

# DBA's guide to Oracle data protection

How to integrate cloud backup with Oracle RMAN to reduce costs and complexity

## Introduction

Oracle's RDBMS has been the gold standard for managing structured data for decades, and today most major businesses rely on it for their mission-critical applications. Yet maintaining relational database integrity during a backup can be complex. It takes keeping physical parameters secure and database processes consistent as well as auditing data trails and performing risk-based validation. To reduce this complexity, Oracle introduced Recovery Manager (RMAN) as its standard tool to handle basic backup and restore functionality.

This white paper explains some fundamental backup concepts applicable to RMAN and describes how Druva works with an Oracle image copy and incremental merge features to securely protect an Oracle database in the cloud. As an Oracle Backup Solutions Program (BSP) partner, Druva also gives additional control of data protection to your backup admins and teams while it provides:

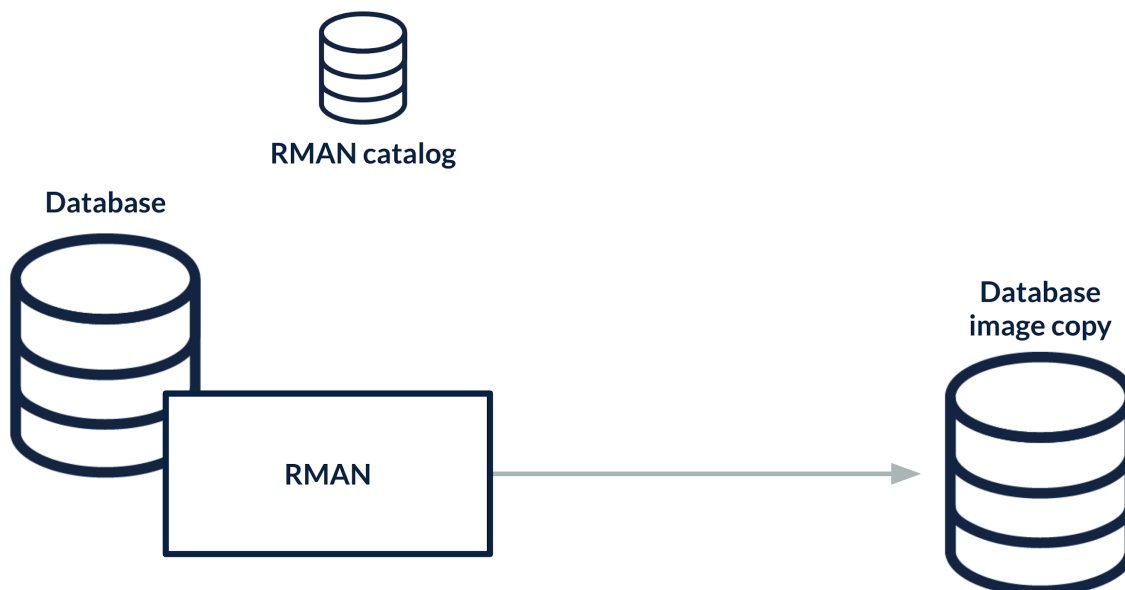
- The most efficient protection for Oracle databases both on-premises and in the cloud
- On-demand scaling and storage without complexity
- Lower TCO for backup and recovery

## Important Oracle data protection concepts

Oracle RMAN was launched with version 8.03 and it has been a standard Oracle component ever since. It is the intermediary between a database and a backup application that stores data on targets that can be anywhere from physical and virtual tape and local disks to remote clouds.

RMAN has two primary methods of compiling data for backup:

- **Backup set** – The most common way for RMAN to prepare data for backup has been to create an RMAN backup set: a logical structure that's the smallest unit of an RMAN backup. The backup set uses PL/SQL blocks and contains the data from one or more datafiles, archived redo logs, and control files or the server parameter file.
- **Image copy** – An alternate method is for RMAN to create an exact, image copy of a single datafile and archived redo log file or control file. Image copies are not stored in an RMAN-specific format. They are identical to the results of copying a file using operating system commands.



## Incremental merge and block change tracking

An image copy lends itself to cloning the database to an alternate node host (copy data management) or refreshing it to make copies, for example, of *Dev*, *Test*, or *Staging* servers. There are other Oracle enhancements that make switching an image copy to an active copy relatively easy. Doing this with a backup set takes more time and it's a more laborious process.

Incremental merge is an Oracle technology, introduced in version 10, that lets you take a level-0 image baseline first and then incrementally restore copies of the level-1 backups on top of the level 0 to create a rolling copy of the database. In practical terms, it provides a level-1 incremental backup in perpetuity.

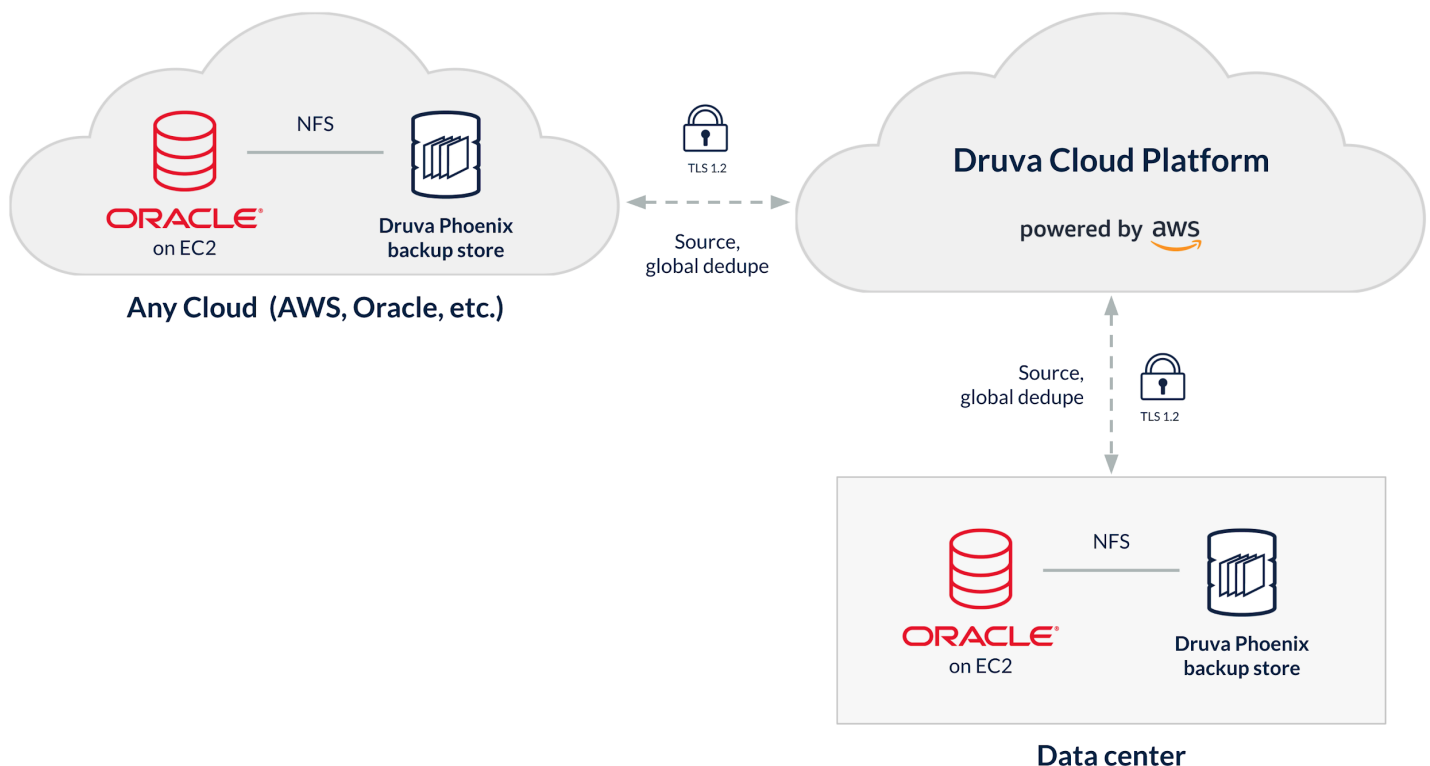
An incremental merge backup leveraging BCT consists only of changed blocks, Oracle recommends enabling block change tracking (BCT). This results in hyper-efficient, hyper-fast level-1 incrementals forever. You can back up a database with RMAN and only back up the changed blocks, which can improve your RPO. When using backup sets, BCT is typically not enabled and thus the RMAN binary has to scan through every block in a database to determine if it's changed or not changed and requires backup.

## Important implications for database and backup admins

Choosing to use backup sets or image copies affects database and backup admins differently. With backup sets, database admins must configure RMAN if they want to control backups and restores. This can be complex, particularly in UNIX environments. Backup sets are smaller, which is an attractive feature for backup admins. However, database admins are typically more concerned about their immediate access to backups and restores than they are about storage costs. Using image copies in the Druva for Oracle Backup Store, a DBA can control backups and restores with an easier-to-use data protection solution than just RMAN.

## Druva for Oracle data protection

Seamlessly integrated with RMAN, Druva provides simple and secure cloud backup and recovery for Oracle databases located both on-premises and in the cloud. It efficiently manages backup sets and image copies as needed with alacrity.



Druva uses cloud- and client-side components to interact, manage, and control backups in your infrastructure. These components include the:

1. **Phoenix Backup Store (PBS)** — an NFS software appliance that can be deployed on a physical or virtual system on-premises or in the cloud which serves as the target for backups (and restores). A mount on the store is a shared directory that serves as a local target location for RMAN operations. The Phoenix Backup Store creates a snapshot of the backup and uploads it to the Druva cloud. The backup remains available for immediate restores or clones in an NFS target managed by the Phoenix service on the PBS.
2. **Druva Management Console** — a web-based app that provides complete visibility and management of all Phoenix Backup Stores and their mounts.

The basic backup workflow is:

1. An admin defines a backup schedule in cronjob, OEM Cloud Control or the Windows Task Scheduler to execute Druva-provided RMAN script templates.
2. The copy is deduplicated, compressed significantly (up to 4:1) with ZFS, and encrypted.
3. The deduplicated, compressed copy is uploaded to an air-gapped location in the Druva cloud.
4. It is compressed further and is globally deduplicated.

For restores up to seven days, database admins can access the backup copy on the local PBS per RMAN recovery window. Older backups (as old as needed for legal compliance requirements) that have been snapshotted to the Druva cloud are accessed via the Druva console and are mounted to the PBS or alternate destinations as desired.

## How to configure Druva for Oracle

Setting up Druva is straightforward and consists of three steps:

1. Deploy a Phoenix Backup Store
2. Create and map a mount
3. Define RMAN backup schedules

### Deploy a Phoenix Backup Store

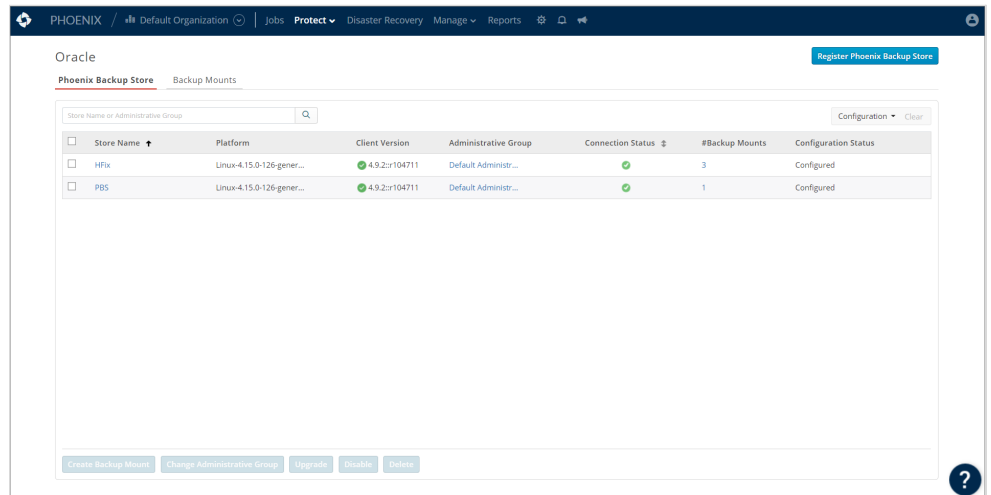
You can deploy the Phoenix Backup Store on an Ubuntu server or on an Ubuntu VM on-premises. In AWS, an EC2 instance will suffice. The Phoenix Backup Store works as an NFS server and as a ZFS server. Druva provides the following deployment packages:

- A Debian package is available to install on an Ubuntu server to work as the Phoenix Backup Store. Or, the package can be deployed on an Amazon EC2 instance (with Ubuntu as its operating system) to work as the PBS.
- An Open Virtual Appliance image is also available for download to deploy on a VMware VM to create a virtual machine as the Phoenix Backup Store by simply importing it into an Ubuntu VM allocated from the vCenter. Storage for the ZFS pool on the PBS is also allocated from a vCenter datastore.

## Create and map a mount

After the Phoenix Backup Store is deployed and activated, log in to the PBS.

1. From the top menu, select the *Organization* where you want to configure the PBS. On the *Organization* page, click *Protect* > *Oracle* on the top menu.
2. On the *Phoenix Backup Stores* tab, select your PBS, click *Create Backup Mount*, and follow the instructions in the wizard.
3. Map the PBS to the Linux or Windows server that hosts the RMAN. Detailed instructions are available in the [support section](#) of [druva.com](#).



## Configure RMAN for schedules

To configure RMAN for a scheduled backup task:

1. Download the [Druva Phoenix RMAN template scripts](#) to the Oracle Server:
  - oracle\_rman\_data\_backup.sh
  - oracle\_rman\_archivelog\_backup.sh
2. Define a CronJob schedule to accommodate RMAN scripts as follows:
  - ./oracle\_rman\_data\_backup.sh /home/test-usr/rman-log-directory 192.0.2.1 testmount
  - ./oracle\_rman\_archivelog\_backup.sh /home/test-usr/rman-log-directory 192.0.2.1 testmount

When the script runs, the RMAN creates an Oracle RMAN backup and stores it on the backup mount of the PBS. All the logs of the Oracle RMAN backup job are created automatically and stored in the NFS target the DBA provides at the time of running the script.

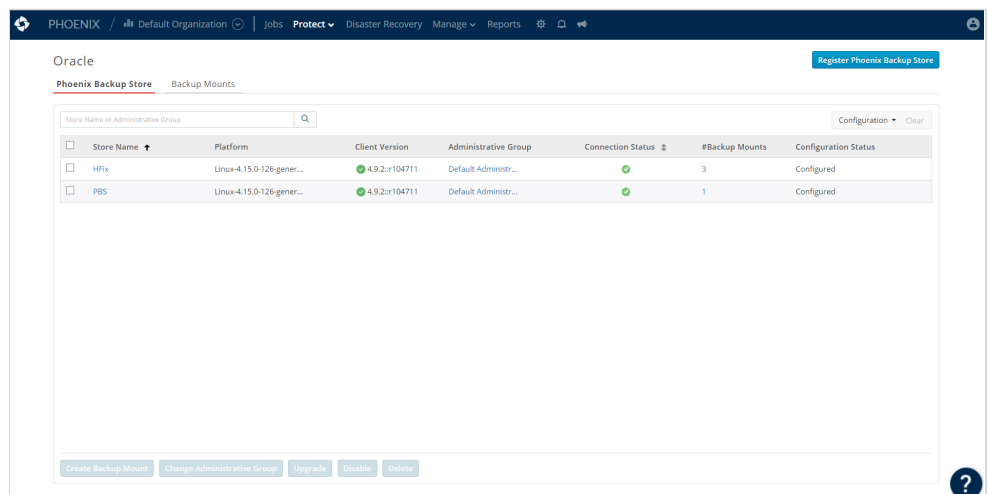
Detailed instructions are available in the [Backup and Restore Oracle Databases](#) section of Druva's documentation.

## Druva for Oracle management console

An intuitive management console lets database and backup admins control and monitor the PBS, mounts, and all backup and restore activities. The following are some of the most-used tabs.

### Protect

This tab lets you manage every aspect of a PBS and its mounts.



## PBS

This tab shows every detail of an active PBS.

Client Version : 4.9.2-r104711  
Platform : Linux-4.15.0-126-ge...  
Administrative Group : Default Administrative Group

Phoenix Store Usage : 565.50KB/192.78GB  
Source + Changes (total) : 27.24 MB  
Current Source (total) : 27.24 MB

Connection Status : Connected  
Configuration Status : Configured  
# Snapshots : 1 (0 Hot, 1 Warm, 0 Cold)

Backup Mount: mount3

Storage : local\_store  
Max Bandwidth : 1000 Mbps  
Backup Enabled :

Retention : 14 D, 4 W, 3 M, 3 Y  
IP Whitelist : \*  
Upload Pending Snapshots : 0

Databases (0)

Backup & Restore (Last 7 days)

Backup: 0 0 0 0 0 0 0  
Restore: 0 0 0 0 0 0 0

Data Trend

27.24 MB  
Source + Changes  
Current Source

27.24 MB  
Current Source

Last 90 days

## Jobs

This tab lists every active job with time and status details.

Job ID	Job Type	Phoenix Store	Backup Mount	Start Time	End Time	Status
792	Restore	PBS	mount3	Dec 04, 2020 10:03:36	Dec 04, 2020 10:03:54	Successful
791	Backup	PBS	mount3	Dec 04, 2020 09:55:16	Dec 04, 2020 09:56:17	Successful

## Jobs/Progress logs

This screen shows job progress details.

Job ID	Job Type	Phoenix Store	Backup Mount	Start Time	End Time	Status
792	Restore	PBS	mount3	Dec 04, 2020 10:03:36	Dec 04, 2020 10:03:54	Successful
791	Backup	PBS	mount3	Dec 04, 2020 09:55:16	Dec 04, 2020 09:56:17	Successful

Job Details

Summary Progress Logs Detailed Logs

Dec 04, 2020 09:55:14 Starting backup operation  
Dec 04, 2020 09:55:24 RMAN backup is starting for the Mountmount3, SnapshotID\_1  
Dec 04, 2020 09:55:24 Starting backup at 04-DEC-20  
Dec 04, 2020 09:55:24 Datafile backup is in progress  
Dec 04, 2020 09:55:34 Finished backup at 04-DEC-20  
Dec 04, 2020 09:55:34 All datafiles are backed up successfully  
Dec 04, 2020 09:55:35 Starting recover at 04-DEC-20  
Dec 04, 2020 09:55:38 Finished recover at 04-DEC-20  
Dec 04, 2020 09:55:38 Starting Control File and SPFILE Autobackup at 04-DEC-20  
Dec 04, 2020 09:55:41 Finished Control File and SPFILE Autobackup at 04-DEC-20  
Dec 04, 2020 09:55:42 Starting backup at 04-DEC-20  
Dec 04, 2020 09:55:42 Archive log backup is in progress  
Dec 04, 2020 09:55:43 channel ORA\_DISK\_1: starting archived log backup set  
Dec 04, 2020 09:55:44 Finished backup at 04-DEC-20  
Dec 04, 2020 09:55:44 Starting Control File and SPFILE Autobackup at 04-DEC-20

## Conclusion

Druva for Oracle brings DBAs, backup admins, and cloud teams together with a secure platform that offers the visibility, control, and automation needed to meet SLAs. It also increases predictability, the transparency of costs, and agility. It enables:

- Automated, single-step, point-in-time and granular recoveries either from a local target or a secure snapshot in the cloud.
- Incremental merge and level-1 backups for as long a duration as needed for legal compliance.
- Reduced bandwidth and storage requirements with global, source-based deduplication.

When you choose Druva, you're getting a cloud-based data protection service for backup and recovery as well as resilience. Druva provides all-inclusive services with no need to manage hardware or software — and it reduces associated costs and complexities.

To learn more, visit [druva.com/solutions/oracle](https://druva.com/solutions/oracle)



Find Druva in AWS Marketplace

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