Oracle® Cloud

Migrating Oracle Database Backup Cloud Service Backups to Oracle Cloud Infrastructure

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Oracle Cloud Migrating Oracle Database Backup Cloud Service Backups to Oracle Cloud Infrastructure,

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Contents

Preface

Topics:

Audience

This document is intended for users who are considering migrating their database backups, created using Oracle Database Backup Cloud Service, from Oracle Cloud Infrastructure Object Storage Classic to Oracle Cloud Infrastructure Object Storage.

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

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Related Resources

For more information, see these Oracle resources:

- Oracle Database Backup Cloud Service documentation

  https://docs.oracle.com/en/cloud/paas/db-backup-cloud/index.html
- Oracle Cloud Infrastructure documentation

  https://docs.cloud.oracle.com/iaas/Content/home.htm
- Oracle Cloud Infrastructure Getting Started

  https://docs.cloud.oracle.com/iaas/Content/GSG/Concepts/baremetalintro.htm
- Oracle Cloud Infrastructure Object Storage Classic documentation

  https://docs.oracle.com/en/cloud/iaas/storage-cloud/index.html

- Upgrade to Oracle Cloud Infrastructure page

  https://docs.oracle.com/en/cloud/migrate-oci.html

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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Introduction to Migrating to Oracle Cloud Infrastructure

Learn how to migrate backups of your on-premise database from Oracle Cloud Infrastructure Object Storage Classic to Oracle Cloud Infrastructure Object Storage.

Topics:

Why Migrate to Oracle Cloud Infrastructure

Oracle encourages you to migrate your existing cloud resources to Oracle Cloud Infrastructure regions. You can gain several advantages by doing so.

In Oracle Cloud, you provision resources in specific regions, which are localized to geographic locations. Certain regions support the Oracle Cloud Infrastructure platform.

Oracle Cloud Infrastructure is Oracle's modern cloud platform that's based on the latest cloud technologies and standards. It provides more consistent performance and better features at lower costs. Oracle continues to invest in Oracle Cloud Infrastructure, including the addition of new regions, services, and features. See Data Regions for Platform and Infrastructure Services.

You can benefit from these additional administrative features when you migrate your cloud resources to Oracle Cloud Infrastructure:

- Organize cloud resources into a hierarchy of logical compartments.
- Create fine-grained access policies for each compartment.

To learn more, see Upgrade Your Classic Services to Oracle Cloud Infrastructure.

About Oracle Cloud Infrastructure

Get familiar with basic Oracle Cloud Infrastructure security, network, and storage concepts.

Cloud resources in Oracle Cloud Infrastructure are created in logical compartments. You also create fine-grained policies to control access to the resources within a compartment.

You create instances within an Oracle Cloud Infrastructure region. You also specify an availability domain (AD), if supported in the selected region.

A virtual cloud network (VCN) is comprised of one or more subnets, and an instance is assigned to a specific subnet. Oracle Cloud Infrastructure does not allow you to reserve specific IP addresses for platform services.

A subnet's security lists permit and block traffic to and from specific IP addresses and ports.

Instances can communicate with resources outside of Oracle Cloud by using Oracle Cloud Infrastructure FastConnect, which provides a fast, dedicated connection to your on-premises network. Alternatively, use an IPSec VPN.

A bucket in Oracle Cloud Infrastructure Object Storage can be used to store files and share them with multiple instances. A user's generated authentication token (auth token) is required to access the bucket.

To learn more, see Key Concepts and Terminology in the Oracle Cloud Infrastructure documentation.

About the Migration Scope

Learn about the scope of migrating Oracle Database Backup Cloud Service to Oracle Cloud Infrastructure.

When you use Database Backup Cloud Service to back up your on-premise database to Oracle Cloud Infrastructure Classic, the backups are stored in a container in Oracle Cloud Infrastructure Object Storage Classic. This guide describes how to migrate these backups from Oracle Cloud Infrastructure Object Storage Classic to Oracle Cloud Infrastructure. After migration, the backups are stored in a bucket in Oracle Cloud Infrastructure Object Storage.

If your recovery window is long, and backups must be retained for a long time, it is best to migrate backups using the information in this guide.

If your recovery window is short, consider retaining existing backups on Oracle Cloud Infrastructure Object Storage Classic and creating new backups to Oracle Cloud Infrastructure. To do this, you install the Oracle Database Cloud Backup Module for OCI and create backups to a bucket in Oracle Cloud Infrastructure Object Storage. Ensure that the location of the credentials wallet and the name of the configuration file are different from those used for the Oracle Database Cloud Backup Module for OCI Classic. If you need to restore backups stored on Oracle Cloud Infrastructure Object Storage Classic, allocate an RMAN channel that uses the confguration details of the Oracle Database Cloud Backup Module for OCI Classic and then perform the restore.

About the Migration Task Flow

At a high level, the migration process comprises these tasks.

1. Prepare to migrate backups from Oracle Cloud Infrastructure Object Storage Classic to Oracle Cloud Infrastructure Object Storage. See Prepare to Migrate Database Backups.
2. Migrate backups to Oracle Cloud Infrastructure Object Storage. See Migrate Database Backups to Oracle Cloud Infrastructure Object Storage.
3. Perform post-migration tasks. See Complete the Post-Migration Steps.

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Prepare to Migrate Database Backups

Before you migrate Oracle Database Backup Cloud Service to Oracle Cloud Infrastructure, plan and prepare for migration.

Topics:

Get Details of the Source Environment

Identify the user name, password, and REST Endpoint URL of the Oracle Cloud Infrastructure Object Storage Classic account from which you want to migrate data.

You can find out the user name and password from the New Account Information email that you received from Oracle Cloud when your account was set up. If you don't have your New Account Information email, ask your account administrator for your Oracle Cloud user name and password.
To identify the REST Endpoint URL:

1. Sign in to your Oracle Cloud account.
2. Open the navigation menu on the top left, select **Classic Infrastructure Services**, then **Storage Classic**.

   The Storage Classic page appears, with Containers as the current tab.
3. Note the name of the container that contains the database backups that you need to migrate.
4. Click the Account tab.

   Note down the REST Endpoint displayed in this page.

Restore Backups from Archive Storage in Oracle Cloud Infrastructure Object Storage Classic

Database backups that have been moved to an archive container in Oracle Cloud Infrastructure Object Storage Classic must be restored before they can be migrated to Oracle Cloud Infrastructure.

To restore backups from an archive container:

1. Sign in to your Oracle Cloud Infrastructure Object Storage Classic console.

2. Open the navigation menu on the left, select **Classic Infrastructure Services**, and then **Storage Classic**.
3. Select the container that stores the archived database backups.
4. Identify the archived object that you want to restore.
5. Select **Check Status**.

   The Checking current status of archive object dialog box appears with the following message:

   ```
   Currently the object is archived.
   ```

   See My Oracle Support Doc ID 2360800.1 at https://support.oracle.com for reporting on backups stored in Oracle Cloud Infrastructure Object Storage Classic without using Recovery Manager (RMAN).
6. Select **Restore** to restore the archived object.

   The following message appears:

   ```
   Are you sure you want to restore the object objectName?
   ```

7. Click **OK**.

   The following message appears:

   ```
   Restore job for objectName initiated successfully. You can check the
   Restore Status by clicking the
         Check Status button.
   ```

   By default, the object remains restored for one day, after which you must restore it again to be able to download it.
8. Click **OK**.

Set Up Your Target Environment

Install and configure the Oracle Database Cloud Backup Module for OCI.

Topics:

Install the Oracle Database Cloud Backup Module for OCI

Use the Oracle Database Cloud Backup Module for OCI to integrate Recovery Manager (RMAN) on your on-premise database with Oracle Cloud Infrastructure Object Storage.

As part of the install, you also create bucket on Oracle Cloud Infrastructure Object Storage to store your migrated backups.

Topics:

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

  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 Cloud account with access to Oracle Cloud Infrastructure Object Storage

  See 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.

- JDK 1.7 or later

  You must have JDK 1.7 or later on the system on which you plan to install the Oracle Database Cloud Backup Module for OCI. Use the following command to check your JDK version:

  ```
  java -version
  ```

- 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 `opc`*SID*`.ora` configuration file (assuming you're using the same cloud credentials for backing up all databases in the database server).
>
> Copy and rename the `opc`*SID*`.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. Parameters include the host name for the Oracle Cloud Infrastructure account and the private key used to sign Oracle Cloud Infrastructure API requests. It's best to compile this information before you run the installer.

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 required parameters. Optional parameters are also listed.

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
```

Parameter	Description	Required or Optional
`-host`	End point of the Oracle Cloud Infrastructure account.	Required
`-pvtKeyFile`	File that contains the private key used to authenticate Oracle Cloud Infrastructure API requests. The key file must be in PEM format. This private key is never transmitted outside of the computer where the installer is run.	Required

Parameter	Description	Required or Optional
`-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
`-tOCID`	Tenancy OCID for the Oracle Cloud Infrastructure account.	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. 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.	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
`-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.	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 `opc2`*`SID`*`.ora`, where *`SID`* is the system identifier of the Oracle database being backed up to Oracle Cloud Infrastructure Object Storage Service.	Optional

Parameter	Description	Required or 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

`-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 opc2_install.jar -argFile arguments.txt`
		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):

   `http://www.oracle.com/technetwork/database/availability/oracle-cloud-backup-2162729.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, `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.

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.
```

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.
`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`).

Configure the Oracle Database Cloud Backup Module for OCI

Configure an RMAN channel to integrate your on-premise database with Oracle Cloud Infrastructure Object Storage.

To configure an RMAN channel that corresponds to the Oracle Database Cloud Backup Module for OCI:

1. Start RMAN on your on-premise database and connect to the target database.

The following example connects to your target database by using operating system authentication:

```
% rman target /
```

The following example connects to your target database, with DBID *prod*, by using password file authentication. Enter the password for the `bkup_admin` user (with the `SYSBACKUP` privileges) when prompted.

```
% rman target "bkup_admin@prod as sysbackup"
```

2. Use the RMAN `CONFIGURE` command to configure a channel that corresponds to the Oracle Database Cloud Backup Module for OCI.

   The RMAN channel configuration must use the path to the backup module's library and configuration files created when you installed the Oracle Database Cloud Backup Module for OCI. Once channel configuration is complete, you are ready to use RMAN commands to work with Oracle Cloud Infrastructure Object Storage.

Example 2-1 Configuring RMAN to Back Up to Oracle Cloud Infrastructure

On Linux and UNIX systems, the following command configures an RMAN channel that uses the Oracle Database Cloud Backup Module for OCI SBT library for backup and restore operations to Oracle Cloud Infrastructure:

```
RMAN> CONFIGURE CHANNEL DEVICE TYPE sbt
      PARMS='SBT_LIBRARY=location-of-the-SBT-library-OCI-Backup-Module-for-OCI,
      SBT_PARMS=(OPC_PFILE=location-of-the-configuration file)';
```

For example:

```
RMAN> CONFIGURE CHANNEL DEVICE TYPE sbt
      PARMS='SBT_LIBRARY=/orclhome/lib/libopc.so,
      SBT_PARMS=(OPC_PFILE=/orclhome/dbs/opcora12.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\opcora12.ora)';
```

> **Note:**
>
> If you have existing backups on Oracle Cloud Infrastructure, ensure that the backup piece names are not the same as the ones in Oracle Cloud Infrastructure Object Storage Classic. This is to avoid the risk of overwriting objects in the target bucket. It is recommended that you use the format "%d_%U' when creating the backups to avoid such conflicts.

Considerations for Migrating Data Using Rclone

Before you begin, consider the following factors that may impact your migration process.

- You can't copy multiple containers at a time. You can copy only one container at a time. However, you can copy one or more objects at a time.
- Metadata and policies aren't copied. This includes:
  - Custom metadata on objects and containers
  - Cross-Origin Resource Sharing (CORS) settings
  - Object immutability
  - ACLs on containers
  - Container quotas
- If you have large objects in your Oracle Cloud Infrastructure Object Storage Classic account, then you should check if the object as well as its segments are stored in the same container. When the same container has the object as well as its segments, Rclone detects this and copies the object correctly without duplicating data.

Consider using the following `rclone` options in the following scenarios:

- `dry-run`: Use this option to validate a migration before start to copy data. Amongst other benefits, this option allows you to check that the specified bucket name is valid.
- `includes, excludes,` or `filtering`: Use these options to include or exclude files to be copied, based on patterns or size.
- `s3-upload-cutoff`: Use this option to copy large objects.
- `progress`: Use this option to generate a real-time overview of the transfer.
- `transfers`: Use this option to utilize your network bandwidth better and increase throughput. You will need to tune this value based on the available bandwidth for your compute shape.

3

Migrate Database Backups to Oracle Cloud Infrastructure Object Storage

Use `rclone` to migrate your database backups from Oracle Cloud Infrastructure Object Storage Classic to Oracle Cloud Infrastructure Object Storage.

Topics:

Download and Install Rclone

Backups of on-premise databases are migrated from Oracle Cloud Infrastructure Object Storage Classic to Oracle Cloud Infrastructure using `rclone`.

To install `rclone`:

1. Download `rclone`. See https://rclone.org/downloads/.

   The website contains information about supported operating systems, downloading the installer, and installation instructions.

2. Install `rclone`. Refer to the installation instructions at: https://rclone.org/install/.

   You can install `rclone` on any virtual machine or system that has network access to both the source and destination environments. Rclone supports Windows, Linux, and other operating systems.

Configure Your Environment

Configure your target environment to enable `rclone` to access Oracle Cloud Infrastructure Object Storage Classic and Oracle Cloud Infrastructure Object Storage.

To configure your target environment:

1. Create the `rclone.conf` file in the `~/.config/rclone` folder if the file doesn't already exist.
2. Add the following information to the `~/.config/rclone/rclone.conf` file to create the remote device configuration for the source.

```
[classic-source]
type = swift
env_auth = false
user = Storage-acme:myuserName
key = pas$word
```

```
storage_url = https://acme.storage.oraclecloud.com/v1/Storage-acme
auth = https://acme.storage.oraclecloud.com/auth/v1.0
```

See Get Details of the Source Environment.

Replace the values for the `user`, `key`, `storage_url`, and `auth` parameters with the values specific to your source environment. Where:

- `user`: Specify the value you that you passed to the `X-Storage-User` header while requesting an authentication token to access Oracle Cloud Infrastructure Object Storage Classic.
- `key`: Specify the password to access your Oracle Cloud Infrastructure Object Storage Classic account.
- `storage_url`: Specify the REST Endpoint URL.
- `auth`: Specify the authentication URL that you had passed while requesting an authentication token to access Oracle Cloud Infrastructure Object Storage Classic.

3. To create the remote device configuration for the destination, add the following information to the `~/.config/rclone/rclone.conf` file:

```
[oci-dest]
type = s3
env_auth = false
access_key_id = YOUR_ACCESS_KEY
secret_access_key = YOUR_ACCESS_SECRET_KEY
region = YOUR_REGION_IDENTIFIER
endpoint = https://
YOUR_NAMESPACE.compat.objectstorage.YOUR_REGION_IDENTIFIER.oraclecloud.c
om
```

Replace the values for the `access_key_id`, `secret_access_key`, `region` and `endpoint` parameters with the values specific to your target environment. Where:

- `access_key_id` and `secret_access_key`: To identify your access key and secret access key, see To create a Custom Secret key in Oracle Cloud Infrastructure documentation.
- `region`: To identify the region, see Regions and Availability Domains in Oracle Cloud Infrastructure documentation. For example, `us-ashburn-1`.
- `endpoint`: To identify the namespace, see Understanding Object Storage Namespaces in Oracle Cloud Infrastructure documentation.

4. Verify your configuration.

The following command uses the remote device configuration for the source to display the existing containers in Oracle Cloud Infrastructure Object Storage Classic:

```
# rclone lsd classic-source:
```

The following command uses the remote device configuration for the target to display the existing buckets in Oracle Cloud Infrastructure Object Storage:

```
# rclone lsd oci-dest:
```

Migrate Backups to Oracle Cloud Infrastructure Object Storage

Migrate backups using `rclone`.

To migrate backups:

1. Copy backups to Oracle Cloud Infrastructure Object Storage.

   The following command copies backups from the `src_cont` container in Oracle Cloud Infrastructure Object Storage Classic to the `dest_bkt` bucket in Oracle Cloud Infrastructure Object Storage. Backups that have already been copied are skipped.

   ```
   rclone --verbose --cache-workers 64 --transfers 64 --retries 32 copy
   classic-source:src_cont oci-dest:dest_bkt
   ```

   To monitor the progress, you can add a debug option. For example:

   ```
   rclone -I --log-level --verbose DEBUG copy classic-source:src_cont oci-
   dest:dest_bkt
   ```

2. Optional. The following command modifies the destination to make it identical with source.

   ```
   rclone sync classic-source:src_cont oci-dest:dest_bkt
   ```

4
Complete the Post-Migration Steps

After you migrate your database backups to Oracle Cloud Infrastructure Object Storage, verify that the backups are valid and accessible.

Topics:

Validate the Migrated Backups

Validate migrated backups to check for physical and logical corruption.

Use the `RESTORE...VALIDATE` command to validate backups. Validation checks that backups are restorable and that there is no corruption. RMAN performs a block-level check of backups and verifies that all required database files are available.

Validation does not actually restore backups and no data is written to storage. Data is streamed from Oracle Cloud Infrastructure Object Storage to your on-premise database. After validation is completed, the data is discarded. Note that the validation does consume CPU, memory, and network resources to read backups and analyze them. You may incur network traffic charges for data being moved from Oracle Cloud Infrastructure Object Storage. The time taken for validation depends on the size of your backups.

To validate migrated backups:

1. Run the `RESTORE` command with the `VALIDATE` option.

   The following command checks for physical and logical corruptions in your backups:

   ```
   RMAN> RESTORE DATABASE VALIDATE CHECK LOGICAL;
   ```

2. Review the RMAN output to ensure that there are no errors.

   The following is a sample output. Note that the output shows "new media label" while reading data from the Oracle Cloud Infrastructure bucket.

   ```
   Starting restore at 24-09-2019 08:14:50
   allocated channel: ORA_DISK_1
   channel ORA_DISK_1: SID=328 device type=DISK
   allocated channel: ORA_DISK_2
   channel ORA_DISK_2: SID=497 device type=DISK
   allocated channel: ORA_SBT_TAPE_1

   channel ORA_SBT_TAPE_1: SID=12 device type=SBT_TAPE
   channel ORA_SBT_TAPE_1: Oracle Database Backup Service Library
   VER=12.2.0.2

   new media label is "objectstorage.us-ashburn-1..ecloud.com/n/dbcl/
   ```

```
my_target" for piece "ORCL_1527520098_vgucjceb_1_1_20190924_1019851211"
new media label is "objectstorage.us-ashburn-1..ecloud.com/n/dbcl/
my_target" for piece "ORCL_1527520098_viucjcgr_1_1_20190924_1019851291"
new media label is "objectstorage.us-ashburn-1..ecloud.com/n/dbcl/
my_target" for piece "ORCL_1527520098_vhucjcfo_1_1_20190924_1019851256"
channel ORA_SBT_TAPE_1: starting validation of datafile backup set
channel ORA_SBT_TAPE_1: reading from backup piece
ORCL_1527520098_vgucjceb_1_1_20190924_1019851211
channel ORA_SBT_TAPE_1: piece
handle=ORCL_1527520098_vgucjceb_1_1_20190924_1019851211
tag=TAG20190924T200010
channel ORA_SBT_TAPE_1: restored backup piece 1
channel ORA_SBT_TAPE_1: validation complete, elapsed time: 00:00:25
channel ORA_SBT_TAPE_1: starting validation of datafile backup set
channel ORA_SBT_TAPE_1: reading from backup piece
ORCL_1527520098_vhucjcfo_1_1_20190924_1019851256
channel ORA_SBT_TAPE_1: piece
handle=ORCL_1527520098_vhucjcfo_1_1_20190924_1019851256
tag=TAG20190924T200010
channel ORA_SBT_TAPE_1: restored backup piece 1
channel ORA_SBT_TAPE_1: validation complete, elapsed time: 00:00:15
channel ORA_SBT_TAPE_1: starting validation of datafile backup set
channel ORA_SBT_TAPE_1: reading from backup piece
ORCL_1527520098_viucjcgr_1_1_20190924_1019851291
channel ORA_SBT_TAPE_1: piece
handle=ORCL_1527520098_viucjcgr_1_1_20190924_1019851291
tag=TAG20190924T200010
channel ORA_SBT_TAPE_1: restored backup piece 1
channel ORA_SBT_TAPE_1: validation complete, elapsed time: 00:00:07
Finished restore at 24-09-2019 08:15:42
```