module Install Tool, build
19.3.0.0.0DBBKPCSBP_2019-10-09
Oracle Database Cloud Backup Module credentials are valid.
Backups would be sent to bucket backup_archival_60.
Oracle Database Cloud Backup Module wallet created in directory /database/dbs/
oci_wallet.
Oracle Database Cloud Backup Module initialization file /home/database/oracle/
oci_config.ora created.
Downloading Oracle Database Cloud Backup Module Software Library from Oracle
Cloud Infrastructure.
Download complete.
```

Files Created when Oracle Database Cloud Backup Module for OCI is Installed

After you run the installer for the Oracle Database Cloud Backup Module for OCI, make sure the required files are on your system.

The following files are created when you install the backup module and they are used to perform cloud backups and restores. For information about the parameters mentioned, see [Parameters to Run the Oracle Database Cloud Backup Module for OCI](#).

File	Location	Purpose
`libopc.so` on Linux and UNIX systems `oraopc.dll` on Windows systems	As specified for the `-libDir` parameter when you run the installer for the Oracle Database Cloud Backup Module for OCI. Example location: `ORACLE_HOME/lib`	Operating system-specific SBT library that enables cloud backups and restores with the Oracle Cloud Infrastructure.

File	Location	Purpose
opc*SID*.ora	As specified for the *–configFile* parameter when you run the installer for the Oracle Database Cloud Backup Module for OCI. Default location on Linux and UNIX systems: *ORACLE_HOME*/dbs Default location on Windows systems: *ORACLE_HOME*\database	Configuration file that contains theOracle Cloud Infrastructure Object Storage bucket URL and credential wallet location, where *SID* is the system identifier of the Oracle database being backed up to Oracle Cloud Infrastructure.
cwallet.sso	As specified for the *–walletDir* parameter when you run the Oracle Database Cloud Backup Module for OCI installer. Example location: *ORACLE_HOME*/dbs/opc_wallet	Oracle wallet file that securely stores Oracle Cloud Infrastructure Object Storage credentials. This file is used during Recovery Manager (RMAN) backup and restore operations and is stored in the Oracle Cloud Infrastructure Object Storage wallet directory (for example, opc_wallet).

Installing the Oracle Database Cloud Backup Module for OCI Classic

To back up to Oracle Cloud Infrastructure Classic, you first need to install the Oracle Database Cloud Backup Module for OCI Classic. You'll download the module from Oracle Technology Network (OTN) and install it on your database server.

Topics

- [Before You Begin Installing Oracle Database Cloud Backup Module for OCI Classic](#)

- [Supported Databases and Operating Systems](#)

- [Parameters Used to Run the Oracle Database Cloud Backup Module for OCI Classic Installer](#)

- [Downloading and Installing the Oracle Database Cloud Backup Module for OCI Classic](#)

- [Files Created When the Oracle Database Cloud Backup Module for OCI Classic is Installed](#)

- [Before You Begin Installing Oracle Database Cloud Backup Module for OCI Classic](#)
  Before you install the Oracle Database Cloud Backup Module for OCI Classic, make sure you have what you need:

- [Parameters Used to Run the Oracle Database Cloud Backup Module for OCI Classic Installer](#)
  You'll need to specify parameters and their values when you run the Oracle Database Cloud Backup Module for OCI Classic installer. Parameters include host (REST endpoint) and account credentials. It's best to compile this information before you run the installer.

- [Downloading and Installing the Oracle Database Cloud Backup Module for OCI Classic](#)
  Download and install the Oracle Database Cloud Backup Module for OCI Classic on your database server.

- [Files Created When the Oracle Database Cloud Backup Module for OCI Classic is Installed](#)

  After you run the installer for the Oracle Database Cloud Backup Module for OCI Classic, make sure the required files are on your system.

Before You Begin Installing Oracle Database Cloud Backup Module for OCI Classic

Before you install the Oracle Database Cloud Backup Module for OCI Classic, make sure you have what you need:

- A supported Oracle Database version and operating system

  See [Supported Databases and Operating Systems](#).

- An Oracle Technology Network (OTN) account or Oracle.com account

  If you don't have an OTN account, create one by registering at `http://www.oracle.com/technetwork/index.html`.

- An Oracle Database Backup Cloud Service account and storage capacity

  See [How to Begin with Oracle Database Backup Cloud Service Subscriptions](#).

- Java SE Development Kit (JDK)

  Default JDK version supported by the target Oracle Database release.

- The required patch if you're using the Standard Edition of Oracle Database

  See My Oracle Support Doc ID 1640149.1 at `http://support.oracle.com`.

- Values for the parameters required to run the Oracle Database Cloud Backup Module for OCI Classic installer

  It's best to compile this information before you run the installer. See [Parameters Used to Run the Oracle Database Cloud Backup Module for OCI Classic Installer](#).

> ⓘ **Note**
>
> If your database server has multiple Oracle homes, the Oracle Database Cloud Backup Module for OCI Classic must be installed into each `ORACLE_HOME`. Alternatively, you can copy the library file (`libopc.so` or `oraopc.dll`, depending on your operating system) to other Oracle home library locations, along with the `opcSID.ora` configuration file (assuming you're using the same cloud credentials for backing up all databases in the database server).
>
> Copy and rename the `opcSID.ora` file for each database instance you are backing up to the cloud, where `SID` matches the SID for the database instance.

Parameters Used to Run the Oracle Database Cloud Backup Module for OCI Classic Installer

You'll need to specify parameters and their values when you run the Oracle Database Cloud Backup Module for OCI Classic installer. Parameters include host (REST endpoint) and account credentials. It's best to compile this information before you run the installer.

The following example shows what you'll need to provide:

```
java -jar opc_install.jar
-host https://foo.storage.oraclecloud.com/v1/Storage-myIdentity3
-opcId 'myAccount@myCompany.com' -opcPass 'opc_password'
-walletDir /walletDirectory -libDir /libraryDirectory
```

The following table lists required parameters. Optional parameters are also listed.

Parameters can also be displayed by running the following command from the directory that contains the `opc_install.jar` installer file:

```
java -jar opc_install.jar
```

Parameter	Description	Required or Optional

`-host`	REST endpoint for your service as listed on the service details page. For information about finding the URL for your account, see the documentation for *Using Oracle Cloud Infrastructure Object Storage Classic*.
	
	For example:
	
	`-host https://`
	`abc.storage.oraclecloud.com/v1/hr-abc`
		Required

`—opcId`	User name for your Oracle Database Backup Cloud Service account. Enclose the user name in single quotes, for example `'myAccount@myCompany.com'`. On Windows systems, use double quotes if the user name contains special characters.	Required
`—opcPass`	Password for the Oracle Database Backup Cloud Service account specified by `—opcId`. Enclose the password in single quotes, for example `'opc_password'`. On Windows systems, use double quotes if the password contains special characters.	Required

`—walletDir`	Directory in which Oracle Database Backup Cloud Service credentials are stored.
	
	Suggested location on Linux and UNIX systems:
	`ORACLE_HOME/dbs/opc_wallet`
	Suggested location on Windows systems:
	`ORACLE_HOME\database\opc_wallet`
	If the specified wallet directory does not exist (for example, `opc_wallet`), the installer creates it.
		Required

Parameter	Description	Required or Optional
—libDir	Directory in which the system backup to tape (SBT) library used for backups and restores is stored. If omitted, the library is not downloaded. In most cases, you should specify this parameter and download the library. An exception might be if you're using the installer to regenerate the wallet and configuration file in an Oracle home directory where the Oracle Database Cloud Backup Module for OCI Classic was previously installed. Suggested location on Linux and UNIX systems: *ORACLE_HOME*/lib Suggested location on Windows systems: *ORACLE_HOME*\bin If the specified directory does not exist, you are prompted to create it and then run the installer again. For Oracle Database 19c Release 27 (19.27) or later and Oracle AI Database 26ai Release Update 23.8 or later, Oracle recommends that you use the database release version specific native SBT library available in the `$ORACLE_HOME/lib` directory after you install the database. In this case, skip the `-libDir` parameter. `oracle.oci` is the predefined alias name for the native SBT library that corresponds to the Backup Cloud Service module. After installing the database, you can configure the RMAN SBT channel using the library alias name `oracle.oci`. This creates a persistent configuration for RMAN while performing backup and restores to Oracle Cloud. See, Configuring Channels for Backup and Recovery Operations to learn more about configuring RMAN channels. See, Configuring RMAN to Use a Native SBT Media Library in the *Backup and Recovery User's Guide* to learn more about native SBT libraries.	Required if you want to download the latest module Optional if you just want to update the password after you change it in Oracle Cloud

Parameter	Description	Required or Optional
`—libPlatform`	Operating system for the SBT library used for backups and restores. In most cases, you don't need to specify this parameter because the installer automatically determines the correct operating system. Exceptions might be if you see error messages indicating your operating system can't be identified or if you need to download the library for use on a different system. Supported values for this parameter: • `linux64` • `windows64` • `solaris_sparc64` • `solaris_x64` • `zlinux64` • `hpux_ia64` • `aix_ppc64` For information about supported operating systems, see Supported Databases and Operating Systems.	Optional
`—container`	Custom container created by you, separate from Oracle Database Backup Cloud Service, to store backups. If omitted, backups are stored in the default container that's created when the backup module is installed. See Storing Backups in Custom Locations. **Note:** Containers that are used by Recovery Manager (RMAN) cannot have server-side encryption enabled. Because RMAN backups are already encrypted at the client side, server-side encryption is not required.	Optional
`-containerClass`	Storage class of the custom container. The valid values for this parameter are: • `Standard`: Represents Standard storage container. • `Tiering`: Represents a Standard storage container whose Lifecycle Tiering Policy is set. This option creates a container for which automatic archive is enabled. The tiering policy controls the frequency at which objects stored in this container are archived. The Oracle Database Cloud Backup Module for OCI Classic sets default parameters for the tiering policy. The default tiering policy excludes XML files and moves backups to archive storage immediately. If this parameter is omitted, then the default is either `Standard` or the storage class of the container specified using `-container`, if the container exists. For more information, see Understanding Storage Tiers.	Optional

Parameter	Description	Required or Optional
-containerLTP	Name of Lifecycle Tiering Policy (LTP) file. This file is a JSON document that specifies the time after which objects in the storage container will be moved to the archive tier and type of objects which can be excluded from being archived.	Optional
	To create archival backups, specify the name of the LTP file that defines the archival policy for the storage container by using the `-containerLTP` parameter. You can optionally set `-containerClass` to `Tiering`.	
	Note: The Lifecycle Tiering Policy file must exclude XML files. If this is not done, an error is displayed both when installing and using the Oracle Database Cloud Backup Module for OCI Classic. The `exclusions` field of the policy must be exactly like the one shown in Example 2-5.	
—configFile	Directory in which the Oracle Database Cloud Backup Module for OCI Classic configuration file is stored. If omitted, the configuration file is stored in a default location.	Optional
	Default location on Linux and UNIX systems:	
	`ORACLE_HOME`/dbs	
	Default location on Windows systems:	
	`ORACLE_HOME`\database	
	The file name is `opcSID.ora`, where `SID` is the system identifier of the Oracle database being backed up to Oracle Database Backup Cloud Service.	
—proxyHost	HTTP proxy server host name	Optional
—proxyPort	HTTP proxy server port number	Optional
—proxyId	HTTP proxy server user name, if needed	Optional
—proxyPass	HTTP proxy server password, if needed	Optional

—argFile	Indicates that parameters should be read from the specified file. For example, a file named `arguments.txt` might contain the following:
	
	`-opcID 'myAccount@myCompany.com'`
	`-opcPass 'abc123$'`
	`-host https://`
	`foo.storage.oraclecloud.com/v1/Storage-`
	`myIdentity3`
	`-libDir /home/oracle/OPC/lib`
	`-walletDir /home/oracle/OPC/wallet`
	
	For this example, the following command installs the Oracle Database Backup Module for OCI Classic using the parameters specified in the file:
	
	`java -jar opc_install.jar -argFile`
	`arguments.txt`
		Optional

Downloading and Installing the Oracle Database Cloud Backup Module for OCI Classic

Download and install the Oracle Database Cloud Backup Module for OCI Classic on your database server.

First, make sure you're ready. See [Before You Begin Installing Oracle Database Cloud Backup Module for OCI Classic](#).

To download and install the Oracle Database Cloud Backup Module for OCI Classic:

1. Download the Oracle Database Cloud Backup Module for OCI Classic from Oracle Technology Network (OTN):

   https://www.oracle.com/database/technologies/oracle-cloud-backup-downloads.html

   Accept the license agreement, click **All Supported Platforms**, and provide your OTN user name and password when prompted. Then download the ZIP file that contains the installer (`opc_installer.zip`) to your system.

2. Extract the contents of the zip file.

   The file contains two directories, `oci_installer` and `opc_installer`, and a README file.

3. Run the installer, `opc_install.jar`, from the `opc_installer` directory. Provide the required parameters in one line, with each parameter preceded by a hyphen and followed by its value. For information about required parameters, see [Parameters Used to Run the Oracle Database Cloud Backup Module for OCI Classic Installer](#).

Example 2-3   Installing the Oracle Database Cloud Backup Module for OCI Classic

This example shows how the installer automatically downloads the Oracle Database Cloud Backup Module for OCI Classic for your operating system, creates a wallet that contains Oracle Database Backup Cloud Service identifiers and credentials, creates the Oracle Database Cloud Backup Module for OCI Classic configuration file, and downloads the library necessary for cloud backups and restores.

```
java -jar opc_install.jar -host https://myDomain.storage.oraclecloud.com/v1/myService-myDomain
-opcId 'myAccount@myCompany.com' -opcPass 'opc_pswd1'
-walletDir /home/oracle/OPC/wallet -libDir /home/oracle/OPC/lib

Oracle Database Cloud Backup Module Install Tool, build 2017-08-15
Oracle Database Cloud Backup Module credentials are valid.
Oracle Database Cloud Backup Module wallet created in directory /home/oracle/OPC/wallet.
Oracle Database Cloud Backup Module initialization file /orclhome/dbs/opcmySID.ora created.
Downloading Oracle Database Cloud Backup Module Software Library from file opc_linux64.zip.
Download complete.
```

Example 2-4   Creating a Tiering Container When Installing the Oracle Database Cloud Backup Module for OCI Classic

This example installs the Oracle Database Cloud Backup Module for OCI Classic and creates a container named `archive_container` for which automatic archive is enabled. To create a container with automatic archiving, you must specify `Tiering` for the `containerClass`. A

default Lifecycle Tiering Policy is associated with this container and the values specified by the tiering policy control when backups stored in this container are moved to archive storage.

```
% java -jar opc_install.jar -host https://myDomain.storage.oraclecloud.com/v1/
myService-myDomain/
  -opcId 'myAccount@myCompany.com' -opcPass 'opc_pswd1'
  -walletDir /home/oracle/opc/opc_wallet
  -libDir /home/oracle/lib
  -containerClass Tiering -container archive_container
Oracle Database Cloud Backup Module Install Tool, build MAIN_2017-09-12
Oracle Database Cloud Backup Module credentials are valid.
Backups would be sent to container archive_container.
Oracle Database Cloud Backup Module wallet created in directory /home/
oracle/opc/opc_wallet.
Oracle Database Cloud Backup Module initialization file /orclhome/dbs/
opcdb18c.ora created.
Downloading Oracle Database Cloud Backup Module Software Library from file
opc_linux64.zip.
Download complete.
```

Example 2-5   JSON Document for Lifecycle Tiering Policy File

The following example shows a JSON document that contains the information required to define a Lifecycle Tiering Policy for an archive container. The Lifecycle Tiering Policy set using this JSON document excludes all XML files from the backup and moves backups to the Archive tier after 7 days.

```
{
    "archiveAfter":
    {
      "timeUnit":"DAYS",
      "time":7
    },
    "exclusions":[{"exclusionType":"REGEX","exclusionFilter":"\\.xml"}]
}
```

> ⓘ **Note**
>
> A value greater than 0 for `archiveAfter` is only supported in limited data centers.

> ⓘ **Note**
>
> You can run the installer and install the Oracle Database Cloud Backup Module for OCI Classic as many times as you like. Periodically perform the installation procedure to get the latest RMAN SBT library module, and also to update the password after you change it in Oracle Cloud.

Files Created When the Oracle Database Cloud Backup Module for OCI Classic is Installed

After you run the installer for the Oracle Database Cloud Backup Module for OCI Classic, make sure the required files are on your system.

The following files are created when you install the Oracle Database Cloud Backup Module for OCI Classic and are used by Oracle Database Backup Cloud Service to perform cloud backups and restores. For information about the parameters mentioned, see [Parameters Used to Run the Oracle Database Cloud Backup Module for OCI Classic Installer](#).

File	Location	Purpose
`libopc.so` on Linux and UNIX systems `oraopc.dll` on Windows systems	As specified for the `-libDir` parameter when you run the Oracle Database Cloud Backup Module for OCI Classic installer. Example location: `ORACLE_HOME/lib`	Operating system-specific SBT library that enables cloud backups and restores.

`opcSID.ora`	As specified for the `-configFile` parameter when you run the Oracle Database Cloud Backup Module for OCI Classic installer.
	Default location on Linux and UNIX systems:
	`ORACLE_HOME/dbs`
	Default location on Windows systems:
	`ORACLE_HOME\database`
		Configuration file that contains the Oracle Database Backup Cloud Service container URL and credential wallet location, where `SID` is the system identifier of the Oracle database being backed up to Oracle Database Backup Cloud Service.
		Note: Containers that are used by Recovery Manager (RMAN) cannot have server-side encryption enabled. Because RMAN backups are already encrypted at the client side, server-side encryption is not required.

`cwallet.sso`	As specified for the `-walletDir` parameter when you run the Oracle Database Cloud Backup Module for OCI Classic installer. Example location: `ORACLE_HOME/dbs/opc_wallet`	Oracle wallet file that securely stores Oracle Database Backup Cloud Service credentials. This file is used during Recovery Manager (RMAN) backup and restore operations and is stored in the Oracle Database Backup Cloud Service wallet directory (for example, `opc_wallet`).

3

Configuring Settings for Using Oracle Database Backup Cloud Service

After installing the backup module, you'll configure the settings that will be used for backup and recovery operations. When using Recovery Manager (RMAN) for backup and recovery operations with Oracle Database Backup Cloud Service, you must configure your RMAN environment.

> ### ⓘ Note
>
> The information provided in this section applies to Oracle Database 19c Release 26 (19.26) and earlier releases.
>
> For Oracle Database 19c Release 27 (19.27) or later and Oracle AI Database 26ai Release Update 23.8 or later, Oracle recommends that you use the simplified procedure to set up the Oracle Database Backup Cloud Service, as described in the *Backup and Recovery User's Guide*.

Topics:

- [Configuring Recovery Manager (RMAN) Settings](#)

- [Configuring Channels for Backup and Recovery Operations](#)

- [Configuring Encryption for Backups](#)

- [Configuring Compression for Backups](#)

- [Storing Backups in Custom Locations](#)

- [Configuring Automatic Archival to Oracle Cloud Infrastructure](#)

- [Configuring Automatic Archival to Oracle Cloud Infrastructure Classic](#)

- [Configuring Recovery Manager (RMAN) Settings](#)
  Configure Recovery Manager (RMAN) to use Oracle Database Backup Cloud Service as the backup destination.

- [Configuring Channels for Backup and Recovery Operations](#)
  Configure an RMAN channel to create a persistent configuration that affects backup, restore, recovery, and maintenance operations. Once the RMAN configuration is done, you can perform cloud backups and restores using any of the RMAN commands you usually use.

- [Configuring Encryption for Backups](#)
  Backups must be encrypted before they can be sent to Oracle Database Backup Cloud Service. You'll specify encryption when you perform a backup.

- [Configuring Compression for Backups](#)
  You can optionally use compression when backing up Oracle databases to Oracle Database Backup Cloud Service. Compression conserves bandwidth by reducing the size of your backups before they're sent to the cloud. You'll specify compression when you perform a backup.

- Configuring Automatic Archival to Oracle Cloud Infrastructure
  You can move backups that are rarely accessed, but must be retained for long periods, to Archive Storage. Archive Storage is more cost effective than Object Storage for preserving cold data.

- Configuring Automatic Archival to Oracle Cloud Infrastructure Classic
  Infrequently-used backups can be moved from standard storage and archived after a specified number of days. This frees up space on the standard storage for new backups.

- Storing Backups in Custom Locations
  A default location is created when you install the Oracle Database Cloud Backup Module for OCI or Oracle Database Cloud Backup Module for OCI Classic and backups are stored as objects in this location. You can also store backups in custom locations you've created yourself.

- Storing Backups in OCI Immutable Buckets
  Learn how to configure the Oracle Database Cloud Backup Module to store backups in OCI immutable buckets.

Configuring Recovery Manager (RMAN) Settings

Configure Recovery Manager (RMAN) to use Oracle Database Backup Cloud Service as the backup destination.

You'll use the `CONFIGURE` command to create or change a persistent configuration affecting RMAN backup, restore, and maintenance. For more information about the command, see CONFIGURE in *Oracle Database Backup and Recovery Reference*.

Configuring Autobackups

As a best practice, you should also configure RMAN to automatically back up the database control file and server parameter file. With a control file autobackup, RMAN can recover the database even if the current control file, recovery catalog, and server parameter file are inaccessible.

The autobackup feature is disabled by default. To enable autobackup, use the following command:

```
RMAN> CONFIGURE CONTROLFILE AUTOBACKUP ON;
```

For information about configuring automatic archive for backups, see Configuring Automatic Archival to Oracle Cloud Infrastructure Classic.

For information about autobackups, see About RMAN Control File and Server Parameter File Autobackups in *Oracle Database Backup and Recovery User's Guide*.

Configuring Channels for Backup and Recovery Operations

Configure an RMAN channel to create a persistent configuration that affects backup, restore, recovery, and maintenance operations. Once the RMAN configuration is done, you can perform cloud backups and restores using any of the RMAN commands you usually use.

You can configure as many RMAN channels as you want. The location to which backups are stored is determined by the configuration that is currently in use. For example, if the current configuration is to Oracle Cloud using the Oracle Database Cloud Backup Module for OCI, then Oracle Cloud Infrastructure Object Storage is used for backup and restore operations. To back up to a different location, for example Oracle Cloud Infrastructure Classic Object Storage

Classic, you just configure a channel that corresponds to Oracle Database Cloud Backup Module for OCI Classic.

For information about RMAN commands, see About RMAN Commands in the *Oracle Database Backup and Recovery Reference*.

Configuring RMAN Channels Using the SBT Library for OCI

RMAN uses the Oracle-supplied System Backup to Tape (SBT) media library for backups and restores with Oracle Cloud Infrastructure (OCI).

When you run the backup module installer, you can choose to download the SBT library and then configure the RMAN channel by specifying the absolute path name to the location where the downloaded SBT library is stored.

For Oracle Database 19c Release 27 (19.27) or later and Oracle AI Database 26ai Release Update 23.8 or later, Oracle recommends that you use the database release version specific native SBT library available in the `$ORACLE_HOME/lib` directory after you install the database. In this case, skip the `-libDir` parameter. `oracle.oci` is the predefined alias name for the native SBT library that corresponds to the Backup Cloud Service module. After installing the database, you can configure the RMAN SBT channel using the library alias name `oracle.oci`. This creates a persistent configuration for RMAN while performing backup and restores to Oracle Cloud.

See, Configuring RMAN to Use a Native SBT Media Library in the *Backup and Recovery User's Guide* to learn more about using native SBT libraries.

- The following command configures an RMAN channel using the alias name of the native SBT library that supports backups and restores with Oracle Cloud:

```
RMAN> CONFIGURE CHANNEL DEVICE TYPE sbt
      PARMS='SBT_LIBRARY='oracle.oci'
      SBT_PARMS=(OPC_PFILE=location-of-the-configuration file)';
```

- The following command configures an RMAN channel using the absolute path name to the location where a downloaded SBT library is stored:

```
RMAN> CONFIGURE CHANNEL DEVICE TYPE sbt
PARMS='SBT_LIBRARY='$ORACLE_HOME/lib/libopc.so'
SBT_PARMS=(OPC_PFILE=location of the configuration file)';
```

Example 3-1   Configuring RMAN to Back Up to Oracle Cloud Infrastructure

This example configures an RMAN channel, on a Linux or UNIX system, that uses the Oracle Database Cloud Backup Module for OCI for backup and restore operations with Oracle Cloud Infrastructure. The `SBT_LIBRARY` parameter specifies the alias name (`oracle.oci`) of the native SBT library that enables RMAN backups and restores with OCI. `opcora12.ora` is the Backup Cloud Service configuration file that is created when you install the Backup Cloud Service module.

```
RMAN> CONFIGURE CHANNEL DEVICE TYPE sbt
      PARMS='SBT_LIBRARY=oracle.oci'
      SBT_PARMS=(OPC_PFILE=$ORACLE_HOME/dbs/opcora12.ora)';
```

On Windows systems, you must specify the `ENV` parameter. For example:

```
RMAN> CONFIGURE CHANNEL DEVICE TYPE sbt
      PARMS='SBT_LIBRARY='oracle.oci'
      ENV=(OPC_PFILE=C:\tmp\opcora12.ora)';
```

Example 3-2   Configuring RMAN to Back Up to Oracle Cloud Infrastructure Classic

On Linux and UNIX systems, the following command configures an RMAN channel that uses the Oracle Database Cloud Backup Module for OCI Classic SBT library and configuration file for backup to the cloud. The `SBT_LIBRARY` parameter specifies the alias name (`oracle.oci`) of the native SBT library that enables RMAN backups and restores with OCI. `opct1.ora` is the configuration file that is created when you install the backup module for OCI Classic.

For example:

```
RMAN> CONFIGURE CHANNEL DEVICE TYPE sbt
      PARMS='SBT_LIBRARY=oracle.oci'
      SBT_PARMS=(OPC_PFILE=/orclhome/dbs/opct1.ora)';
```

> **ⓘ Note**
>
> For Oracle Database 10g Release 2 (10.2), specify the `ENV` parameter instead of the `SBT_PARMS` parameter shown in the previous example. For example:
>
> ```
> RMAN> CONFIGURE CHANNEL DEVICE TYPE sbt
>       PARMS='SBT_LIBRARY=/orclhome/lib/libopc.so,
>       ENV=(OPC_PFILE=/orclhome/dbs/opct1.ora)';
> ```

On Windows systems, you'll need to specify the `ENV` parameter. For example:

```
RMAN> CONFIGURE CHANNEL DEVICE TYPE sbt
      PARMS='SBT_LIBRARY=C:\tmp\oraopc.dll,
      ENV=(OPC_PFILE=C:\tmp\opct1.ora)';
```

If you're on a Windows system and keep getting System or Media Management Loading errors when you try to perform a backup, your Windows environment could be missing C libraries needed by the backup module. Download the Redistributable Package for Visual Studio 2013 from https://www.microsoft.com/en-us/download/details.aspx?id=40784. Choose the 64-bit version and run the downloaded EXE file. This should resolve the problem.

> **ⓘ Note**
>
> In a Windows environment, install the `oraopc.dll` library file in the `ORACLE_HOME`/bin directory, or pass `ORACLE_HOME` as a parameter to the channel by using `sbt PARMS`.

Example 3-3   Viewing the Configuration Settings

The `SHOW ALL` command displays the current RMAN configuration. Use this command to confirm that you've configured RMAN to use Oracle Database Backup Cloud Service as the backup destination:

```
RMAN> SHOW ALL;
```

When you use the Oracle Database Cloud Backup Module for OCI Classic, you'll see an entry similar to this in your list of settings:

```
CONFIGURE CHANNEL DEVICE TYPE 'SBT_TAPE' PARMS
'SBT_LIBRARY='oracle.oci'
SBT_PARMS=(OPC_PFILE=/orclhome/dbs/opct1.ora)';
```

Configuring Encryption for Backups

Backups must be encrypted before they can be sent to Oracle Database Backup Cloud Service. You'll specify encryption when you perform a backup.

If a backup is not encrypted, you'll get an error message similar to the one shown below when you try to back up to the service:

```
RMAN-03009: failure of backup command on ORA_SBT_TAPE_1 channel at 08/15/2014 14:00:43
ORA-27030: skgfwrt: sbtwrite2 returned error
ORA-19511: non RMAN, but media manager or vendor specific failure, error text:
   KBHS-01602: backup piece 14p0jso8_1_1 is not encrypted
```

Recovery Manager (RMAN) encrypted backups are securely created, transmitted, and stored in the cloud. Use one of the following RMAN encryption modes to encrypt backups:

• Password encryption

• Transparent Data Encryption (TDE)

• Dual-mode encryption (combination of password and TDE)

For information about encryption methodologies and choosing an encryption algorithm, see Configuring Backup Encryption in *Oracle Database Backup and Recovery User's Guide*.

Configuring Compression for Backups

You can optionally use compression when backing up Oracle databases to Oracle Database Backup Cloud Service. Compression conserves bandwidth by reducing the size of your backups before they're sent to the cloud. You'll specify compression when you perform a backup.

Recovery Manager (RMAN) supports binary compression using one of the following compression levels: HIGH, MEDIUM, BASIC, and LOW. The recommended level for cloud backups is MEDIUM.

For example, the following RMAN commands configure compression using the MEDIUM algorithm:

```
RMAN> CONFIGURE COMPRESSION ALGORITHM 'MEDIUM';
RMAN> CONFIGURE DEVICE TYPE sbt BACKUP TYPE TO COMPRESSED BACKUPSET;
```

Backups must be in the form of backup sets, not image copies. For information about configuring compression for backups, see Configuring Compression Options in *Oracle Database Backup and Recovery User's Guide*.

Configuring Automatic Archival to Oracle Cloud Infrastructure

You can move backups that are rarely accessed, but must be retained for long periods, to Archive Storage. Archive Storage is more cost effective than Object Storage for preserving cold data.

You can either create a new bucket or use an existing bucket to store backups that must be automatically moved to Archive Storage.

To configure automatic archival of backups to Oracle Cloud Infrastructure Archive Storage:

1. Authorize Object Storage service to move backups to Archive Storage. See *Service Permissions* in [Using Object Lifecycle Management](#) of the *Oracle Cloud Infrastructure Documentation*.

2. To use an existing bucket, ensure that automatic archival is enabled for the bucket.

   a. Check if automatic archival is enabled by viewing the bucket details. See [Managing Buckets](#) in the *Oracle Cloud Infrastructure Documentation*.

   b. If automatic archival is not enabled, run the installer with the `-enableArchiving` parameter to enable archiving for the bucket.

      The command to run the installer is similar to the one in [Downloading and Installing the Oracle Database Cloud Backup Module for OCI](#). The `-bucket` parameter must specify the name of the existing bucket. The default values are used if the `-archiveAfterBackup` and `-retainAfterRestore` parameters are not not specified.

      An archiving rule is applied to all the existing objects in the bucket. For example, if you apply a lifecycle policy that archives after two weeks to an existing bucket containing objects, all the objects older than two weeks will be archived.

3. To create a new bucket, run the installer with the `-bucket` and `-enableArchiving` parameters.

   See [Downloading and Installing the Oracle Database Cloud Backup Module for OCI](#) for an example.

4. Configure an RMAN channel that corresponds to the Oracle Database Cloud Backup Module for OCI. See [Configuring Channels for Backup and Recovery Operations](#).

Configuring Automatic Archival to Oracle Cloud Infrastructure Classic

Infrequently-used backups can be moved from standard storage and archived after a specified number of days. This frees up space on the standard storage for new backups.

To archive backups, you must store them in a standard container that is associated with a Lifecycle Tiering Policy (LTP). The LTP is a container policy that defines the type of tiering that is associated with the standard container. After the number of days specified by the LTP elapses, the backups stored in the standard container are automatically archived. You can explicitly exclude specific objects from being archived automatically.

To configure automatic archive of backups to Oracle Cloud Infrastructure Classic:

1. Use one of the following techniques, when installing the Oracle Database Cloud Backup Module for OCI Classic, to specify the container to which backups must be archived:

   • Create a standard container that is associated with an LTP

     Specify the name that must be used for the new standard container by using the `-container` parameter. Set the `-containerClass` parameter to Tiering. To specify a user-defined LTP, use the `-containerLTP` parameter. If you omit this parameter, the default LTP is associated with the new container.

     See [Downloading and Installing the Oracle Database Cloud Backup Module for OCI Classic](#)

     For example:

     ```
     -container PAYROLL_ARC
     -containerClass Tiering
     ```

The standard container with the specified name is created and a default LTP is assigned to it. All backups, except XML objects, are archived when the number of days specified by the LTP elapses. This automatically adds the `OPC_CONTAINER` and `OPC_CONTAINER_CLASS` parameters to the `opcSID.ora` file so that these settings are used for backups.

- Specify only the container class

  Set `-containerClass` to `Tiering`.

  The `OPC_CONTAINER_CLASS` parameter is set to `Tiering` in the `opcSID.ora` configuration file. The Oracle Database Cloud Backup Module for OCI Classic installer attempts to find an existing standard container that is associated with an LTP. If no such container is found, a new standard container with the default LTP is created. The naming convention used for the new container is `oracle-data-account_name-index`.

- Use an existing standard container that is associated with an LTP

  Include the `-container` parameter with the name of an existing standard container that is associated with an LTP.

  For example:

  ```
  -container PAYROLL_ARC
  ```

  This automatically adds the `OPC_CONTAINER` parameter to the `opcSID.ora` configuration file so that the specified container is used to store backups.

2. Configure an RMAN channel that corresponds to the Oracle Database Cloud Backup Module for OCI Classic. See [Configuring Channels for Backup and Recovery Operations](#).

Storing Backups in Custom Locations

A default location is created when you install the Oracle Database Cloud Backup Module for OCI or Oracle Database Cloud Backup Module for OCI Classic and backups are stored as objects in this location. You can also store backups in custom locations you've created yourself.

With the Oracle Database Cloud Backup Module for OCI, a default bucket is created. With the Oracle Database Cloud Backup Module for OCI Classic, a default storage container is created.

Custom containers and custom buckets can be created using REST calls or third-party tools such as CloudBerry Explorer.

To create containers using the REST API, see the tutorial [Oracle Cloud Infrastructure Object Storage Classic: Creating Containers Using the REST API](#). For related Oracle Cloud Infrastructure Object Storage Classic Service documentation, see [Creating a Container](#).

To create buckets using the REST API or the OCI Console, see [Managing Buckets](#).

> ⓘ **Note**
>
> If you're using Oracle Cloud Infrastructure Object Storage or Oracle Exadata Database Service on Dedicated Infrastructure and want to automatically store backups in cloud storage, you need to create buckets or containers before you create your database deployment. For information about backing up your deployment to the cloud, see OCI Object Storage or Manage Database Backup and Recovery on Oracle Exadata Database Service on Dedicated Infrastructure.

> ⓘ **Note**
>
> Containers that are used by Recovery Manager (RMAN) cannot have server-side encryption enabled. Because RMAN backups are already encrypted at the client side, server-side encryption is not required.

Example 3-4   Using Custom Buckets with Oracle Cloud Infrastructure

You can specify that backups must be stored in custom containers either while installing the Oracle Database Cloud Backup Module for OCI or after the installation.

- While running the Oracle Database Cloud Backup Module for OCI installer, include the `-bucket` parameter and the custom bucket name.

  For example:

  `-bucket SALES_DB`

  This automatically adds the `OPC_CONTAINER` parameter to the `opcSID.ora` configuration file so the custom bucket is used for backups, where `SID` is the system identifier of the Oracle database being backed up to Oracle Database Backup Cloud Service.

- To specify a custom container after you've installed the Oracle Database Cloud Backup Module for OCI, add the `OPC_CONTAINER` parameter and the bucket name to `opcSID.ora`.

  For example:

  `OPC_CONTAINER=SALES_DB`

Example 3-5   Using Custom Containers with Oracle Cloud Infrastructure Classic

Specify that backups must be stored in a custom container either while installing the Oracle Database Cloud Backup Module for OCI Classic or after the installation.

- While running the Oracle Database Cloud Backup Module for OCI Classic installer, include the `-container` parameter and the custom container name.

  For example:

  `-container PAYROLL_DB`

  This automatically adds the `OPC_CONTAINER` parameter to the `opcSID.ora` configuration file so the custom container is used for backups, where `SID` is the system identifier of the Oracle database being backed up to Oracle Database Backup Cloud Service.

- To specify a custom container after you've installed the Oracle Database Cloud Backup Module for OCI Classic, add the `OPC_CONTAINER` parameter and the container name to `opcSID.ora`.

  For example:

```
OPC_CONTAINER=PAYROLL_DB
```

For information about parameters used by the installer, see [Parameters Used to Run the Oracle Database Cloud Backup Module for OCI Classic Installer](#).

For information about the opc*SID*.ora configuration file, see [Files Created When the Oracle Database Cloud Backup Module for OCI Classic is Installed](#).

Storing Backups in OCI Immutable Buckets

Learn how to configure the Oracle Database Cloud Backup Module to store backups in OCI immutable buckets.

In Oracle Cloud Infrastructure (OCI) Object Storage, an immutable bucket is a storage location governed by time-bound retention rules that protect data from modification or deletion for a specified duration. Use immutable buckets to implement a flexible backup retention strategy for each target database, and to prevent any modification to backups.

The Oracle Database Cloud Backup Module supports storing backups in immutable buckets that you have created in OCI.

To store backups in immutable buckets, you must first create these buckets in OCI Object storage:

- `Regulatory Compliance Bucket` configured with retention rules and rule lock (if necessary)
  You can also reuse an existing bucket associated with retention rules.

- `Temporary Metadata Bucket` with no retention rules or retention settings
  During backup operations, the temporary bucket is used to store backup metadata and files temporarily.

> ⓘ **Note**
>
> If you have stored your database backups in an existing regular bucket, then you can configure the same bucket to store immutable backups. In this case, first specify the existing bucket and a temporary bucket in the `opcSID.ora` configuration file (or run the backup module installer again), and then apply retention rules to the bucket in OCI. This ensures that your existing backups are also protected for the duration defined in the retention rule.

> ⓘ **Note**
>
> Your databases may have varied demands for backup retention. As a best practice, Oracle recommends that you maintain a separate immutable bucket and a corresponding unique temporary metadata bucket for each target database.
>
> For example, if you create an immutable bucket named `sales_db`, then create a temporary metadata bucket named `sales_db_temp`.
>
> If you plan to reuse an existing OCI bucket that is currently used by more than one target database, ensure that you reconfigure the bucket per the best practice recommended by Oracle.

For more information about creating buckets and retention rules, see *OCI Object Storage* documentation.

To Store Immutable Backups with Oracle Database Cloud Backup Module for OCI

1. Download and install the Oracle Database Cloud Backup Module on your database server.

   When you run the backup module, use either of these options:

   • Specify the `-bucket` parameter and the name of an existing bucket or a new immutable bucket that you have created in OCI

   • Skip the `-bucket` parameter if you want to use the default bucket created by the installer

   If you have not installed the latest `SBT` library, run the backup module installer again using the `-lib-download-only` option.

   ```
   java -jar oci_install.jar -libdir '/home/oracle/OPC/lib' -lib-download-only
   ```

2. After you install the backup module, add the `OPC_CONTAINER` parameter, the `OPC_TEMP_CONTAINER` parameter, and the bucket names in `opcSID.ora`.

   This example specifies the immutable bucket `sales_db` and the temporary metadata bucket `sales_db_temp` in the `opcSID.ora` file:

   ```
   OPC_CONTAINER=sales_db
   OPC_TEMP_CONTAINER=sales_db_temp
   ```

3. In the OCI Console, review the retention rule applied on the immutable bucket to ensure that you have specified the exact duration for which you want to prevent any modification to backups. Lock the rule, if necessary.

   > ⓘ **Note**
   >
   > Ensure that the duration you specify in a retention rule is shorter than the RMAN recovery window period. RMAN issues an error while trying to delete an expired backup that exists in the retention period.

If you use the Oracle Database Backup Cloud Service Module for OCI Classic, use a similar procedure to install the backup module, and then add the `OPC_CONTAINER` parameter, the `OPC_TEMP_CONTAINER` parameter, and the container names in `opcSID.ora`.

Related Topics

• [Installing the Backup Module for Oracle Database Backup Cloud Service](#)
  To use Oracle Database Backup Cloud Service for Oracle database backups, you'll need to install the appropriate backup module needed for cloud backups.

• [Files Created when Oracle Database Cloud Backup Module for OCI is Installed](#)
  After you run the installer for the Oracle Database Cloud Backup Module for OCI, make sure the required files are on your system.

• [Oracle Cloud Infrastructure Object Storage](#)

4

Backing Up to Oracle Database Backup Cloud Service

After you install the required backup module and configure Recovery Manager (RMAN) settings, you can create backups using familiar RMAN commands.

Information about your cloud backups is maintained in the database control file, and in the recovery catalog if you use one.

Encryption is required to back up to Oracle Database Backup Cloud Service. You can use password encryption, Transparent Data Encryption (TDE), or dual-mode encryption, which is a combination of password and TDE.

> ⓘ **Note**
>
> Use RMAN parallelism, compression, and other best practices to speed up cloud backups and restores. For more information about optimizing performance, see the guidelines listed in [Best Practices to Optimize Cloud Backup Rates](#).

For information about performing various types of backup and restore operations, see [Backing Up and Archiving Data](#) in *Oracle Database Backup and Recovery User's Guide*.

For information about RMAN commands, see [About RMAN Commands](#) in *Oracle Database Backup and Recovery Reference*.

Topics

- [Best Practices to Optimize Cloud Backup Rates](#)
- [Prerequisites for Backups and Restores with Oracle Database Backup Cloud Service](#)
- [Backing Up to Oracle Database Backup Cloud Service Using Password Encryption](#)
- [Backing Up to Oracle Database Backup Cloud Service Using Transparent Data Encryption (TDE)](#)
- [Backing Up to Oracle Database Backup Cloud Service Using Dual-Mode Encryption](#)
- [Using the Weekly Full and Daily Incremental Backup Strategy](#)
- [Backing Up from the Fast Recovery Area (FRA) to Oracle Database Backup Cloud Service](#)
- [Monitoring Your Storage Capacity](#)
- [Extracting Backup Metadata from OCI Object Storage](#)
- [Best Practices to Optimize Cloud Backup Rates](#)
  Because cloud backups are sent over the public internet, backup performance is affected by network bandwidth limitations. Use RMAN parallelism and compression to speed up cloud backups and restores.

- [Prerequisites for Backups and Restores with Oracle Database Backup Cloud Service](#)
  Certain prerequisite steps must be completed before you can back up to or restore from Oracle Database Backup Cloud Service.

- [Backing Up to Oracle Database Backup Cloud Service Using Password Encryption](#)
  You can use password encryption to back up to Oracle Database Backup Cloud Service. The password must be specified each time you back up and restore.

- [Backing Up to Oracle Database Backup Cloud Service Using Transparent Data Encryption (TDE)](#)
  You can use Transparent Data Encryption (TDE) to back up to Oracle Database Backup Cloud Service. With TDE you don't need to provide a password every time you create or restore a backup.

- [Backing Up to Oracle Database Backup Cloud Service Using Dual-Mode Encryption](#)
  You can use dual-mode encryption to back up to Oracle Database Backup Cloud Service. Dual-mode encryption is a combination of password encryption and Transparent Data Encryption (TDE).

- [Backing Up from the Fast Recovery Area (FRA) to Oracle Database Backup Cloud Service](#)
  You can back up image copies and backup sets from the fast recovery area (FRA) to Oracle Database Backup Cloud Service.

- [Using the Weekly Full and Daily Incremental Backup Strategy](#)
  The weekly full and daily incremental backup strategy is set up once. Backups continue to be created forever and they can be used to perform restore or recovery operations when required.

- [Monitoring Your Storage Capacity](#)
  When you subscribe to Oracle Database Backup Cloud Service you purchase the amount of storage capacity you want for your backups. If you reach your storage capacity limit and try to back up your database, your backup will fail.

- [Extracting Backup Metadata from OCI Object Storage](#)
  Use this procedure to extract the backup metadata from OCI Object Storage and store the information in an XML file.

Best Practices to Optimize Cloud Backup Rates

Because cloud backups are sent over the public internet, backup performance is affected by network bandwidth limitations. Use RMAN parallelism and compression to speed up cloud backups and restores.

To optimize performance:

- Use multiple RMAN channels for higher parallelism, which results in full utilization of the network. You can configure as many RMAN channels as you want. For example, the following configuration uses eight channels in parallel to back up to the cloud:

  ```
  RMAN> CONFIGURE DEVICE TYPE sbt PARALLELISM 8;
  ```

  Try increasing the parallelism until you find the optimal transfer rate.

- Use an RMAN compression level of MEDIUM.

- Use multisection backups. With these, multiple RMAN channels are used in parallel to back up large data files in separate sections.

  You create multisection backups by specifying the `SECTION SIZE` parameter with the `BACKUP` command. For example, the following command specifies a backup section size of 1 GB:

```
RMAN> BACKUP DEVICE TYPE sbt DATABASE SECTION SIZE 1g;
```

- Use a backup strategy of weekly full and daily incremental backups. This results in faster backups and could save a significant amount of network bandwidth. Use the RMAN fast incremental backup feature (based on block change tracking) to optimize the performance of your daily incremental backups.

- Also note it is recommended practice to include the RMAN format string `%d` and `%U` to ensure uniqueness.

- Use a recovery catalog to store long-term backups. For information about recovery catalogs, see Managing a Recovery Catalog in *Oracle Database Backup and Recovery User's Guide*.

> ⓘ **Note**
>
> You can test network throughput by using the throughput measurement tool. See Testing Network Throughput in *Managing and Monitoring Oracle Cloud*.

Prerequisites for Backups and Restores with Oracle Database Backup Cloud Service

Certain prerequisite steps must be completed before you can back up to or restore from Oracle Database Backup Cloud Service.

Prerequisites

- Install the backup module that corresponds to the destination in which backups must be stored.

  – To create backups to Oracle Cloud Infrastructure, install the Oracle Database Cloud Backup Module for OCI. Backups created using this module are stored in Oracle Cloud Infrastructure Object Storage. See Installing the Oracle Database Cloud Backup Module for OCI.

  – To create backups to Oracle Cloud Infrastructure Classic, install the Oracle Database Cloud Backup Module for OCI Classic. Backups created using this module are stored in Oracle Cloud Infrastructure Object Storage Classic. See Installing the Oracle Database Cloud Backup Module for OCI Classic.

- Configure an RMAN channel that will be used to create the required backups.

  To configure channels, see Configuring Channels for Backup and Recovery Operations. To configure other backup settings, see Configuring Settings for Using Oracle Database Backup Cloud Service.

  To automatically move infrequently-used backups to archive storage, see Configuring Automatic Archival to Oracle Cloud Infrastructure Classic.

Backing Up to Oracle Database Backup Cloud Service Using Password Encryption

You can use password encryption to back up to Oracle Database Backup Cloud Service. The password must be specified each time you back up and restore.

Prerequisites

See Prerequisites for Backups and Restores with Oracle Database Backup Cloud Service for prerequisites.

Procedure

1. Specify the password that must be used to encrypt backups. Use the `SET ENCRYPTION` command.

2. Back up the database using the `BACKUP DATABASE` command. Include archived redo log files, if required.

> ⓘ **Note**
>
> If you forget or lose the password, you won't be able to restore the backup.

The following example configures password encryption for the backup and creates a backup of the entire database:

```
RMAN> SET ENCRYPTION ON IDENTIFIED BY 'my_pswd' ONLY;
RMAN> BACKUP DEVICE TYPE sbt DATABASE;
```

For information about restoring and recovering backups, see Restoring Backups from Oracle Database Backup Cloud Service.

Backing Up to Oracle Database Backup Cloud Service Using Transparent Data Encryption (TDE)

You can use Transparent Data Encryption (TDE) to back up to Oracle Database Backup Cloud Service. With TDE you don't need to provide a password every time you create or restore a backup.

Prerequisites

To back up using TDE you need to have a TDE wallet (TDE keystore), which is different from the OPC wallet that stores Oracle Database Backup Cloud Service credentials.

See Prerequisites for Backups and Restores with Oracle Database Backup Cloud Service for prerequisites.

Procedure

To create a TDE wallet if you don't already have one:

1. Add the following line to the `sqlnet.ora` file:

   ```
   ENCRYPTION_WALLET_LOCATION=
     (SOURCE=(METHOD=FILE)(METHOD_DATA=
       (DIRECTORY=path_to_TDE_wallet)))
   ```

   where `path_to_TDE_wallet` is the location where the TDE wallet is to be created; this must be different from the OPC wallet location.

2. Start SQL*Plus as sys:

   ```
   sqlplus / as sysdba
   ```

3. Create the TDE wallet in the location specified in `sqlnet.ora`:

   ```
   SQLPLUS> alter system set encryption key identified by "TDE-password";
   ```

   where `TDE-password` is the password that must be used to open the TDE wallet.

4. Whenever the database is restarted, open the TDE wallet with the following command:

   ```
   SQLPLUS> alter system set encryption wallet open identified by "TDE-password";
   ```

For complete information about TDE, see Using Transparent Data Encryption in *Oracle Database Advanced Security Guide*.

To back up an Oracle database that uses TDE:

1. Connect Recovery Manager (RMAN) to the target database to be backed up and configure encryption for the database:

   ```
   RMAN> SET ENCRYPTION ON;
   ```

2. Back up the database:

   ```
   RMAN> BACKUP DATABASE;
   ```

For information about restoring and recovering backups, see Restoring Backups from Oracle Database Backup Cloud Service.

Backing Up to Oracle Database Backup Cloud Service Using Dual-Mode Encryption

You can use dual-mode encryption to back up to Oracle Database Backup Cloud Service. Dual-mode encryption is a combination of password encryption and Transparent Data Encryption (TDE).

Prerequisites

See Prerequisites for Backups and Restores with Oracle Database Backup Cloud Service for prerequisites.

Procedure

1. Enable encryption using the `SET ENCRYPTION` command.

   If TDE is configured for the Oracle database you're backing up, omit the `ONLY` keyword with the `SET ENCRYPTION` command to indicate the backup is protected with both a password and the configured transparent encryption.

2. Back up the database using the `BACKUP DATABASE` command. Include archived redo log files, if required.

> ⓘ **Note**
>
> If you forget or lose the password, you won't be able to restore the backup.

For information about restoring and recovering backups, see [Restoring Backups from Oracle Database Backup Cloud Service](#).

The following commands create a back up of the entire database by using dual-mode encryption.

```
RMAN> SET ENCRYPTION ON IDENTIFIED BY 'my_pswd';
RMAN> BACKUP DEVICE TYPE sbt DATABASE;
```

Backing Up from the Fast Recovery Area (FRA) to Oracle Database Backup Cloud Service

You can back up image copies and backup sets from the fast recovery area (FRA) to Oracle Database Backup Cloud Service.

Prerequisites

See [Prerequisites for Backups and Restores with Oracle Database Backup Cloud Service](#) for prerequisites.

Procedure

To back up image copies from FRA to Oracle Database Backup Cloud Service, use these commands:

```
RMAN> BACKUP RECOVERY AREA;
RMAN> BACKUP DEVICE TYPE sbt COPY OF DATABASE;
RMAN> BACKUP RECOVERY FILES;
RMAN> BACKUP RECOVERY FILE DESTINATION;
```

To back up backup sets from FRA to Oracle Database Backup Cloud Service, use this command:

```
RMAN> BACKUP DEVICE TYPE sbt BACKUPSET ALL;
```

For information about restoring and recovering backups, see [Restoring Backups from Oracle Database Backup Cloud Service](#).

Using the Weekly Full and Daily Incremental Backup Strategy

The weekly full and daily incremental backup strategy is set up once. Backups continue to be created forever and they can be used to perform restore or recovery operations when required.

To configure a weekly full and daily incremental backup strategy:

1. Configure an RMAN channel that corresponds to the destination to which you want to save backups. See [Configuring Channels for Backup and Recovery Operations](#).
2. Configure autobackups for the control file. See [Configuring Recovery Manager (RMAN) Settings](#).

3. Configure any additional optimizations such as compression, parallelism, or multisection backups. See Best Practices to Optimize Cloud Backup Rates.

4. Set up the backup strategy using the following commands:

```
BACKUP INCREMENTAL LEVEL 0 DATABASE PLUS ARCHIVELOG NOT BACKED UP DELETE
INPUT;
BACKUP INCREMENTAL LEVEL 1 DATABASE PLUS ARCHIVELOG NOT BACKED UP DELETE
INPUT;
```

Monitoring Your Storage Capacity

When you subscribe to Oracle Database Backup Cloud Service you purchase the amount of storage capacity you want for your backups. If you reach your storage capacity limit and try to back up your database, your backup will fail.

You can quickly increase the limit by purchasing more capacity on demand. Once you buy more capacity, you can continue doing backups. You can also free up space by using RMAN to delete obsolete backups.

You can monitor how much storage capacity you've used by viewing detailed metrics about your usage. If your backups are stored in Object Storage Classic, use the Infrastructure Classic Console. If your backups are stored in Object Storage, use the Cost Analysis tools. See Monitor Your billing Data in *Oracle Cloud Managing and Monitoring Oracle Cloud* or Checking Your Balance and Usage in the *Oracle Cloud Infrastructure* documentation or .

You can also check the capacity used by your account or under a container by using cURL.

Example commands for Oracle Cloud Infrastructure Classic:

```
# curl -v -s -X GET
       -H "X-Storage-User: service-identitydomain:userid"
       -H "X-Storage-Pass: password"
       https://identitydomain.storage.oraclecloud.com/auth/v1.0
```

Use the `Auth–Token` entry to get the header information:

```
# curl -v -X HEAD
       -H "X-Auth-Token: auth-token"
       https://identitydomain.storage.oraclecloud.com/v1/service-identitydomain
```

Example output (pertinent details in bold):

```
< HTTP/1.1 204 No Content
< X-Account-Container-Count: 2
< X-Account-Object-Count: 567
* Server Oracle-Storage-Cloud-Service is not blacklisted
< Server: Oracle-Storage-Cloud-Service
< X-Account-Meta-Policy-Georeplication: us2
< X-Account-Meta-Policy-Archive: arch-us2
< X-Timestamp: 1446492266.33718
< X-Account-Bytes-Used: 7884540569
< X-Account-Meta-Quota-Bytes: 536870912000
< Accept-Ranges: bytes
< X-Trans-Id: txeb611621958647a681cd6-0056a4404bga
< Date: Sun, 24 Jan 2016 03:08:59 GMT
< Connection: keep-alive
< X-Storage-Class: Standard
< X-Container-Meta-Policy-Georeplication: us2
```

```
< X-Last-Modified-Timestamp: 1446492266.33718
< Content-Type: text/plain;charset=UTF-8
```

Example output for a tiering container (pertinent details in bold):

```
< HTTP/1.1 204 No Content
< X-Container-Object-Count: 0
< X-Container-Write: myIdentity4.Storage.Storage_ReadWriteGroup
< Accept-Ranges: bytes
< X-Timestamp: 1531949125.70314
< X-Container-Read:
myIdentity4.Storage.Storage_ReadOnlyGroup,myIdentity3.Storage.Storage_ReadWrit
eGroup
< X-Container-Bytes-Used: 0
< X-Trans-Id: tx0d71e235b8814b94b197b-005b4fb04ega
< Date: Wed, 18 Jul 2018 21:25:34 GMT
< Connection: keep-alive
< X-Storage-Class: Standard
< Container-Meta-Policy-Georeplication: uscom-central-1
< Container-Policies-Enabled: tiering
< Last-Modified-Timestamp: 1531949125.70314
< Content-Type: text/plain;charset=utf-8
< Server: Oracle-Storage-Cloud-Service
```

Extracting Backup Metadata from OCI Object Storage

Use this procedure to extract the backup metadata from OCI Object Storage and store the information in an XML file.

If your database backups are stored in OCI Object Storage, then you can use the `odbsrmt.py` tool to manually extract the backup metadata into an XML file.

The `odbsrmt.py` file and the associated readme are both located in the Oracle home directory (`ORACLE_HOME/rdbms/admin`) of the target database.

1. On the database server, install the Oracle Database Cloud Backup Module for OCI Classic module if you are using the Swift APIs to access Object Storage. If you are using the OCI native endpoints, then install the Oracle Database Cloud Backup Module for OCI module.

2. Run the `odbsrmt.py` tool on the database server by providing the mandatory parameters and their values.

   - If you are using the Swift APIs to access an Object Storage bucket, then provide these mandatory parameters and values to generate a backup metadata XML file.

     ```
     --mode=rman-listfile
     --ocitype=classic
     --credential=user name for your cloud backup module for OCI Classic
     account/password
     --host=REST endpoint for the OCI Classic account
     --container=Name of the storage container that contains the source
     database backups
     --forcename=Specify a name for the metadata XML file
     --dir=Directory to store the metadata XML file
     ```

```
--dbid=The DBID of the source database
--prefix=The common prefix used in the backup piece names
```

- If you are using the OCI native APIs to access an Object Storage bucket, then provide these mandatory parameters and values to generate the backup metadata XML file.

```
--mode=rman-listfile
--ocitype=bmc
--uocid=User OCID for the Oracle Cloud Infrastructure account
--tocid=Tenancy OCID for the Oracle Cloud Infrastructure account
--pubfingerprint=public key fingerprint
--pvtkeyfile=private key used to authenticate OCI API requests
--host=REST endpoint for the OCI account
--container=Name of the bucket that contains the source database backups
--forcename=Specify a name for the metadata XML file
--dir=Directory to store the metadata XML file
--dbid=The DBID of the source database
--prefix=The common prefix used in the backup piece names
```

- The `rman-listfile` mode generates the backup metadata in an XML file that can be read by RMAN to perform a `DUPLCIATE` operation of the source database. You can run the `DUPLICATE` command along with the `BACKUP LOCATION FROM FILE` `backup_list_file` clause to specify the XML file required for duplication. See *Backup and Recovery Reference* for more information.

- The `odbsrmt.py` tool searches a bucket or container for backup piece names that start with the specified `prefix`.

This example shows how the `odbsrmt.py` tool creates a backup metadata file `duplicate.xml` for a database backup stored in the Object Storage container `PRODBACKUPS`

```
$ $ORACLE_HOME/bin/python /home/oracle/OPC/lib/odbsrmt.py
--mode=rman-listfile
--host= https://myDomain.storage.oraclecloud.com/v1/myService-myDomain/
--ocitype=classic
--credential='myAccount@myCompany.com'/'account-password'
--container=PRODBACKUPS
--forcename=duplicate.xml
--dir=/home/oracle/OPC
--dbid=2500571935
--prefix=CloudBkp

odbsrmt.pl: ALL report output will be written to [/home/oracle/OPC/
duplicate.xml]
odbsrmt.pm: gathering information from container PRODBACKUPS...
odbsrmt.pm: object count = 10 in container PRODBACKUPS
odbsrmt.pm: scanned all entries in PRODBACKUPS
odbsrmt.pl: ALL report output has been written to [/home/oracle/OPC/
duplicate.xml]
odbsrmt.pl: Reporting completed
```

This example shows how the `odbsrmt.py` tool creates a backup metadata file `duplicate.xml` for a database backup stored in the Object Storage bucket `OCIBACKUPS`

```
python ./ocilib/odbsrmt.py
--mode=rman-listfile
--host=https://objectstorage.us-ashburn-1.oraclecloud.com
--ocitype=bmc
--
uocid=ocid1.user.oc1..aaaaaaaasd754pijuwheaq67t7tninefkn7z7aibtusj7jqac5lpm
7wm37va
--
tocid=ocid1.tenancy.oc1..aaaaaaaavjhvwf4c7q2ozzyduh7njrft58i6ts3ryjk7v83w7q
4wdr2ka
--pubfingerprint=e5:10:06:b1:fb:24:ef:db:46:21:16:20:46:jk:th:35
--pvtkeyfile=./oci_api_key.pem
--container=OCIBACKUPS
--dbid=2275063903
--forcename=duplicate.xml
--dir=/home/oracle
```

This example shows the sample contents of an XML file that contains the backup metadata.

```
<MetaData>
    <File>
        <Filename>6GJ28IEKFL_07CEC18D372F4D29E06379624664E053</Filename>
        <SetStamp>1150345378</SetStamp>
        <IsSpfile>NO</IsSpfile>
        <IsControlFile>NO</IsControlFile>
        <PieceNo>1</PieceNo>
        <Dbname>SALESDB</Dbname>
        <Dbid>3483424530</Dbid>
    </File>
    <File>
        <Filename>6GJ28IEKFL_07CEC18D374B4D29E06379624664E053</Filename>
        <SetStamp>1150345398</SetStamp>
        <IsSpfile>NO</IsSpfile>
        <IsControlFile>NO</IsControlFile>
        <PieceNo>1</PieceNo>
        <Dbname>SALESDB</Dbname>
        <Dbid>3483424530</Dbid>
    </File>
    <File>
        <Filename>6GJ28IEKFL_07CEC1A625064D36E0637962466444CD</Filename>
        <SetStamp>1150345378</SetStamp>
        <IsSpfile>NO</IsSpfile>
        <IsControlFile>NO</IsControlFile>
        <PieceNo>1</PieceNo>
        <Dbname>SALESDB</Dbname>
        <Dbid>3483424530</Dbid>
    </File>
    <File>
        <Filename>6GJ28IEKFL_07CEC1A6254D4D36E0637962466444CD</Filename>
        <SetStamp>1150345451</SetStamp>
        <IsSpfile>NO</IsSpfile>
```

```
                    <IsControlFile>NO</IsControlFile>
                    <PieceNo>1</PieceNo>
                    <Dbname>SALESDB</Dbname>
                    <Dbid>3483424530</Dbid>
                </File>
            </MetaData>
```

5

Restoring Backups from Oracle Database Backup Cloud Service

You can use standard Recovery Manager (RMAN) commands to perform restore and recovery operations from Oracle Database Backup Cloud Service. You'll also use RMAN to specify retention policies, perform crosschecks, and delete backups.

A few possible scenarios are addressed here. For complete information about using RMAN to perform various types of restore and recovery operations, see Diagnosing and Responding to Failures in *Oracle Database Backup and Recovery User's Guide*. For information about RMAN commands, see About RMAN Commands in *Oracle Database Backup and Recovery Reference*. The concepts and commands in these RMAN guides are applicable to the database backed up to Oracle Database Backup Cloud Service.

Topics

- Best Practices for Cloud Restores

- Performing General Restore and Recovery Operations

- Recovering Databases from Archive Storage

- Restoring to a New Database Host

- Creating a Data Guard Standby Database in Oracle Cloud

- Best Practices for Cloud Restores
  Recovery best practices ensure that, in the event of a failure, backups required to recover your Oracle database are available and usable.

- Performing General Restore and Recovery Operations
  Oracle database backups stored in the cloud can be restored and recovered using Recovery Manager (RMAN). All RMAN restore and recovery operations are supported with cloud backups.

- Recovering Databases from Archive Storage
  Oracle database backups stored in archive storage can be restored and recovered using Recovery Manager (RMAN).

- Restoring to a New Database Host
  If there's a site failure and your database servers are down, you can use the backups in the cloud to restore to a new host. The following example shows how to restore backups from Oracle Database Backup Cloud Service to a new host.

- Creating a Data Guard Standby Database in Oracle Cloud
  To deploy a disaster recovery site for an on-premises production database using Oracle Database Cloud Service or Oracle Database Exadata Cloud Service, you need to create a standby database in the cloud to be used with Oracle Data Guard or Oracle Active Data Guard.

Best Practices for Cloud Restores

Recovery best practices ensure that, in the event of a failure, backups required to recover your Oracle database are available and usable.

Use the following recovery best practices:

- Crosscheck your backups periodically

  Use the RMAN `CROSSCHECK` command to crosscheck backups. It is recommended that you crosscheck backups before you run a `DELETE OBSOLETE` command. Crosschecking marks missing backup sets or backup pieces as expired in the RMAN repository, but does not delete or remove the actual files. Any backup sets and backup pieces marked as expired are excluded from subsequent backup, restore, and recover operations.

  After a `CROSSCHECK` command, you can review and confirm any missing backup files using he `REPORT EXPIRED` command. Subsequently, running a `DELETE EXPIRED` command deletes expired backups from the RMAN repository.

- Validate backups to check for physical and logical corruptions

  After a backup operation, use the RMAN `BACKUP VALIDATE` command to check the data files for physical corruptions. To check for logical corruptions, include the `CHECK LOGICAL` clause in the `BACKUP VALIDATE` command.

- Verify that the backups are restorable

  Use the RMAN `BACKUP RESTORE` command to check if backups are restorable and if they contain physical or logical corruptions. The command performs a block level check of the backups and verifies that all required database files are available, thereby ensuring that an actual restore can be performed. It is recommended that you validate backups on a regular basis.

  Note that this command does not consume CPU, memory, storage, or network resources. It only reads the backup sets and checks for corruption. The data is streamed from the cloud to the on-premise database for validation purposes and is discarded after the validation. For large backup sets, this command can take longer to complete.

Performing General Restore and Recovery Operations

Oracle database backups stored in the cloud can be restored and recovered using Recovery Manager (RMAN). All RMAN restore and recovery operations are supported with cloud backups.

Before you restore backups, configure an RMAN channel that corresponds to the location where the backup that must be restored is stored. The backups can be stored in Oracle Cloud Infrastructure Object Storage or Oracle Cloud Infrastructure Object Storage Classic. For information about configuring channels, see [Configuring Recovery Manager (RMAN) Settings](#).

For example, if password encryption was used to encrypt the backup, commands for a typical restore for the entire database would look as follows, specifying the password that was used to encrypt the backup:

```
RMAN> SET DECRYPTION IDENTIFIED BY 'my_pswd';
RMAN> RESTORE DATABASE;
RMAN> RECOVER DATABASE;
```

If Transparent Data Encryption (TDE) was used to encrypt the backup, you'd specify something like this:

```
RMAN> SET ENCRYPTION ON;
RMAN> RESTORE DATABASE;
RMAN> RECOVER DATABASE;
```

Recovering Databases from Archive Storage

Oracle database backups stored in archive storage can be restored and recovered using Recovery Manager (RMAN).

Backups can be stored in Oracle Cloud Infrastructure Archive Storage or archive storage in Oracle Cloud Infrastructure Classic. Backups stored in archive storage need to be recalled first before they can be restored. You must plan in advance for restore and recover operations using backups stored in archive storage. Use `RESTORE DATABASE PREVIEW … RECALL` to initiate a recall operation for the required backups. After you begin the restore operation, if the backups are still not available to read from the archive storage, then the restore operation waits until the required backups are available. This may slow down the restore operation.

To recover a database using backups from archive storage:

1. Start RMAN and connect to the target database.

2. If the database is not mounted, then mount but do not open the database.

   For example, enter the following command:

   ```
   STARTUP MOUNT;
   ```

3. Depending on where the backups are stored, configure an RMAN channel that corresponds to Oracle Database Cloud Backup Module for OCI or Oracle Database Cloud Backup Module for OCI Classic. See Configuring Recovery Manager (RMAN) Settings.

4. Provide information required to decrypt the backups.

   - If password or dual-mode encryption was used to create the backups, provide the encryption password using the following syntax:

     ```
     RMAN> SET DECRYPTION IDENTIFIED BY encryption_password;
     ```

   - If Transparent Data Encryption (TDE) with a password-protected software keystore was used to create the backups, ensure that the keystore that contains the encryption key is open.

     The following command, in SQL*Plus, opens a password-protected keystore:

     ```
     ADMINISTER KEY MANAGEMENT SET KEYSTORE OPEN IDENTIFIED BY 'password';
     ```

5. Preview the backups required for the restore operation using the `PREVIEW` option of the `RESTORE` command.

   The following command previews backups that will be used for the restore operation:

   ```
   RESTORE DATABASE PREVIEW;
   ```

   The output displays a detailed list of the backup pieces that will be used in the restore operation and the location of these backup pieces (standard Object Storage or Archive Storage). If any backup pieces are in Archive Storage, the output indicates that these are remote files.

6. Recall the required backups from archive storage using the `RECALL` option in the `RESTORE` command.

The following command recalls database backups from archive storage:

```
RESTORE DATABASE PREVIEW RECALL;
```

7. Restore and recover the database using the following commands:

```
RESTORE DATABASE;
RECOVER DATABASE;
```

Related Topics

• *Oracle Database Backup and Recovery User's Guide*

Restoring to a New Database Host

If there's a site failure and your database servers are down, you can use the backups in the cloud to restore to a new host. The following example shows how to restore backups from Oracle Database Backup Cloud Service to a new host.

> ⓘ **Note**
>
> If you want to restore the database to an Oracle Database Cloud Service database deployment (non-Virtual Image), see Creating a Database Deployment Using a Cloud Backup in *Using Oracle Database Cloud Service*. Otherwise, use the following steps to restore to a new host. You would also use these steps to restore to Oracle Database Cloud Service - Virtual Image database deployments.

To perform the steps in this example, the new host must have the following:

• Internet connectivity to connect to Oracle Database Backup Cloud Service

• A compatible operating system with the same endian format as the source host

• The same version of Oracle Database software as the source host

  If the new host has a higher version of Oracle software, ensure that there is a supported upgrade path between the Oracle Database version on the source host and the destination host. Then, perform the steps required to upgrade the destination database after the RMAN restore.

You must also know the following:

• DBID of the source database

• Password used to encrypt the backup if password-based encryption was used

• TDE encryption wallet from the source database if TDE encryption was used

To restore from a cloud backup stored using Oracle Cloud Infrastructure or Oracle Cloud Infrastructure Classic to a new host:

1. Install the Oracle Database Cloud Backup Module for OCI or Oracle Database Cloud Backup Module for OCI Classic on the new host using the same subscription credentials and custom container (if any) used for the backup. For information about installing the module, see Downloading and Installing the Oracle Database Cloud Backup Module for

[OCI](#) or [Downloading and Installing the Oracle Database Cloud Backup Module for OCI Classic](#).

For example, with Oracle Cloud Infrastructure Classic, the service name (`-serviceName`), identity domain (`-identityDomain`), user name (`-opcId`), password (`-opcPass`), and container name (`-container`), if you used a custom container, must be the same. With Oracle Cloud Infrastructure, the tenancy OCID (`-tOCID`), user OCID (`-uOCID`), and bucket (`-bucket`), if you used a custom bucket, must be the same.

2. On the new host, connect to Recovery Manager (RMAN), set the decryption password, set the DBID, and restore the SPFILE.

For example:

```
rman target /
RMAN> STARTUP NOMOUNT;
RMAN> SET DECRYPTION IDENTIFIED BY 'my_bkup_pwd';
RMAN> SET DBID=3389098001;
RMAN> RUN {
ALLOCATE CHANNEL t1 DEVICE TYPE sbt PARMS 'SBT_LIBRARY=libopc.so
ENV=(OPC_PFILE=/u01/app/oracle/product/12.1.0/dbhome_1/dbs/opcDUP.ora)';
RESTORE SPFILE TO PFILE '/u01/app/oracle/product/12.1.0/dbhome_1/dbs/initDUP.ora'
FROM AUTOBACKUP;
}
```

The same password used to encrypt the backup must be used for restore and recovery operations.

If the TDE wallet was used to encrypt the backup, the wallet must be copied to the new host and the wallet location must be set in the `sqlnet.ora` file before restoration is started. For details, see relevant information in My Oracle Support Doc ID 1560327.1 at http://support.oracle.com. Also, use `SET ENCRYPTION ON;` instead of `SET DECRYPTION IDENTIFIED BY 'my_bkup_pwd';` as shown in the example above.

3. Edit the PFILE to reflect the new host, changing control file locations, create and recovery file destinations, and audit file destinations. For example, change the `*_dest` parameters so all destinations are correct, change the `control_files` parameter, and so on. If necessary, create the relevant directories on the new host.

4. Shut down the target database instance on the new host, restart the instance to the `NOMOUNT` state, restore the control file, and mount the database.

For example:

```
RMAN> SHUTDOWN IMMEDIATE;
RMAN> STARTUP NOMOUNT;
RMAN> RUN {
ALLOCATE CHANNEL t1 DEVICE TYPE sbt PARMS 'SBT_LIBRARY=libopc.so
ENV=(OPC_PFILE=/u01/app/oracle/product/12.1.0/dbhome_1/dbs/opcDUP.ora)';
RESTORE CONTROLFILE FROM AUTOBACKUP;
}
RMAN> ALTER DATABASE MOUNT;
```

5. If necessary, use the `SET NEWNAMES` command to define a new location for the restored data file (Oracle Database 10g and later) or database (Oracle Database 11g and later), and then start the restoration and recovery.

For example:

```
RMAN> RUN {
SET NEWNAME FOR DATABASE TO '/u02/app/oracle/oradata/DUP/%U';
ALLOCATE CHANNEL t1 DEVICE TYPE sbt PARMS 'SBT_LIBRARY=libopc.so
ENV=(OPC_PFILE=/u01/app/oracle/product/12.1.0/dbhome_1/dbs/opcDUP.ora)';
ALLOCATE CHANNEL t2 DEVICE TYPE sbt PARMS 'SBT_LIBRARY=libopc.so
```

```
ENV=(OPC_PFILE=/u01/app/oracle/product/12.1.0/dbhome_1/dbs/opcDUP.ora)';
ALLOCATE CHANNEL t3 DEVICE TYPE sbt PARMS 'SBT_LIBRARY=libopc.so
ENV=(OPC_PFILE=/u01/app/oracle/product/12.1.0/dbhome_1/dbs/opcDUP.ora)';
RESTORE DATABASE;
SWITCH DATAFILE ALL;
SQL "ALTER DATABASE RENAME FILE ''+DATA/ASMDEMO1/ONLINELOG/group_3.263.873380343''
TO ''/u04/app/oracle/redo/redo03.log''";
SQL "ALTER DATABASE RENAME FILE ''+FRA/ASMDEMO1/ONLINELOG/group_3.260.873380343'' TO
''/u04/app/oracle/redo/redo01.log''";
SQL "ALTER DATABASE RENAME FILE ''+DATA/ASMDEMO1/ONLINELOG/group_2.262.873380341''
TO ''/u04/app/oracle/redo/redo02.log''";
SQL "ALTER DATABASE RENAME FILE ''+FRA/ASMDEMO1/ONLINELOG/group_2.259.873380341'' TO
''/u04/app/oracle/redo/redo04.log''";
SQL "ALTER DATABASE RENAME FILE ''+DATA/ASMDEMO1/ONLINELOG/group_1.261.873380341''
TO ''/u04/app/oracle/redo/redo05.log''";
SQL "ALTER DATABASE RENAME FILE ''+FRA/ASMDEMO1/ONLINELOG/group_1.258.873380341'' TO
''/u04/app/oracle/redo/redo06.log''";
}
```

6. Find the system change number (SCN) to make the database consistent:

   ```
   RMAN> RESTORE DATABASE PREVIEW DEVICE TYPE SBT;
   ```

   The output includes the name and location of backup pieces that will be used when restoring the database.

7. Recall any required backup pieces that were archived.

   If the `RESTORE...PREVIEW` command output contains a section named *List of remote backup files*, it means that some required backup pieces were archived. Recall these backup pieces using the following command:

   ```
   RMAN> RESTORE DATABASE PREVIEW RECALL DEVICE TYPE SBT;
   ```

8. Restore the database using the following command:

   ```
   RESTORE DATABASE DEVICE TYPE SBT;
   ```

9. Recover the database to that point:

   ```
   RMAN> RECOVER DATABASE DEVICE TYPE SBT UNTIL SCN scn;
   ```

   where `scn` is the SCN identified in the previous step.

   For Oracle Database 12c Release 2 (12.2) and higher, you can use the `RECOVER DATABASE UNTIL AVAILABLE REDO` command.

10. Open the database with the `RESETLOGS` option after restore and recovery is complete:

    ```
    RMAN> ALTER DATABASE OPEN RESETLOGS;
    ```

Creating a Data Guard Standby Database in Oracle Cloud

To deploy a disaster recovery site for an on-premises production database using Oracle Database Cloud Service or Oracle Database Exadata Cloud Service, you need to create a standby database in the cloud to be used with Oracle Data Guard or Oracle Active Data Guard.

One way to create a standby database is to restore the backup performed from the on-premises production database.

6

Troubleshooting Oracle Database Backup Cloud Service

You might encounter some problems when you use Oracle Database Backup Cloud Service.

This section lists common problems and their possible solutions.

Also see the Oracle Database Backup Cloud Service FAQ (My Oracle Support Doc ID 1640149.1) and Cloud Backup Performance Analysis (My Oracle Support Doc ID 2078576.1) at `http://support.oracle.com`.

Topics

- [Problems with Installing the Backup Module](#)

- [Problems with Backing Up and Restoring](#)

- [Problems with Connectivity](#)

- [Problems with Installing the Backup Module](#)
  The following solutions apply if you run into issues when you install the Oracle Database Cloud Backup Module.

- [Problems with Backing Up and Restoring](#)
  The following solutions apply if you run into issues when you perform cloud backup and restore operations.

- [Problems with Connectivity](#)
  The following solution applies if you run into issues when you try to connect to Oracle Database Backup Cloud Service.

Problems with Installing the Backup Module

The following solutions apply if you run into issues when you install the Oracle Database Cloud Backup Module.

For general information about installation, see [Installing the Oracle Database Cloud Backup Module for OCI](#) or [Installing the Oracle Database Cloud Backup Module for OCI Classic](#).

> ⓘ **Note**
>
> In addition to what's listed in this section, also check the following:
>
> - **Java SE Development Kit (JDK):** Default JDK version supported by the target Oracle Database release.
>
> - **Identity domain name or service name:** Make sure they're spelled correctly
>
> - **Backup module:** Make sure you've downloaded the latest backup module from Oracle Technology Network (OTN)
>
> - **Proxy or firewall issues:** Make sure your proxy is set up correctly, and you can reach general URLs from your system

I get a `Request to set the lifecycle policy failed` error

Specific error:

```
Exception in thread "main" java.lang.RuntimeException:
SetBucketLCP: 400 Bad Request. at
oracle.backup.opc.install.BmcConfig.SetBucketLCP(BmcConfig.java:851)
  at oracle.backup.opc.install.BmcConfig.setBucket(BmcConfig.java:620)
  at oracle.backup.opc.install.BmcConfig.doBmcConfig(BmcConfig.java:236)
  at oracle.backup.opc.install.BmcConfig.main(BmcConfig.java:219)
Failed: 1 ()
```

`SetbucketLCP` is setting the lifecycle policy on the bucket, which means `enableArchive` was set to True. But the Object Storage service in the region was not granted the permission to manage objects, and hence the request to set the lifecycle policy failed.

Authorize the Object Storage service to move backups to Archive Storage. See *Service Permissions* in the [Required IAM Policies](#) section of the Oracle Cloud Infrastructure documentation.

I get an `HTTP response code` error when I run the installer for Oracle Cloud Infrastructure Classic

Specific error:

```
Server returned HTTP response code: 504 for URL:
https://identityDomain.storage.oraclecloud.com/v1/storage-identityDomain/?format=xml
```

Use the `-host` parameter when you run the installer, instead of the `-serviceName` and `-identityDomain` parameters. For example:

```
-host https://abc.storage.oraclecloud.com/v1/hr-abc
```

Exclude `/?format=xml` at the end of the URL. For information about these parameters, see [Parameters Used to Run the Oracle Database Cloud Backup Module for OCI Classic Installer](#).

I get a `ConfigFile was not specified` error when I run the installer

Specific error:

```
ConfigFile was not specified, and a default location could not be
determined because ORACLE_HOME and ORACLE_SID are not both set.
```

Set `ORACLE_HOME` and `ORACLE_SID` and rerun the installer.

I get a `Specified directory does not exist` error when I run the installer

Specific error:

```
Specified directory /home/oracle/OPC/lib does not exist.
```

The directory specified for the `-libDir` parameter does not exist. Create the directory and rerun the installer.

I get a `java.io.IOException` or `java.io.FileNotFound` error when I run the installer

For example:

```
java.io.IOException: Server returned HTTP response code: 401 for
the URL URL-name
```

The installer can't connect to Oracle Cloud with the information you provided. Try the following:

- Make sure the user name, password, service name, and identity domain used to run the installer are correct. With Oracle Cloud Infrastructure, make sure that the user OCID, tenancy OCID, fingerprint, and keys are correct.

  Enclose the user name and password in single quotes, for example `'myAccount@myCompany.com'` and `'opc_pswd'`. On Windows systems, use double quotes if the user name or password contains special characters.

  Fix any errors and rerun the installer. If the information you provided is correct, contact Oracle Support to verify your account information.

  > ⓘ **Note**
  >
  > If you have a pre-paid metered subscription for Oracle Cloud Infrastructure Classic, the default service name is `Storage` (case sensitive). This is the name you'll use for the `-serviceName` parameter when you install the backup module.

- Check connectivity and see if you can reach the cloud storage endpoint URL from your database server. For example:

  ```
  $ ping storage.us2.oraclecloud.com
  PING storage.us2.oraclecloud.com (160.34.0.51): 56 data bytes
  64 bytes from 160.34.0.51: icmp_seq=0 ttl=239 time=63.738 ms
  64 bytes from 160.34.0.51: icmp_seq=1 ttl=239 time=67.288 ms
  ```

I get a `Could not authenticate` or `403 Forbidden` error when I run the installer for Oracle Cloud Infrastructure Classic

This could be because you need to select a data center. See How to Begin with Oracle Database Backup Cloud Service Subscriptions.

The replication policy must be set before you run the backup module installer. Otherwise you'll get errors such as `Could not authenticate to Oracle Database Cloud Backup Module` or `403 Forbidden`. Set the replication policy and wait at least 10 minutes for synchronization to complete before you retry the installation.

I get a `Failed to load Media Management Library` error

If you're on a Windows system and keep getting System or Media Management Loading errors, your Windows environment could be missing C libraries needed by the RMAN backup

module. Download the Redistributable Package for Visual Studio 2013 from https://www.microsoft.com/en-us/download/details.aspx?id=40784. Choose the 64-bit version and run the downloaded EXE file. This should resolve the problem.

If the problem persists, run the following operating system command (all platforms):

```
sbttest -f foo.txt -libname full-path-to-libopc|oraopc-library
```

The output shows why the module is not being loaded.

I'm using a Solaris 64-bit operating system and keep getting `ORA-27211 - Failed to load Media Management Library`

Installation is most likely failing because the `libc.so.1` file does not exist in your environment. Confirm this by running the following operating system command:

```
sbttool -f foo.txt -libname full-path-to-libopc.so
```

To resolve the issue, set the operating system variable `LD_LIBRARY_PATH_64` to the 64-bit library path that has the `libc.so.1` file. If that doesn't resolve the issue and you're using an Oracle Solaris release earlier than Solaris 10 Update 10 (s10u10), upgrade your system to at least s10u10.

I get an `Exception in thread` error when I run the installer

Specific error:

```
Exception in thread "main" java.io.FileNotFoundException:
orclhome/dbs/opcdb1210.ora (No such file or directory)
```

The installer can't create the configuration file under the *ORACLE_HOME*/dbs directory. Make sure the directory is accessible. Also make sure the path for ORACLE_HOME is set correctly.

I get a `PKIX path building failed: unable to find valid certification path to requested target` error when I run the installer

Your database server's Java keystore does not have the SSL certificate of Oracle Cloud. You can work around this problem by using the `-no-check-certificate` option from the command line.

The wallet directory can't be created by the installer

Make sure the path you specified is correct, and the user account (`oracle`, for instance) has read/write/execute (rwx) access to that path. Alternatively, create a wallet directory and use that as the location for the `-walletDir` parameter.

I have a pre-paid metered subscription and don't know what service name to use to install the Oracle Database Cloud Backup Module for OCI Classic

If you have a pre-paid metered subscription, the service name is `Storage` (case sensitive). This is the name you'll use for the `-serviceName` parameter when you install the backup module.

Problems with Backing Up and Restoring

The following solutions apply if you run into issues when you perform cloud backup and restore operations.

For general information about cloud backups and restores, see Backing Up to Oracle Database Backup Cloud Service and Restoring Backups from Oracle Database Backup Cloud Service.

I get an RMAN encryption error when I try to back up

Specific error:

```
RMAN-03009: failure of backup command on ORA_SBT_TAPE_1 channel at 08/15/2014 14:00:43
ORA-27030: skgfwrt: sbtwrite2 returned error
ORA-19511: non RMAN, but media manager or vendor specific failure, error text:
   KBHS-01602: backup piece 14p0jso8_1_1 is not encrypted
```

Backups must be encrypted before they can be sent to the cloud. Specify encryption and try backing up again.

I changed my password for Oracle Cloud and now my backups to Oracle Cloud Infrastructure Classic are failing

When you change your password for Oracle Cloud, you also need to update your password in the wallet used for backing up to Oracle Cloud Infrastructure Classic. Credentials in the wallet are used to authenticate to the cloud before backup data is sent. If the password isn't updated in the wallet, the backup fails because of the incorrect password.

To update the password in the wallet, rerun the Oracle Database Cloud Backup Module for OCI Classic installer with the new credentials. You can omit the `-libdir` parameter if you don't want to download the library. For more information about running the installer, see Downloading and Installing the Oracle Database Cloud Backup Module for OCI Classic.

If you're using Oracle Database Cloud Service or Oracle Database Exadata Cloud Service and use object storage for backups, you need to update the password used for backing up after you change your password for Oracle Cloud. For Database Cloud Service, see Updating the Password for Backing Up to the Storage Cloud in *Using Oracle Database Cloud Service*. For Exadata Cloud Service, see Updating the Password for Backing Up to the Storage Cloud in *Using Oracle Database Exadata Cloud Service*.

I get a `Request Entity Too Large` error when I try to back up

When you subscribe to Oracle Database Backup Cloud Service, you purchase the amount of storage capacity you want. If you reach your storage capacity limit and try to back up your database, your backup will fail. An error related to this might look as follows:

```
RMAN-00571: ===========================================================
RMAN-00569: =============== ERROR MESSAGE STACK FOLLOWS ===============
RMAN-00571: ===========================================================
RMAN-03009: failure of backup command on c1 channel at 12/02/2014 16:35:58
ORA-27030: skgfwrt: sbtwrite2 returned error
ORA-19511: Error received from media manager layer, error text:
KBHS-01404: See trace file /u01/app/oracle/admin/proddb/diag/rdbms/proddb/trace/
sbtio_5884_123456.log for details
KBHS-00700: HTTP response error 'Request Entity Too Large'
```

You can quickly increase the limit by purchasing more storage capacity on demand. Once you buy more capacity, you can continue doing backups. You can also use the RMAN `DELETE` operation to free up space. As a best practice you should set up a proper retention period and periodically run RMAN backup management operations such as `CROSSCHECK`, `OBSOLETE`, and `DELETE`.

You can monitor how much storage capacity you've used by viewing detailed metrics. You can also check the capacity used by your account or under a container by using cURL. See Monitoring Your Storage Capacity.

I'm on a Windows system and keep getting System or Media Management Loading errors when I try to back up. How do I resolve this?

Your Windows environment could be missing C libraries needed by the RMAN backup module. Download the Redistributable Package for Visual Studio 2013 from `https://www.microsoft.com/en-us/download/details.aspx?id=40784`. Choose the 64-bit version and run the downloaded EXE file. This should resolve the problem.

How do I get more information when a backup fails?

Add the following parameter to the `opcSID.ora` configuration file to enable tracing, and then rerun the RMAN command:

```
_OPC_TRACE_LEVEL=100
```

This adds trace data to the `sbtio.log` file. To disable tracing, remove the `_OPC_TRACE_LEVEL` parameter or set the value to 0.

For information about the `opcSID.ora` configuration file, see Files Created When the Oracle Database Cloud Backup Module for OCI Classic is Installed.

I get an error when I use password-based encryption for my backup

Specific error:

```
RMAN-03009: failure of backup command on ORA_SBT_TAPE_1 channel at 08/15/2014 11:10:57
ORA-19914: unable to encrypt backup
ORA-28361: master key not yet set
```

You probably didn't add the `ONLY` parameter when you specified password encryption. It should be something like this:

```
RMAN> SET ENCRYPTION ON IDENTIFIED BY 'my_pswd' ONLY;
```

I used password-based encryption for my backup and don't remember the password — how do I restore the backup?

Unfortunately, you can't. The password used to encrypt a backup must also be used to decrypt it for restore and recovery operations. If you forget or lose the password, you cannot restore the backup.

RMAN restores from another location, not the cloud

Use `SHOW ALL` to confirm that RMAN is configured to use Oracle Database Backup Cloud Service as the backup destination. See Configuring Recovery Manager (RMAN) Settings. Also check for proper syntax.

Problems with Connectivity

The following solution applies if you run into issues when you try to connect to Oracle Database Backup Cloud Service.

I get connectivity errors from my database server

This could be caused by any number of things, including network bandwidth issues and incorrect proxy settings. Test to see if you can reach general URLs from your system.