



# OCI Oracle Database Migration Tools

Be The CXM Academy

---

**Marcel Lamarca**

Exadata Cloud Specialist

Oracle, Alliances and Channels - LAD

March, 2023



**SQL> select \* from person where name = 'Marcel Lamarca'**



## MARCEL LAMARCA

Exadata Cloud Specialist  
Upgrade, Utilities, Patching, Performance & Migrations

[marcel-lamarca](#)

marcel.lamarca@oracle.com

### About My Career

- 22 Years dedicated to study and support Oracle Databases.
- 12 Years working with Exadata (On-prem, C@C and Cloud Services) .
- 5 Year working for Oracle do Brasil
- 2 Year on Alliances LAD knowledge Team

### Certifications

#### Oracle Cloud Specialist (OCS)

- Exadata Database Machine X9M Certified Specialist
- OCI Foundation 2020 / 2023
- Oracle Autonomous Database Administrator Professional 2019 / 2023
- Oracle Cloud Database Migration and Integration 2021
- OCI Cloud Certified Architect Associate 2022
- OCI Cloud Certified Architect Professional 2022
- OCI Multi-Cloud Architect Professional 2023
- Oracle Database Services Certified Professional 2023

#### Oracle Certified Professional (OCP)

- Oracle Database certified professional 10g, 11g, 12c and 19c.
- Mysql 8.0 Database Administrator Certified Professional

#### Oracle Certified Specialist (OCE)

- Grid/RAC Database Administrator 11g
- Oracle Golden Gate 12c Certified Implementation Specialist

# Agenda

1

Big Endian VS Little Endian concepts

2

Physical Vs Logical migration

3

Cloud Migration Tools

4

Resources



# Big Endian VS Little Endian

# Endianness | The Basis



**Big-endian**

<i>increasing addresses →</i>					
...	4Ah	6Fh	68h	6Eh	...
...	'J'	'o'	'h'	'n'	...

**Little-endian**

<i>increasing addresses →</i>					
...	6Eh	68h	6Fh	4Ah	...
...	'n'	'h'	'o'	'J'	...

Source: <https://en.wikipedia.org/wiki/Endianness>

# S.O Platforms using LittleEndian Engine



```
SQL> SELECT platform_name, endian_format  
      FROM v$transportable_platform  
     WHERE endian_format='Little';
```

PLATFORM_NAME	ENDIAN_FORMAT
Apple Mac OS (x86-64)	Little
HP IA Open VMS	Little
HP Open VMS	Little
HP Tru64 UNIX	Little
Linux IA (32-bit)	Little
<b>Linux IA (64-bit)</b>	<b>Little</b>
<b>Linux x86 64-bit</b>	<b>Little</b>
Microsoft Windows IA (32-bit)	Little
<b>Microsoft Windows IA (64-bit)</b>	<b>Little</b>
<b>Microsoft Windows x86 64-bit</b>	<b>Little</b>
Solaris Operating System (x86)	Little
<b>Solaris Operating System (x86-64)</b>	<b>Little</b>

# S.O Platforms using Big Endian Engine

ORACLE  
SOLARIS

IBM



```
SQL> SELECT platform_name, endian_format
      FROM v$transportable_platform
     WHERE endian_format != 'Big';
```

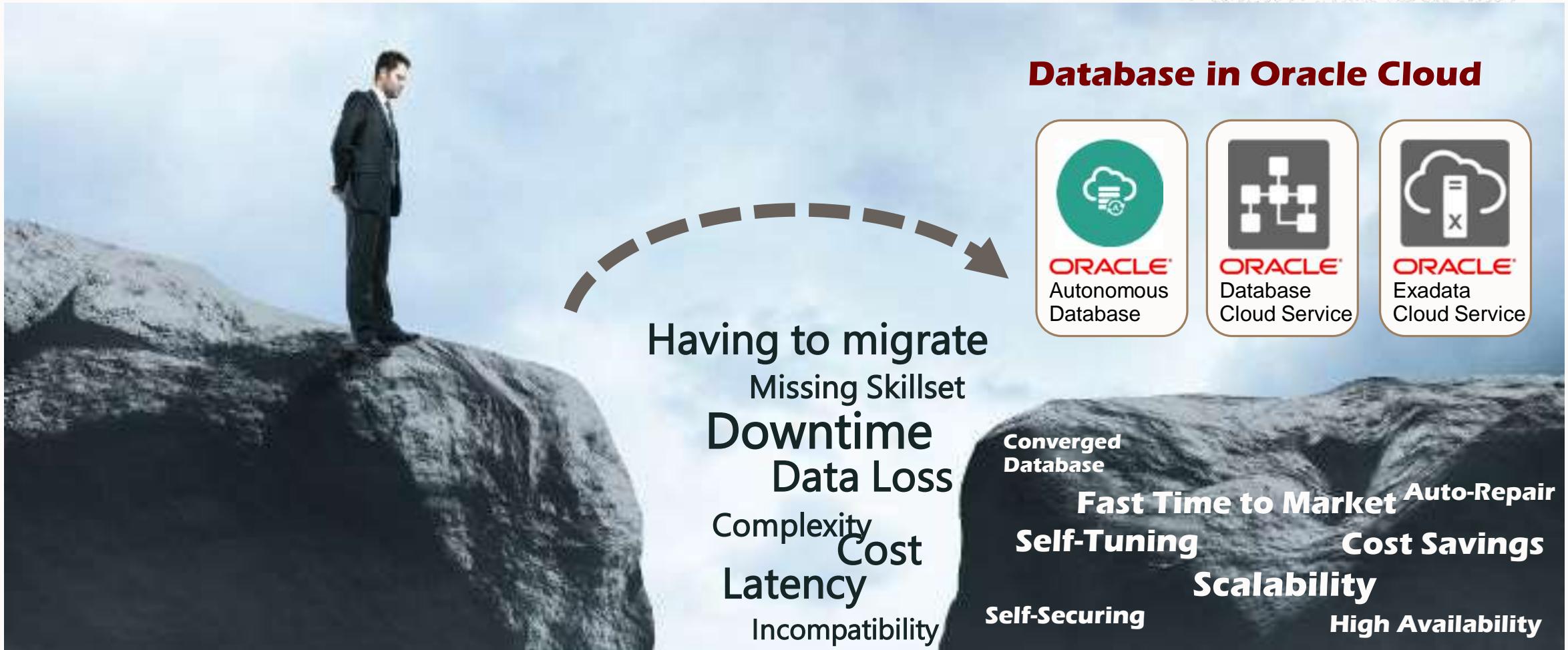
PLATFORM_NAME	ENDIAN_FORMAT
<b>AIX-Based Systems (64-bit)</b>	<b>Big</b>
Apple Mac OS	Big
HP-UX (64-bit)	Big
HP-UX IA (64-bit)	Big
IBM Power Based Linux	Big
IBM zSeries Based Linux	Big
Linux OS (S64)	Big
<b>Solaris[tm] OE (32-bit)</b>	<b>Big</b>
<b>Solaris[tm] OE (64-bit)</b>	<b>Big</b>



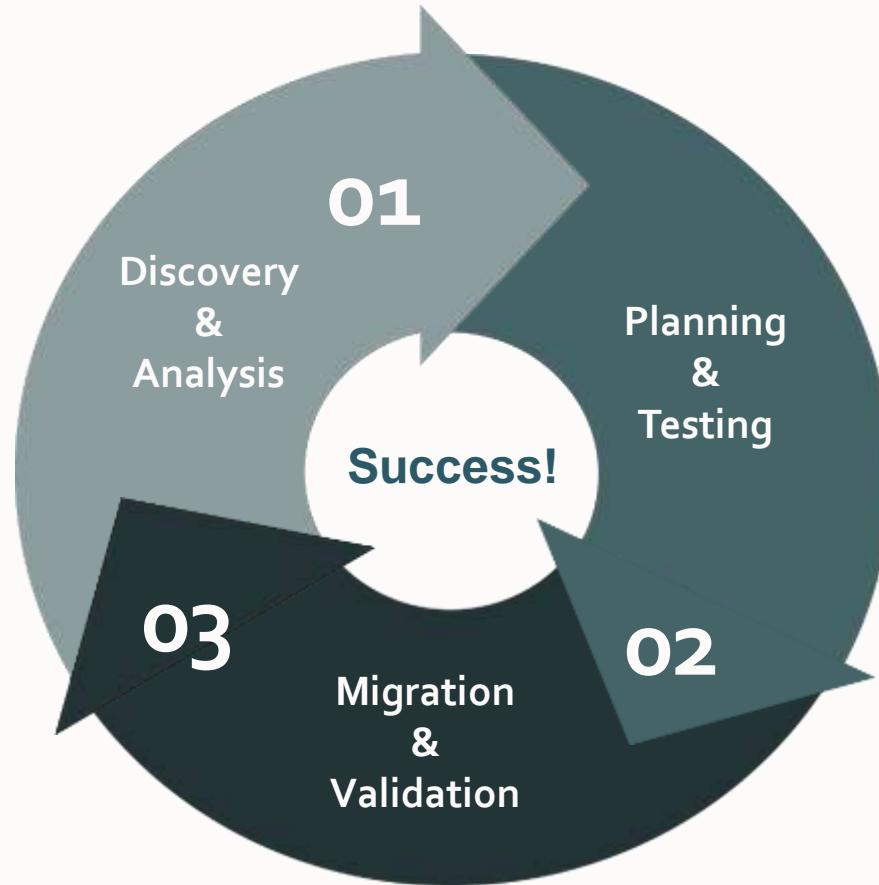
# From where do I have to start ?

# The future of databases is here in Oracle Cloud

But... how to best get there?



# There is no other path to success!



# Migration requirements and constraints...

Source Database	Target Database	Runtime Constraints
<ul style="list-style-type: none"><li>• Database version</li><li>• Database size</li><li>• Workload Type</li><li>• Usage and performance requirements</li><li>• Single/Multi-tenant Architecture</li><li>• Endian format</li><li>• Character set</li></ul>	<ul style="list-style-type: none"><li>• Database Type</li><li>• Database version</li><li>• HA and DR requirements</li></ul>	<ul style="list-style-type: none"><li>• Bandwidth and Connectivity</li><li>• Fallback Capability</li><li>• Down-time requirements for migration</li><li>• Project resources available for migration</li></ul>

# Tools for all Steps of the Migration Process



## Profile Estate

Review and prioritize by least effort and ongoing TCO

- [Oracle Estate Explorer\\*](#)
- [Cloud Services Advisor](#)



## Methods

Select the simplest migration method

- [Migration Method Advisor](#)
- Cloud Migration Advisor\*



## Preparation

Ensure source compatibility with target

- Cloud Premigration Advisor Tool (CPAT)
- Embedded in OCI DM



## Execution

Choose zero downtime or offline migrations

- [OCI Database Migration](#)



## Validation

Ensure synchronization for ongoing online migrations

- GoldenGate Veridata

- Cloud Pre mig Advisor (CPAT) Analyzes DB for Suitability of Cloud Migration (Doc ID [2758371.1](#))

## SOLUTION

The Cloud Premigration Advisor Tool can perform analysis of both the source and the target database instance and provide information about the suitability of migrating the source database to an Oracle Cloud offering.

This document describes what CPAT does, where to get it, and how to use it.

## Cloud Premigration Advisor Tool (CPAT)

CPAT is a Java based tool that connects to an Oracle database instance in order to perform a series of checks. Each check is designed to evaluate a particular set of objects or conditions to ensure a successful migration to an Oracle Cloud offering.

Once the checks are performed CPAT will generate a report indicating what was found. Reports contain both summary information and details for each check including the check "result" (e.g. **Passing**, **Review Suggested**, **Review Required**, **Action Required**) and what "relevant data" was found in the source database. CPAT can generate reports in HTML, TEXT, and JSON format.

## Downloading and Extracting CPAT from the Zip File

This CPAT can be downloaded from [here](#). Note that the CPAT application itself is not tied to a particular database version. Therefor there is a single download for CPAT and that one download can be used for all supported versions of the Oracle database (11.2.0.4 and higher)

Once downloaded use a standard unzip utility to unzip the CPAT kit.

## Supported Database Versions



# Different Migration Types



## *Offline Migration*

- One-time copy of the database
- Requires applications to be offline during migration

## *Physical Migration*

- Blockwise copy of database files
- Requires database vendors and versions be same on source and target
- No filtering or transformation
- Tools: **RMAN**, **DataGuard**

## *Direct Connection*

- Source database can be accessed directly from target network
- Requires VPN/FastConnect for On-Prem

## *Online Migration*

- Initial copy of database followed by change data capture during migration
- Applications can stay online during migration

## *Logical Migration*

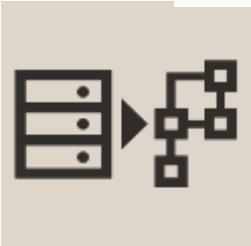
- Logically interpret database contents and copy to database in target format
- Source and target can be different
- Tools: **Datapump**, **GoldenGate**

## *Indirect Connection*

- Source database cannot be accessed directly, behind firewall
- Requires migration tool with agent

# Oracle Solutions to migrate databases to Oracle Cloud

## OCI Database Migration (DMS)



- Fully managed
- Graphical guidance
- Online and offline migrations
- Autonomous Database target only in first release Based on Zero Downtime Migration

## Zero Downtime Migration (ZDM)



- User Managed Expert Tool
- Fleet Migrations
- Logical and Physical Migrations
- Migrations to ExaCC

## SQL Developer



- Developer Experience
- Fine-grained transformations

## Enterprise Manager



- Integrated with EM ecosystem
- Use as part of EM Automation and Monitoring

## Database Tools



- Manual use of DB Tools (RMAN, Data Guard, Datapump, GoldenGate)
- Full expert control
- Special use cases (bi-directional replication, etc.)

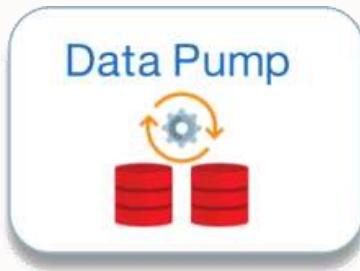
# Datapump expdp / impdp

# Data Pump

Fast, full offline database migration tool

## Source databases:

- CDB/PDB Databases 12c, 18c, 19c, 21c and 23c
- Non-CDB Databases 11g, 12c, 18c, 19c, 21c and 23c



## Target databases:

- DBaaS VM, DBaaS BM, ExaCS, ExaCC
- Versions: 12c, 18c, 19c

## When to use

- ✓ Supports small to large databases
- ✓ Supports cross-endian and character-set
- ✓ In-flight Upgrade possible
- ✓ Changes to database structure possible
- ⚠ Requires knowledge of various methods
- ⚠ Requires some down-time



Simple



Interoperability  
with versions



Enterprise fleet-  
scale migrations

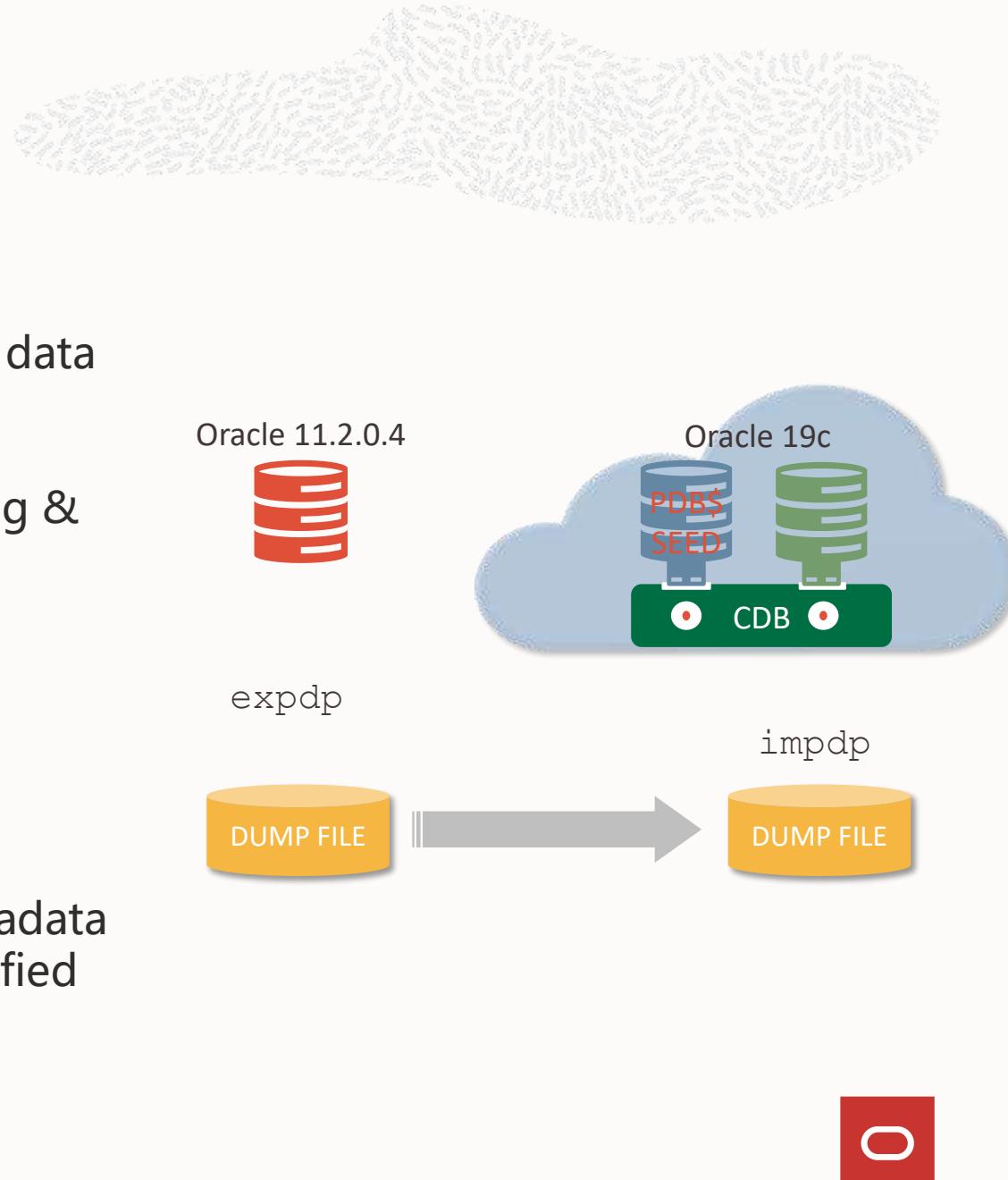


Free

# Data Pump

## Features and Capabilities

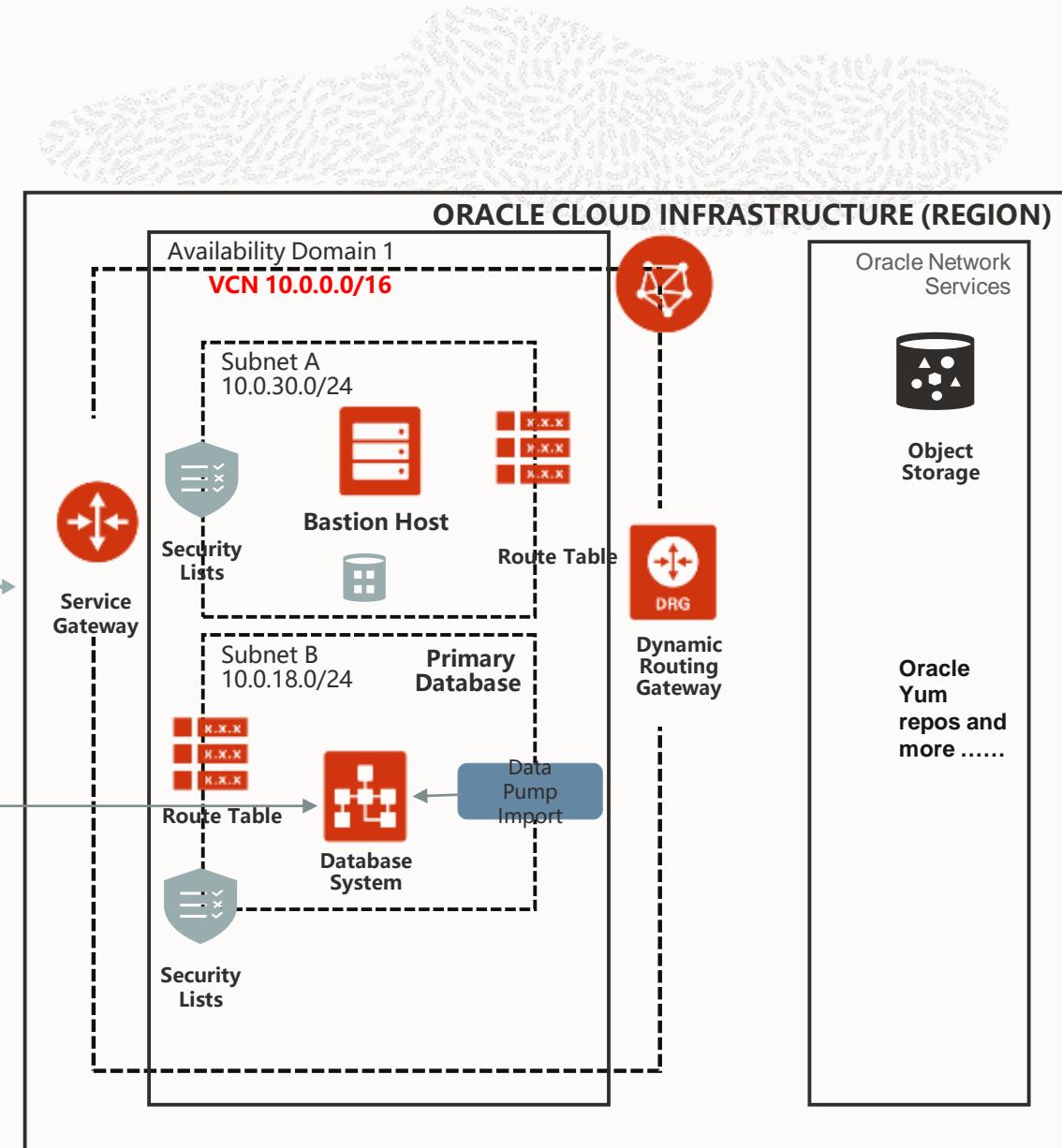
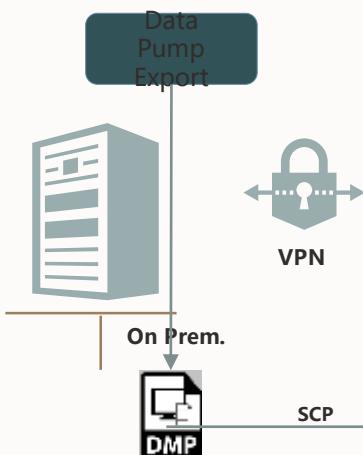
- Oracle Data Pump enables high-speed movement of data and metadata from one database to another
- Oracle Data Pump is available on Oracle Database 10g & later
- There are five different modes of data unloading
  - **Schema Mode** - default mode, specific schemas
  - **Table Mode** - specified set of tables dependent objects
  - **Tablespace Mode** - the tables in the specified tablespace
  - **Transportable Tablespace Mode** - only the metadata for the tables and dependent objects within a specified set of tablespaces
  - **Full Export Mode** - entire database



# Use Case: Data Pump Migration Conventional Export/Import

## Migration Steps

- Invoke Data Pump Export on-premises DB
- Secure copy the dump file to the OCI Database System
- On OCI DB System invoke Data Pump Import
- Validate the import



# Datapump recommendations

- Always use a **parameter file**.
- Applies to export and import.

```
$ more export.par

DYRECTORY=my_data_pump_dir
DUMPFILE=dumpfile%U.dmp
LOGFILE=logfile.log
SCHEMAS=HR
EXCLUDE=STATISTICS
LOGTIME=ALL
METRICS=YES
FLASHBACK_TIME=SYSTIMESTAMP
PARALLEL=4
FILESIZE=5G
TRANSFORM=OMIT_ENCRYPTION_CLAUSE

expdp parfile=export.par
```

# Datapump recommendations

- Always export to **multiple files**.
- **DUMPFILE** applies to export and import
- **FILESIZE** applies only to export
  - More than 99 files, use  
**DUMPFILE=dumpfile%L.dmp**

```
$ more export.par

DYRECTORY=my_data_pump_dir
DUMPFILE=dumpfile%U.dmp
LOGFILE=logfile.log
SCHEMAS=HR
EXCLUDE=STATISTICS
LOGTIME=ALL
METRICS=YES
FLASHBACK_TIME=SYSTIMESTAMP
PARALLEL=4
FILESIZE=5G
TRANSFORM=OMIT_ENCRYPTION_CLAUSE

expdp parfile=export.par
```

# Datapump recommendations

- Always use **schema mode**.
- Applies to export

```
$ more export.par

DYRECTORY=my_data_pump_dir
DUMPFILE=dumpfile%U.dmp
LOGFILE=logfile.log
SCHEMAS=HR
EXCLUDE=STATISTICS
LOGTIME=ALL
METRICS=YES
FLASHBACK_TIME=SYSTIMESTAMP
PARALLEL=4
FILESIZE=5G
TRANSFORM=OMIT_ENCRYPTION_CLAUSE

expdp parfile=export.par
```

# Datapump recommendations

- Always exclude **statistics**.
- Applies to export

```
$ more export.par

DYRECTORY=my_data_pump_dir
DUMPFILE=dumpfile%U.dmp
LOGFILE=logfile.log
SCHEMAS=HR
EXCLUDE=STATISTICS
LOGTIME=ALL
METRICS=YES
FLASHBACK_TIME=SYSTIMESTAMP
PARALLEL=4
FILESIZE=5G
TRANSFORM=OMIT_ENCRYPTION_CLAUSE

expdp parfile=export.par
```

# Datapump recommendations

- Always make **consistent exports**
- Applies to export only

```
$ more export.par

DYRECTORY=my_data_pump_dir
DUMPFILE=dumpfile%U.dmp
LOGFILE=logfile.log
SCHEMAS=HR
EXCLUDE=STATISTICS
LOGTIME=ALL
METRICS=YES
FLASHBACK_TIME=SYSTIMESTAMP
PARALLEL=4
FILESIZE=5G
TRANSFORM=OMIT_ENCRYPTION_CLAUSE

expdp parfile=export.par
```

# Datapump recommendations

- Always use **parallel**

- **Enterprise Edition only**

- OCI : Number of OCPUs
- On-premises : Number physical cores x 2

```
$ more export.par

DYRECTORY=my_data_pump_dir
DUMPFILE=dumpfile%U.dmp
LOGFILE=logfile.log
SCHEMAS=HR
EXCLUDE=STATISTICS
LOGTIME=ALL
METRICS=YES
FLASHBACK_TIME=SYSTIMESTAMP
PARALLEL=4
FILESIZE=5G
TRANSFORM=OMIT_ENCRYPTION_CLAUSE

expdp parfile=export.par
```

# Datapump recommendations

- Always remove **column encryption**
- Applies to import only

```
$ more export.par

DYRECTORY=my_data_pump_dir
DUMPFILE=dumpfile%U.dmp
LOGFILE=logfile.log
SCHEMAS=HR
EXCLUDE=STATISTICS
LOGTIME=ALL
METRICS=YES
FLASHBACK_TIME=SYSTIMESTAMP
PARALLEL=4
FILESIZE=5G
TRANSFORM=OMIT_ENCRYPTION_CLAUSE

expdp parfile=export.par
```

# Datapump recommendations

- Consider using **compression**
- **Advanced Compression Option**  
**License required**
- Applies to export only
- Algorithms : **BASIC | LOW | MEDIUM | HIGH**

```
$ more export.par

DYRECTORY=my_data_pump_dir
DUMPFILE=dumpfile%U.dmp
LOGFILE=logfile.log
SCHEMAS=HR
EXCLUDE=STATISTICS
LOGTIME=ALL
METRICS=YES
FLASHBACK_TIME=SYSTIMESTAMP
PARALLEL=4
FILESIZE=5G
COMPRESSION=ALL
COMPRESSION_ALGORITHM=MEDIUM

expdp parfile=export.par
```

# Datapump recommendations

- Remap any tablespace to **DATA** tablespace
- Applies to import only
- Just in case moving to Autonomous

```
$ more export.par

DYRECTORY=my_data_pump_dir
DUMPFILE=dumpfile%U.dmp
LOGFILE=logfile.log
SCHEMAS=HR
EXCLUDE=STATISTICS
LOGTIME=ALL
METRICS=YES
FLASHBACK_TIME=SYSTIMESTAMP
PARALLEL=4
FILESIZE=5G
COMPRESSION=ALL
COMPRESSION_ALGORITHM=MEDIUM
REMAP_TABLESPACE=%:DATA

expdp parfile=export.par
```

# ADB Compliance : Data Pump

- Follow **ADW best practices** and exclude these objects types

\$ For expdp

```
EXCLUDE=INDEX,CLUSTER,INDEXTYPE,  
      MATERIALIZED_VIEW,  
      MATERIALIZED_VIEW_LOG,  
      MATERIALIZED_ZONEMAP,DB_LINK  
DATA_OPTIONS=GROUP_PARTITION_TABLE_DATA
```

\$ For impdp

```
TRANSFORM=DWCS_CVT_IOTS:Y  
TRANSFORM=CONSTRAINT_USE_DEFAULT_INDEX:Y  
TRANSFORM=SEGMENT_ATTRIBUTES:N  
REMAP_TABLESPACE=%:DATA  
EXCLUDE=INDEX,CLUSTER,INDEXTYPE,  
      MATERIALIZED_VIEW,  
      MATERIALIZED_VIEW_LOG,  
      MATERIALIZED_ZONEMAP,DB_LINK  
PARTITION_OPTIONS=MERGE
```

# ADB Compliance : Data Pump

- Follow **ATP best practices** and exclude these objects types

\$ For expdp

```
EXCLUDE=CLUSTER,DB_LINK
```

\$ For impdp

```
TRANSFORM=DWCS_CVT_IOTS:Y  
TRANSFORM=CONSTRAINT_USE_DEFAULT_INDEX:Y  
TRANSFORM=SEGMENT_ATTRIBUTES:N  
REMAP_TABLESPACE=%:DATA  
EXCLUDE=CLUSTER,DB_LINK
```

# Recovery Manager (RMAN)

# Recovery Manager (RMAN)

Reliable and Versatile offline migration tool

## Source databases:

- CDB/PDB Databases 12c, 18c, 19c
- Non-CDB Databases 11g, 12c, 18c, 19c



## Target databases:

- DBaaS VM, DBaaS BM, ExaCS, ExaCC
- Versions: 12c, 18c, 19c, 21c and 23c

## When to use

- ✓ Cross-platform migration possible
  - ✓ Allows point-in time recovery
  - ✓ Migrate from non-CDB to CDB
  - ✓ Small to Large Database size
- ⚠ Requires knowledge of various RMAN methods
- ⚠ Requires some down-time



Point-in-Time  
Recovery



Interoperability  
with versions



Enterprise fleet-  
scale migrations

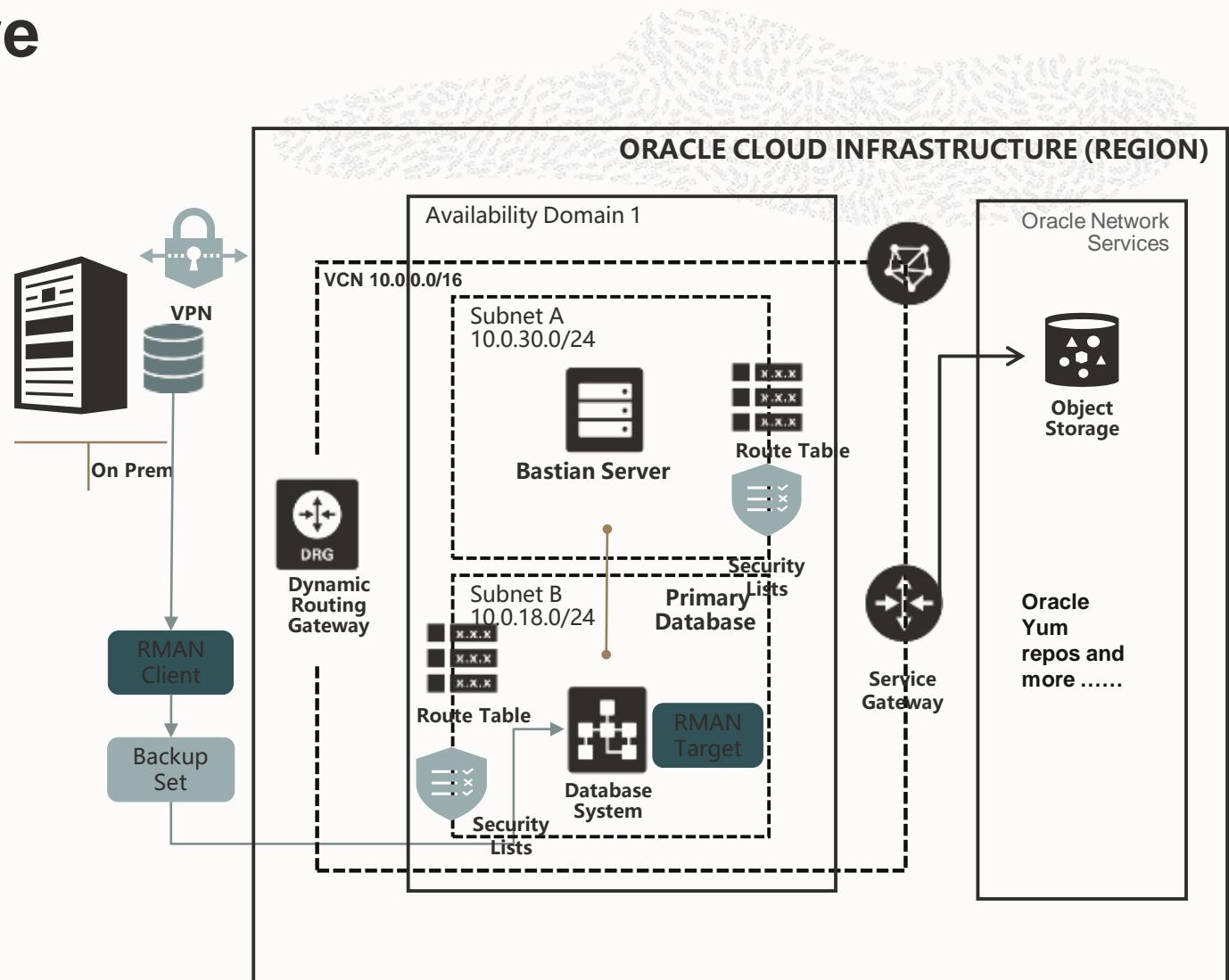


Free

# RMAN Reference Architecture

## Migration Steps

- On-premises Target Database – perform backup & recovery operations
- RMAN Client – command line interface to interpret and execute
- RMAN Methods
  - RMAN Cross-Platform Transportable PDB
  - RMAN Cross-Platform Transportable Tablespace Backup Sets
  - RMAN Transportable Tablespace with Data Pump
  - RMAN DUPLICATE from an Active Database
  - RMAN CONVERT Transportable Tablespace with Data Pump



# Oracle Database Dataguard

# Data Guard

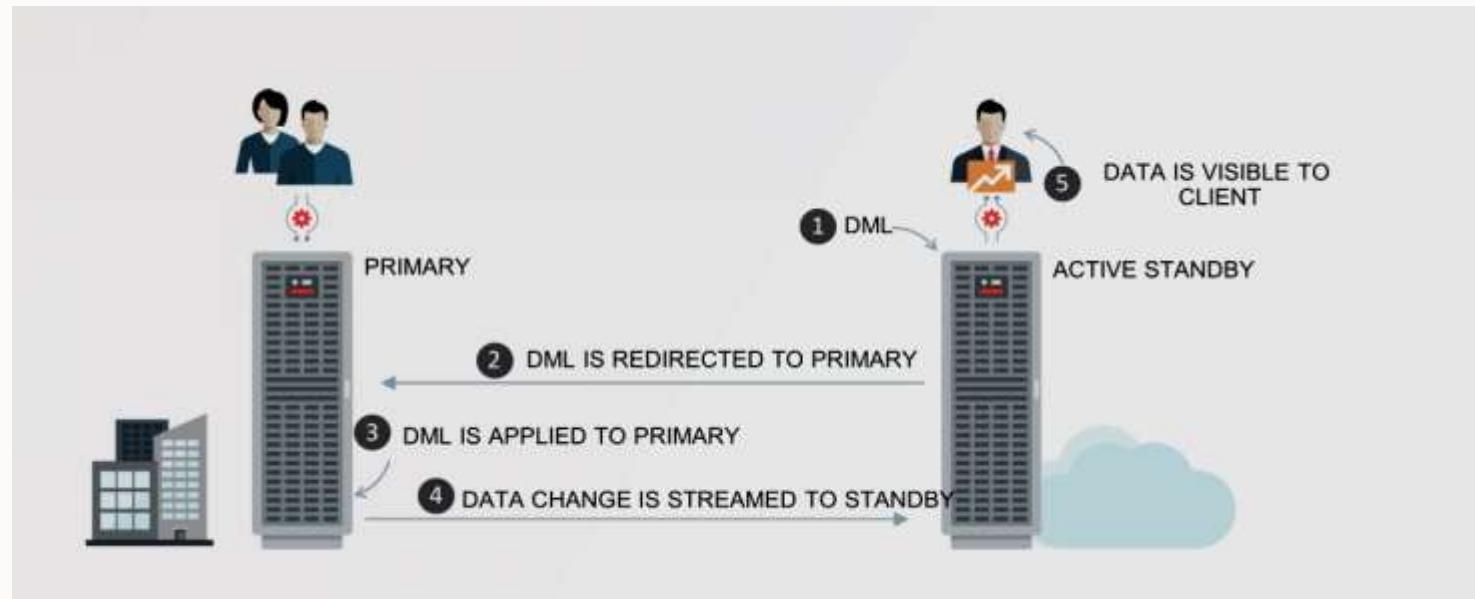
## Real-time Data Protection & Availability

### When to use

- ✓ Provides HA and DR solutions
- ✓ Minimal downtime migration
- ✓ Source version 11.2.0.4, 12.1.0.2, 12.2.0.1, 18, 19, 21 and 23c
- ✓ Only for Little Endian platforms  
Only non-CDB to non-CDB or PDB to PDB
- ⚠ No structural changes
- ⚠ No upgrade to new version

**Oracle Data Guard** ensures high availability, data protection, and disaster recovery for enterprise data.

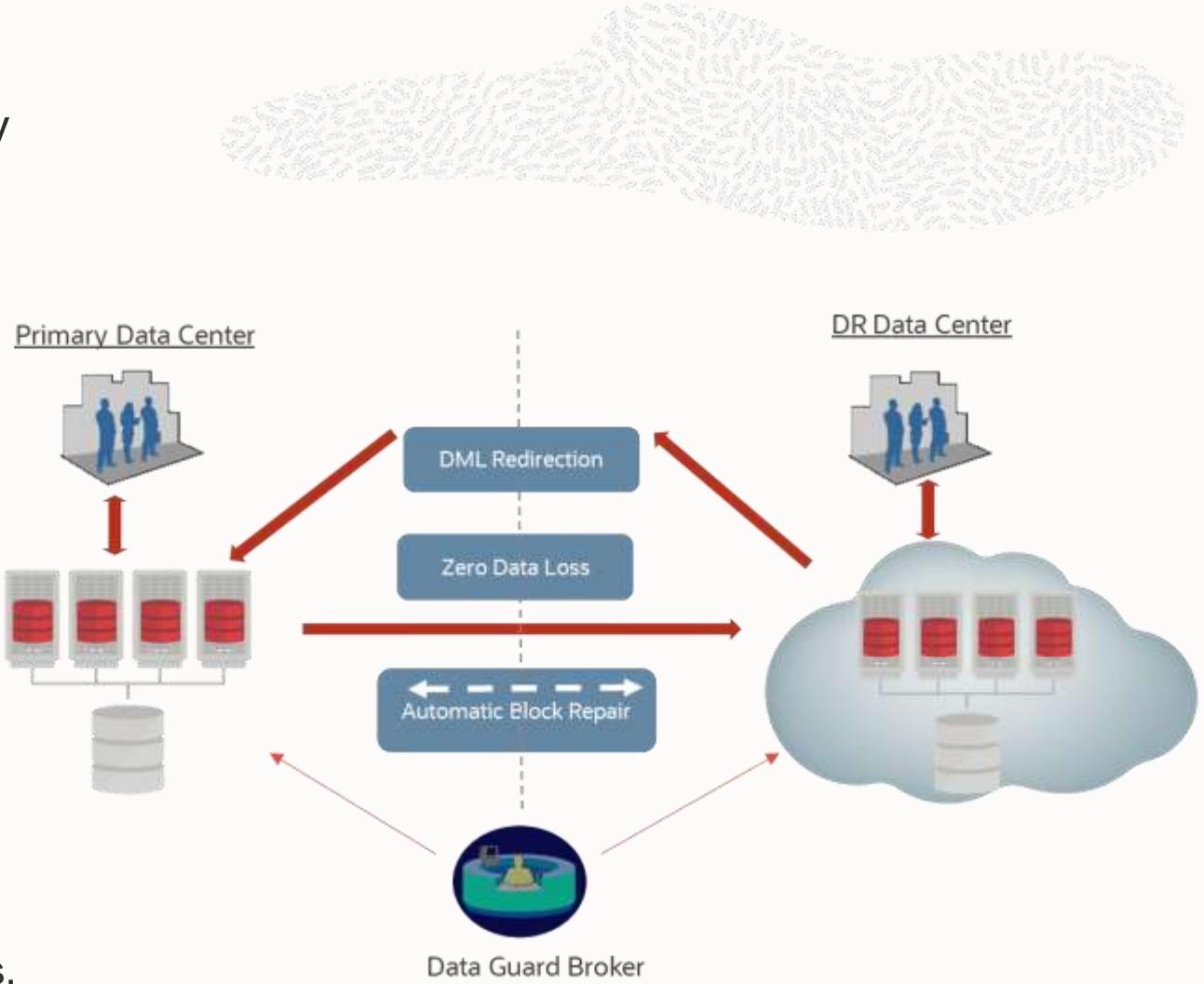
It provides a comprehensive set of services that create, maintain, manage, and monitor one or more standby databases.



# Active Data Guard

Oracle solution for Active Disaster Recovery

- Eliminates single point of failure
- Efficiently uses network bandwidth
- Provides unique levels of data protection
- Fast-Start failover to the standby
- Switchover to a standby
- Read Write mode on Standby.
- A True Sync between Primary and Secondary Instances.



# Oracle Database Multitanant

# Plug/Unplug

## Migration Methodology

### Source databases:

- CDB Databases 18c, 19c
- Non-CDB or CDB Databases 12c
- Non-CDB Databases 11g (via Upgrade)



### Target databases:

- DBaaS VM, DBaaS BM, ExaCS, ExaCC
- Versions: 12c, 18c, 19c, 21c and 23c

### When to use

- ✓ Source DB is Little-endian
- ✓ Supports small to large databases
- ✓ Migrate from non-CDB to CDB
- ⚠ Requires knowledge of migration tools like RMAN and Data Pump
- ⚠ Requires some down-time
- ⚠ Upgrade before migrate for 11g and lower versions



Simple



Flexible  
Architecture



Enterprise fleet-  
scale migrations



Free

# Plug/Unplug

## Migration Methodology

### Source databases:

- CDB Databases 18c, 19c
- Non-CDB or CDB Databases 12c
- Non-CDB Databases 11g (via Upgrade)



### Target databases:

- DBaaS VM, DBaaS BM, ExaCS, ExaCC
- Versions: 12c, 18c, 19c

### When to use

- ✓ Source DB is Little-endian
- ✓ Supports small to large databases
- ✓ Migrate from non-CDB to CDB
- ⚠ Requires knowledge of migration tools like RMAN and Data Pump
- ⚠ Requires some down-time
- ⚠ Upgrade before migrate for 11g and lower versions



Simple



Flexible  
Architecture



Enterprise fleet-  
scale migrations



Free

# Zero Downtime Migration (ZDM)

# Oracle Zero Downtime Migration 21.4

Announcing



## Oracle Zero Downtime Migration 21.4

Available  
Now !



[www.oracle.com/goto/zdm](http://www.oracle.com/goto/zdm)

### Physical Migration

Pause for Redo Apply Catch-up

Resume after manual Switchover

Configurable RMAN section size

Enhanced handling of  
DB\_NK\_Cache\_Size values

**& Much more !**

### Logical Migration

Support for Tables with  
XML Data Types

Separate Phase Data  
& Metadata migration

Sudo-less migration

**& Much more !**

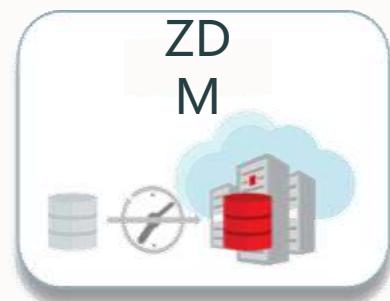
# Zero Downtime Migration (ZDM)

Simple migration tool for lift and shift use cases

## When to use

### Source databases:

- CDB/PDB Databases 12c, 18c, 19c
- Non-CDB Databases 11g, 12c, 18c, 19c



### OCI Target database:

- DBaaS VM, DBaaS BM, ExaCS, ExaCC
- Versions: 11g, 12c, 18c, 19c

- ✓ Free, easy to use tool
- ✓ Small to Large Database sizes
- ✓ Lift and Shift like to like versions
- ✓ Requires no downtime

- ⚠ In-Flight upgrade not possible
- ⚠ Cross-endian/ Cross-platform not possible



Simple



MAA Enabled

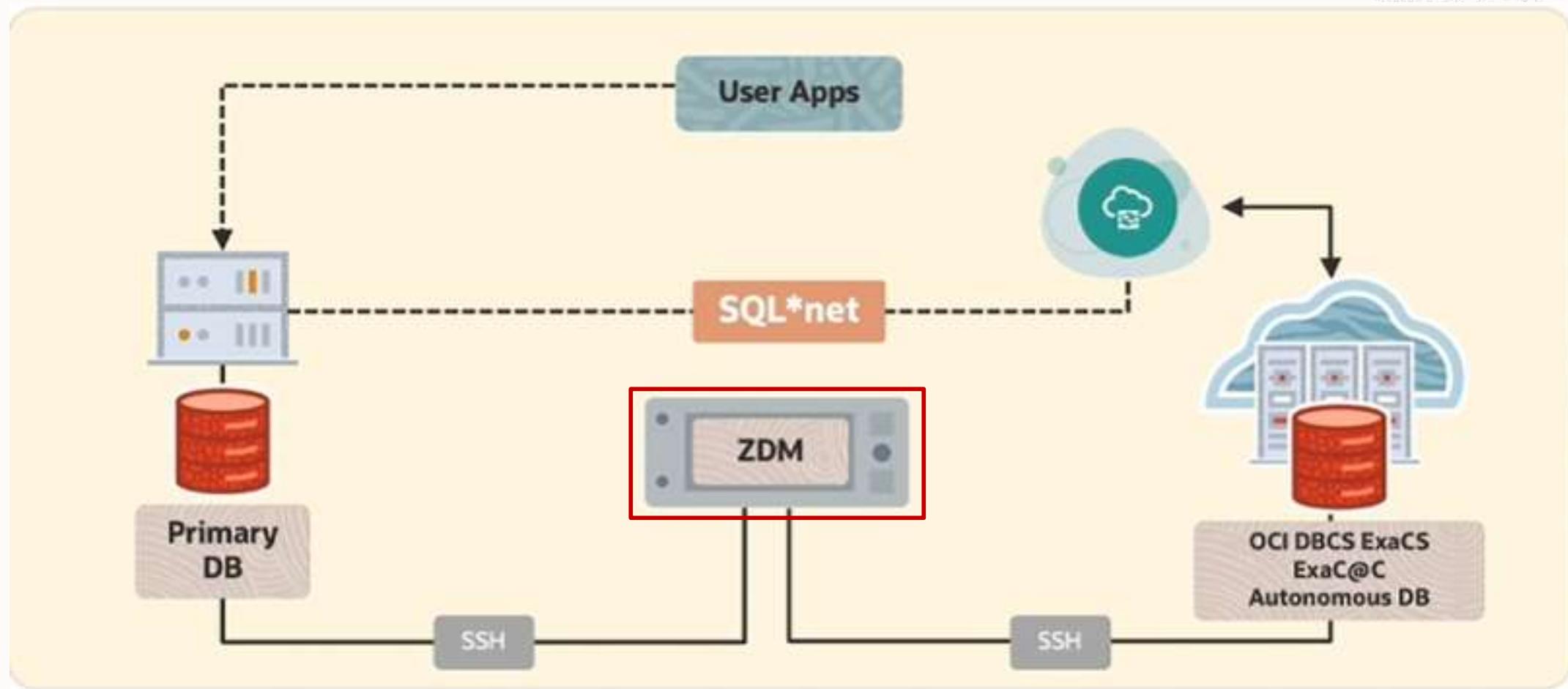


Enterprise fleet-  
scale migrations

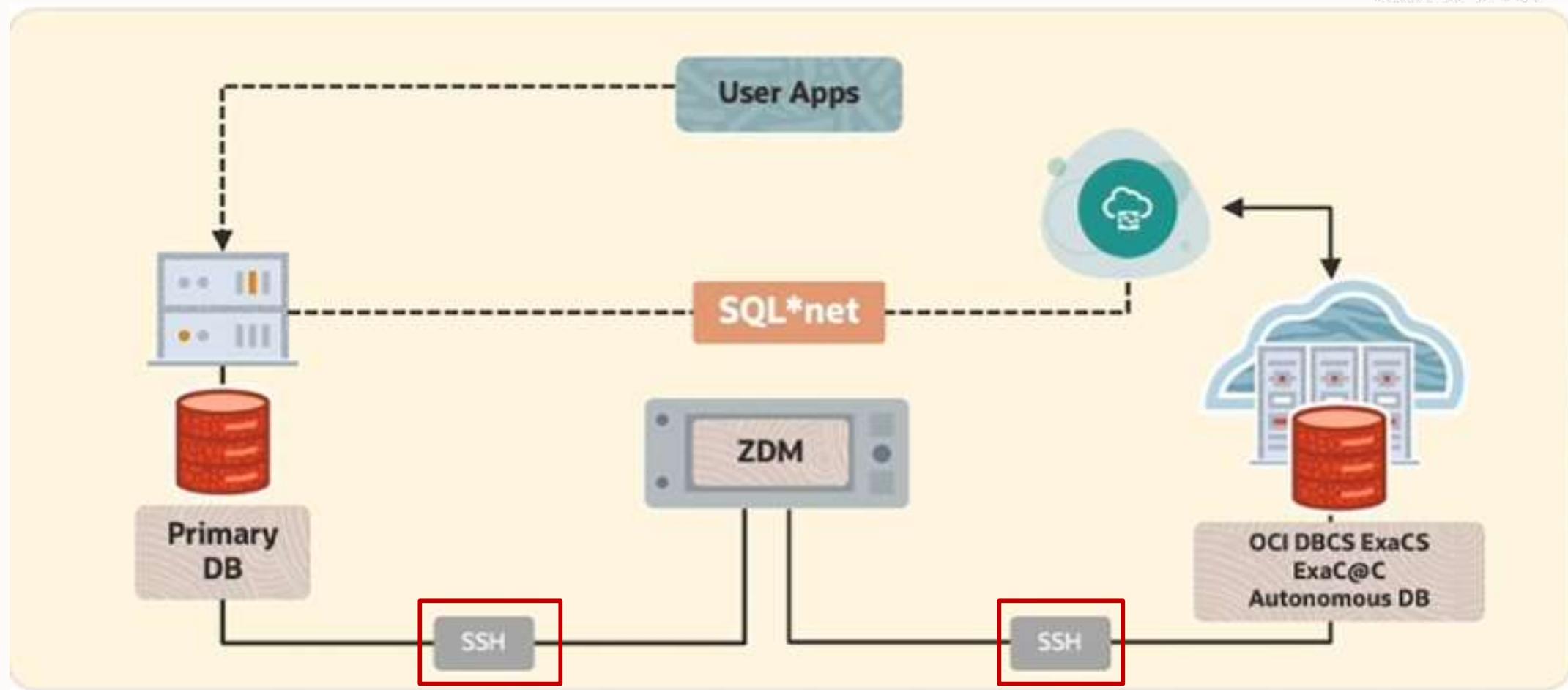


Free

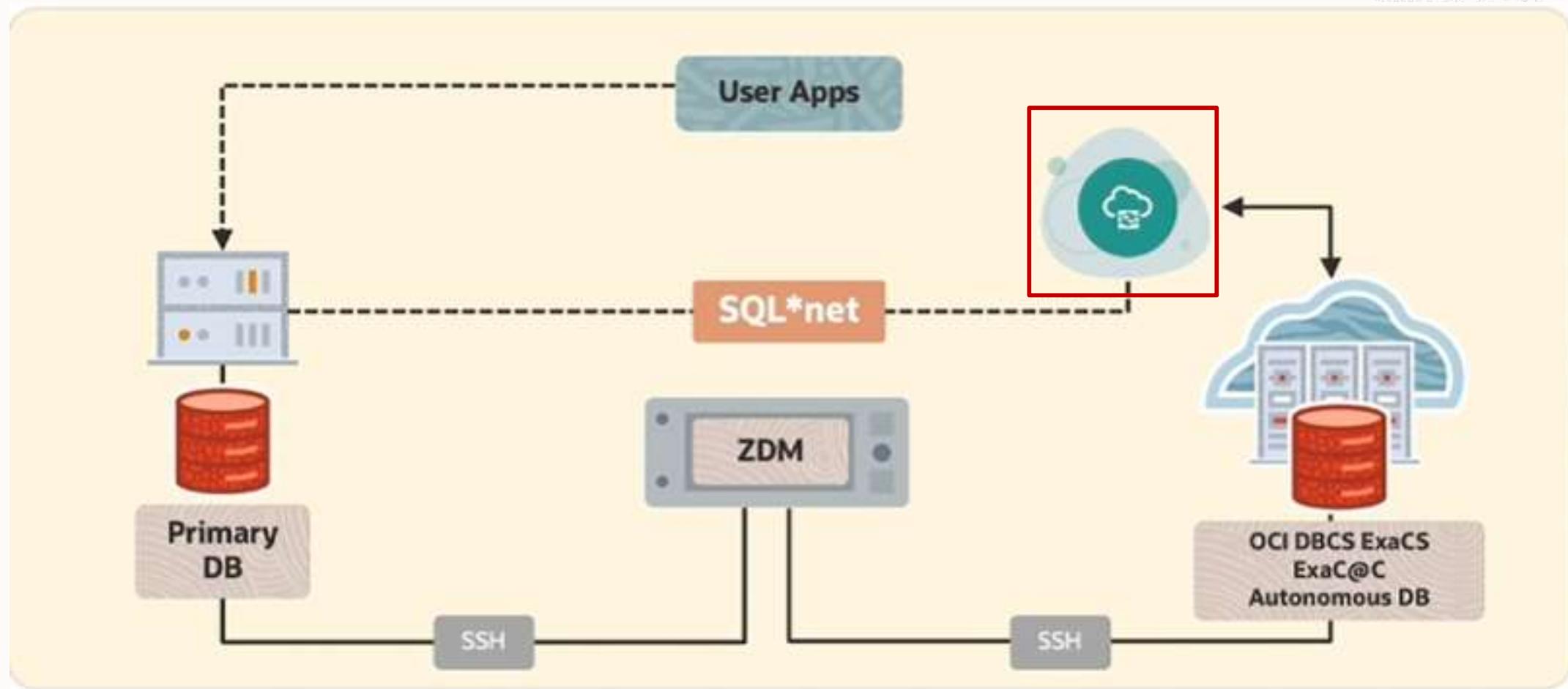
# ZDM | Architecture Physical Migration



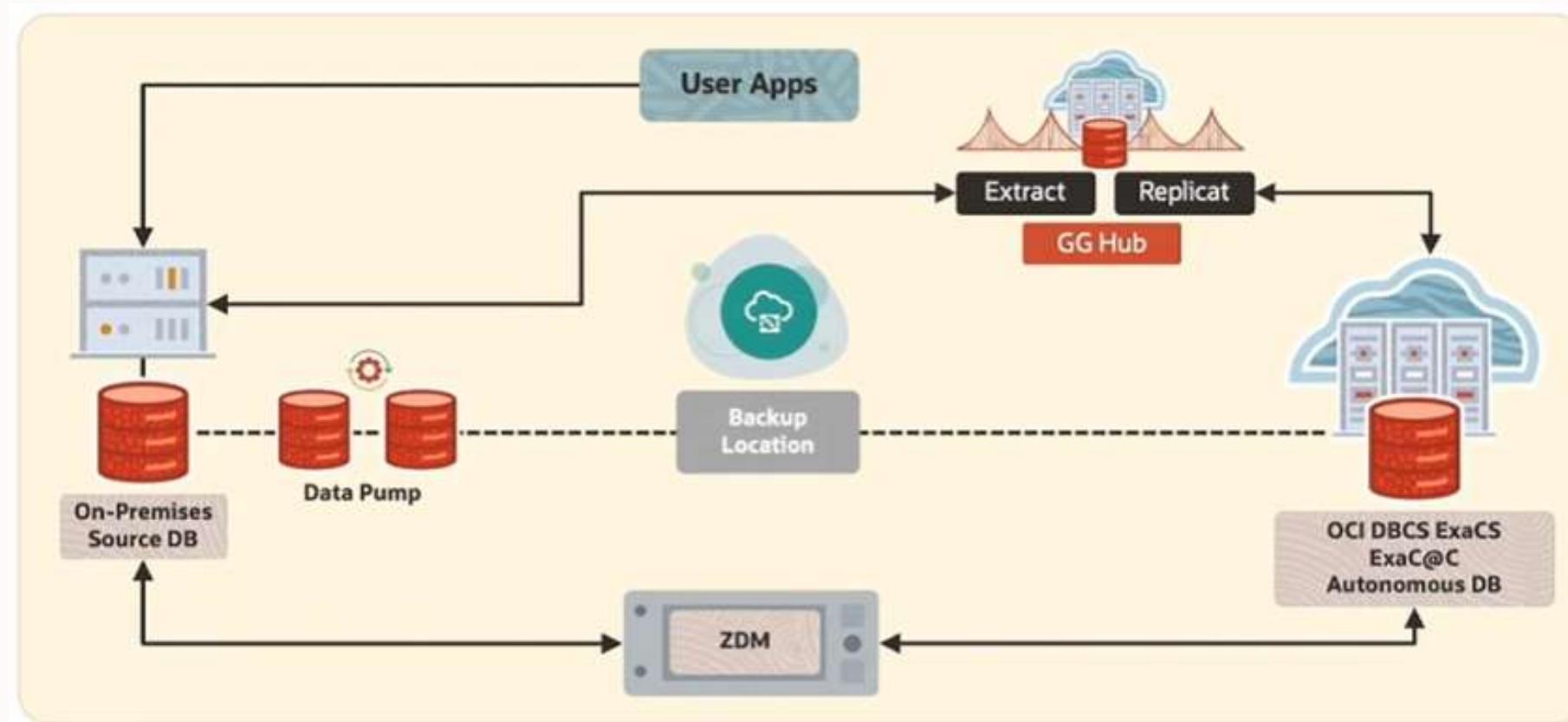
# ZDM | Architecture physical Migration



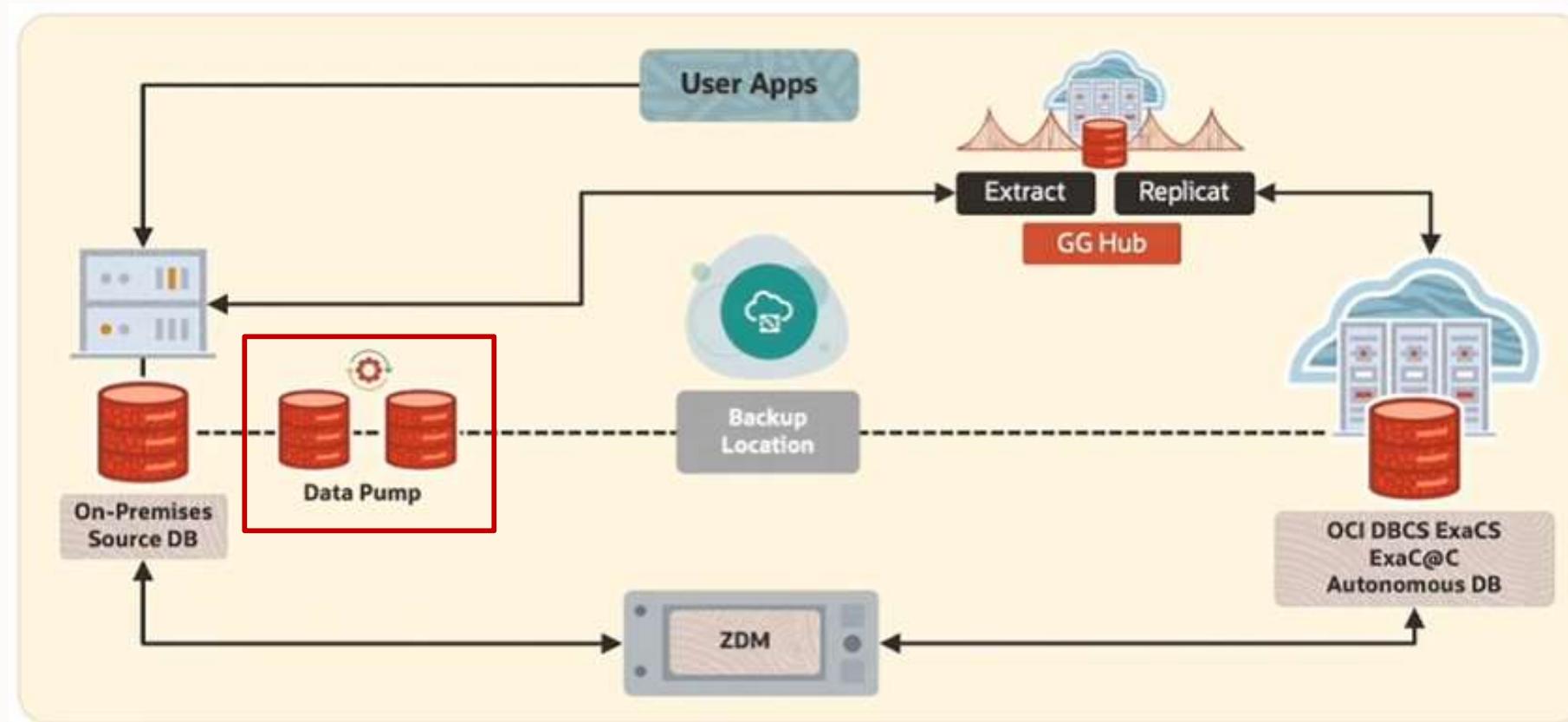
# ZDM | Architecture physical Migration



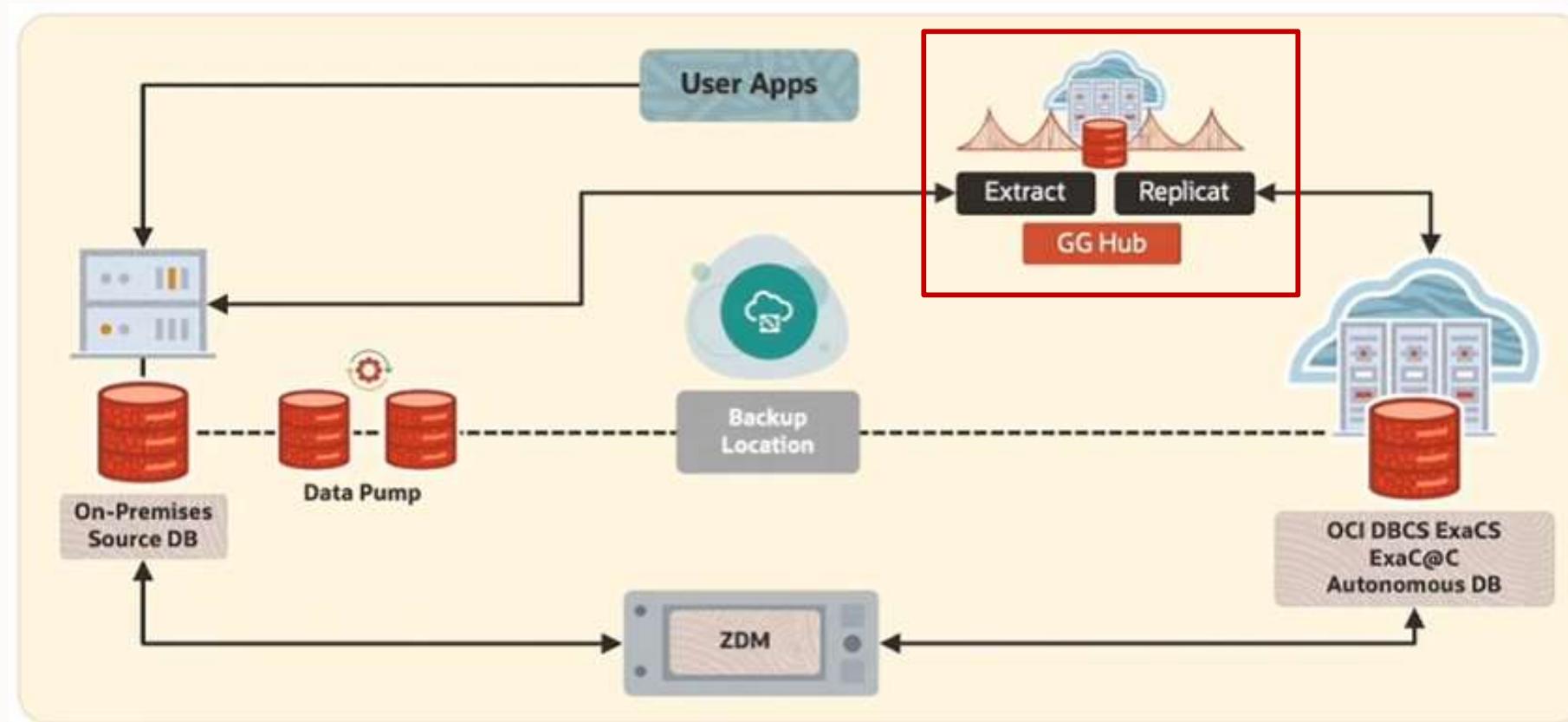
# ZDM | Architecture Logical Migration



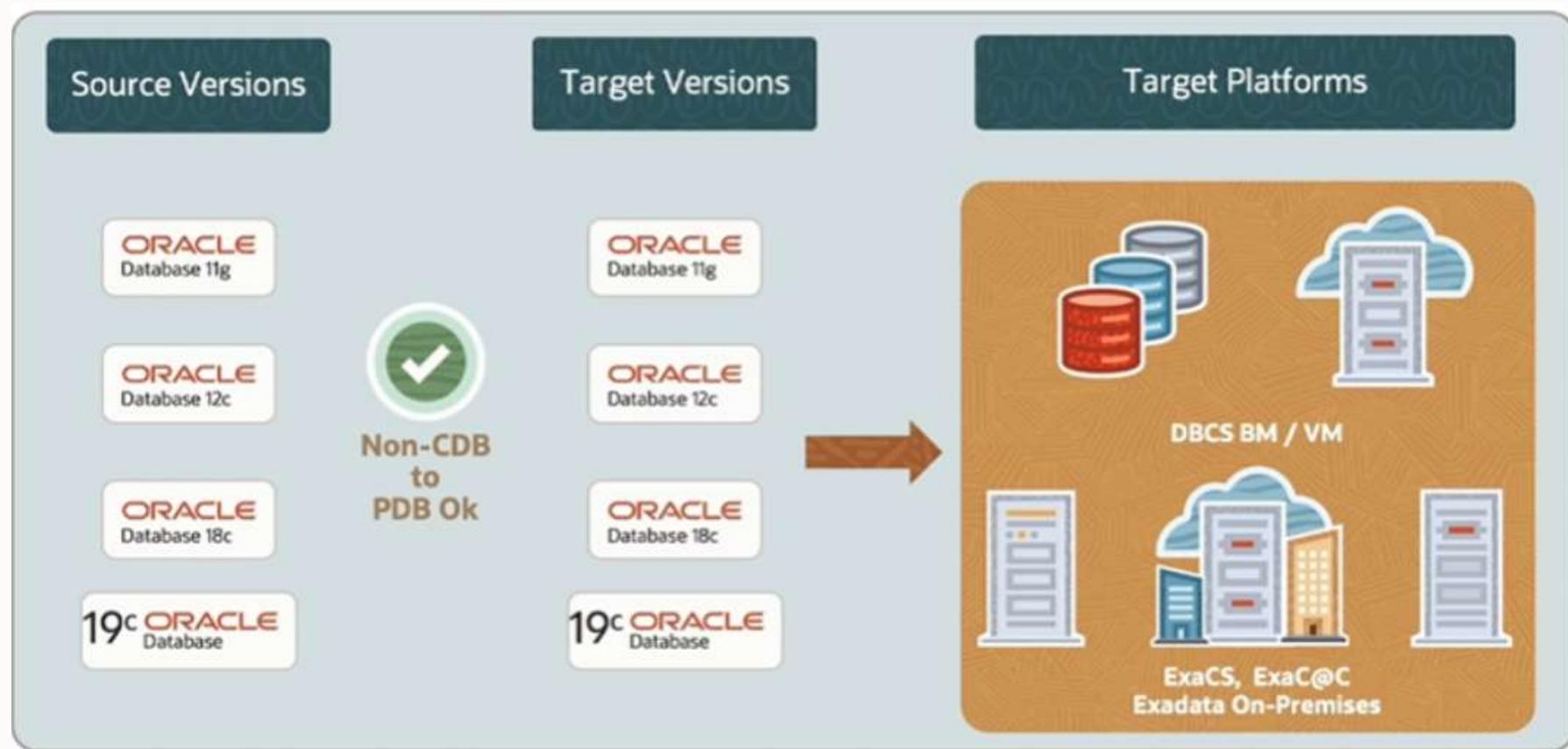
# ZDM | Architecture Logical Migration



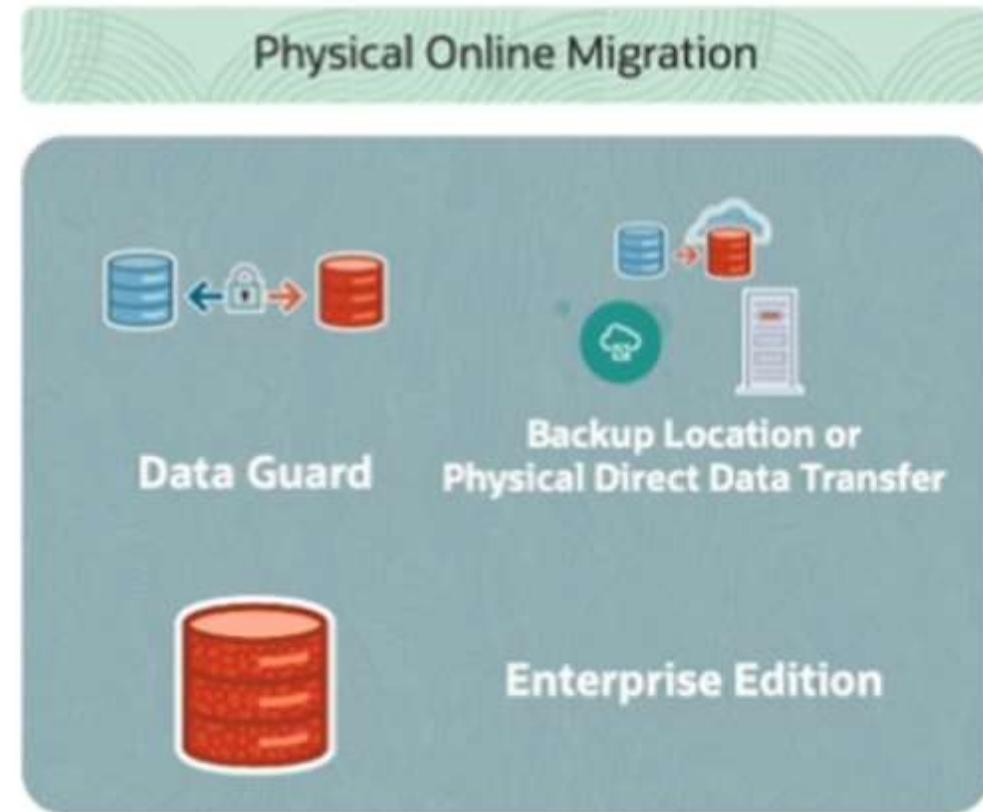
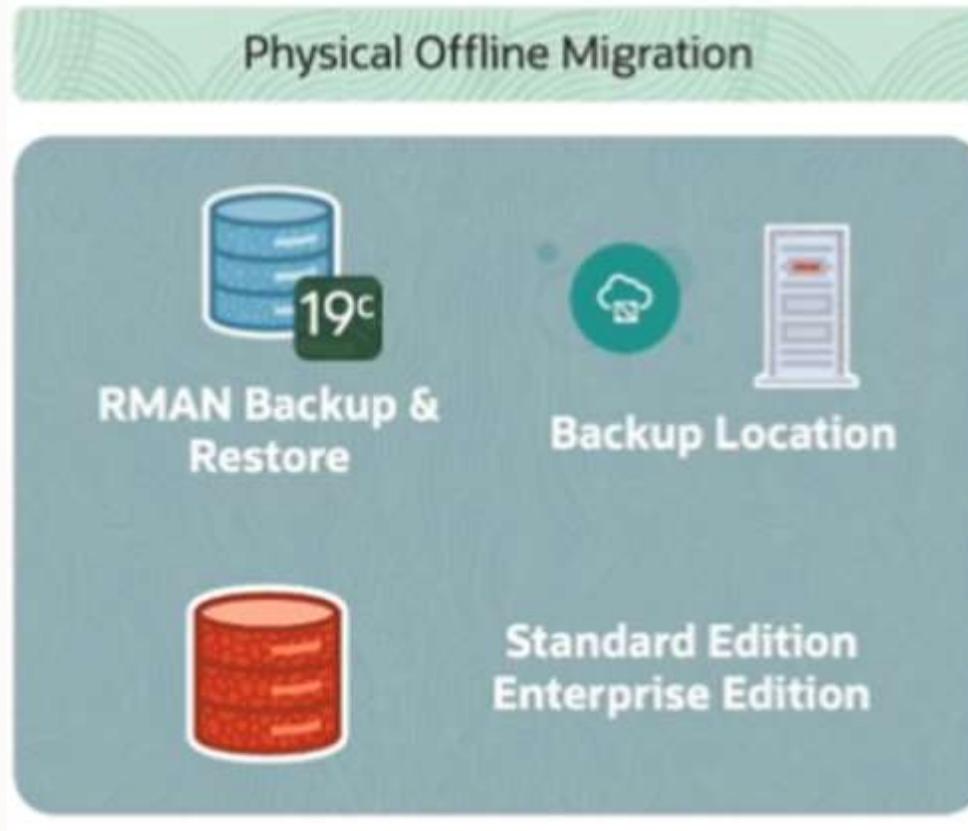
# ZDM | Architecture Logical Migration



# ZDM | Architecture Logical Migration



# ZDM | Architecture physical Migration



# Migration Process using Zero Downtime Migration Tool

## Migration Steps

### 1. Network Configuration

#### 1. Installing ZDM Tool

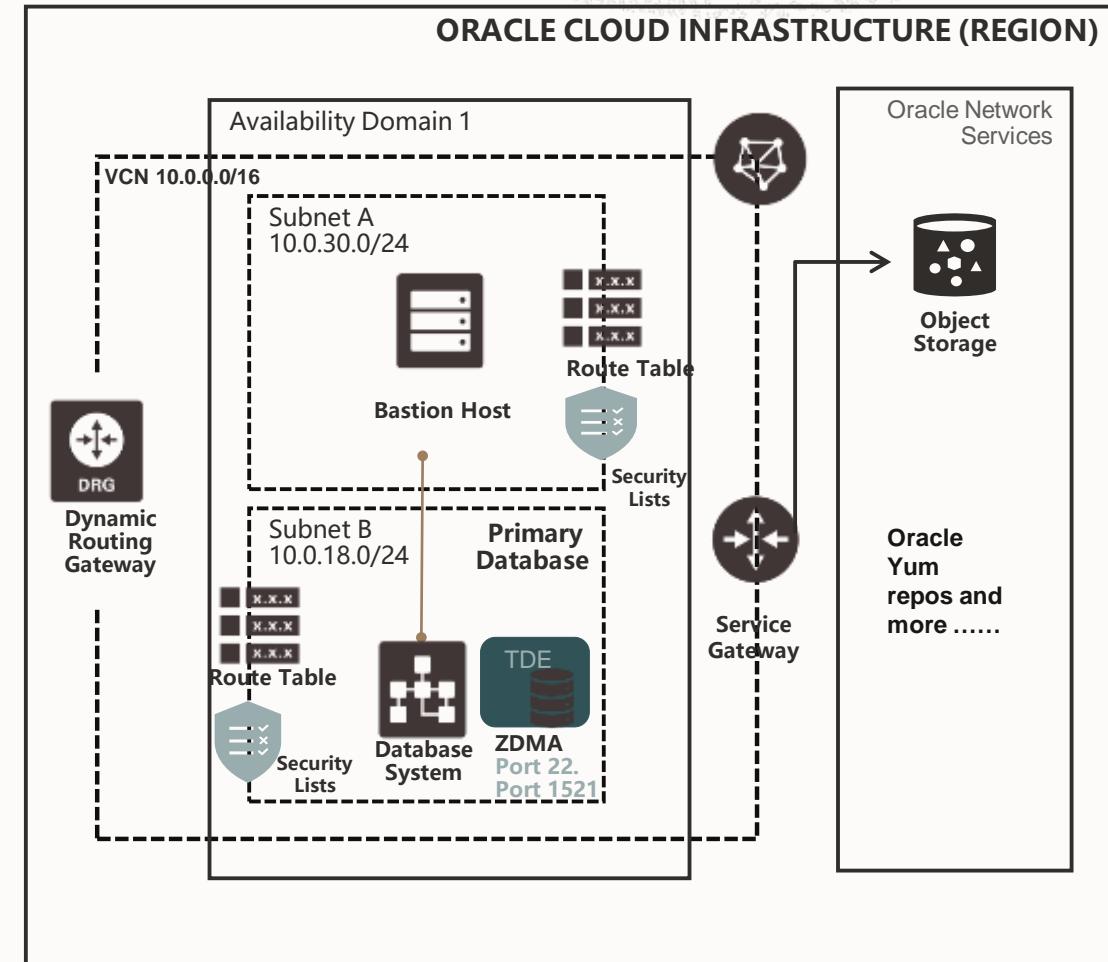
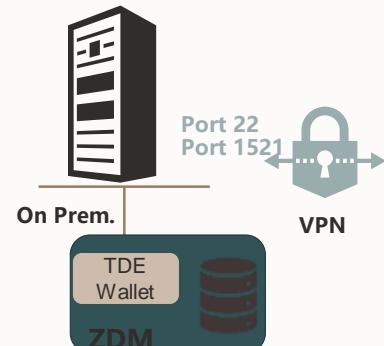
#### 2. Setting up communication

#### 3. Checking Encryption Wallet

#### 4. Configuring ZDM Tool

#### 5. Migration pre-check

#### 6. Migrate the Database



# OCI Database Migration (DMS)

# OCI Data Fully managed, easy-to-use database migrations

## Database migrations

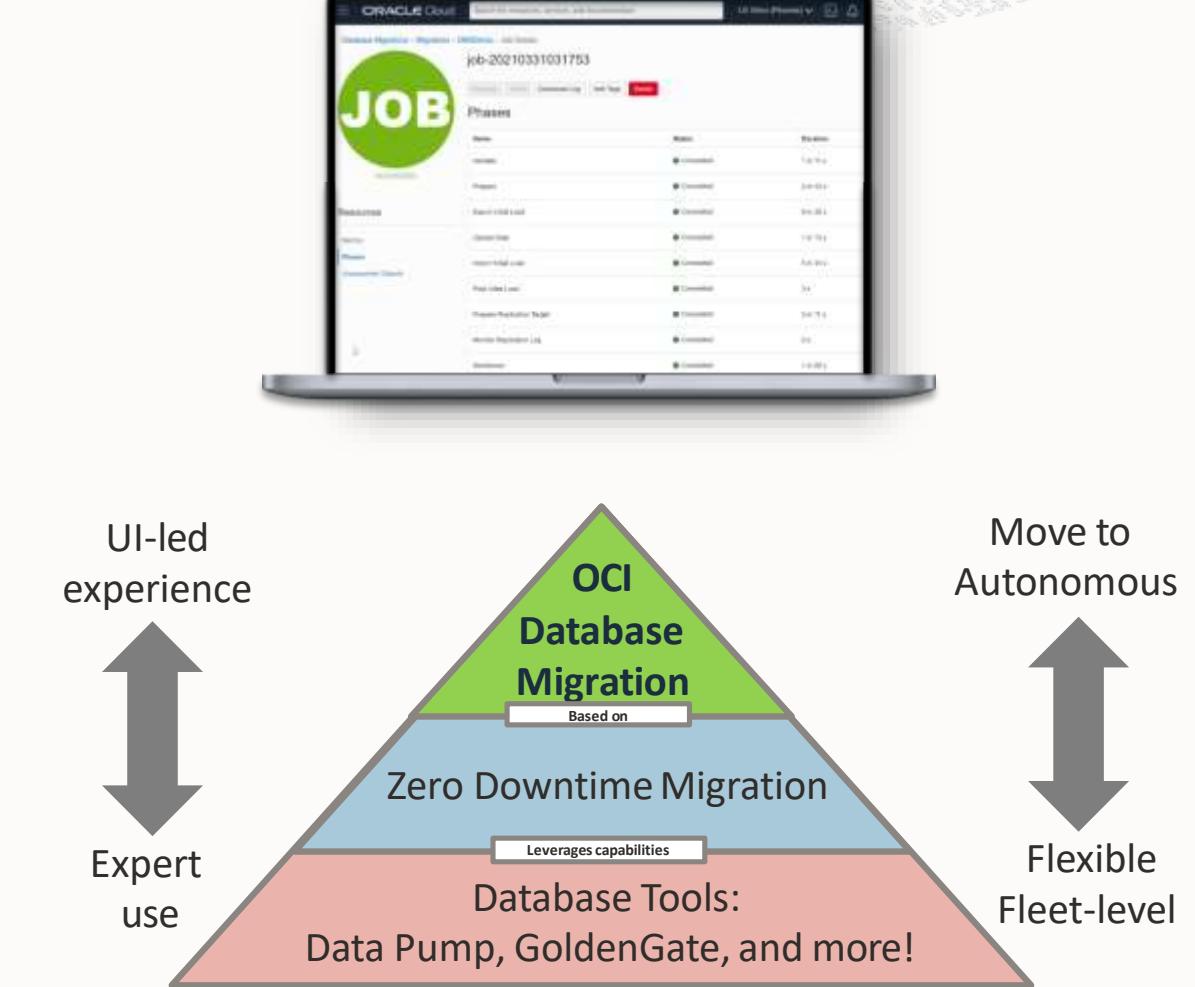
- Reduce cost and improve performance in Oracle Cloud
- Migrate databases, free for 6 months per migration

## Core use cases

- Machine-assisted migrations for Oracle Databases, Data Marts and Data Warehouses into Oracle Cloud

## Differentiated use cases

- Simplifies underlying technologies and resources
- Logical *offline* and *online* migrations
- Schema/metadata migration
- Uses enterprise-strength Oracle tools: Data Pump, Zero Downtime Migration, and GoldenGate

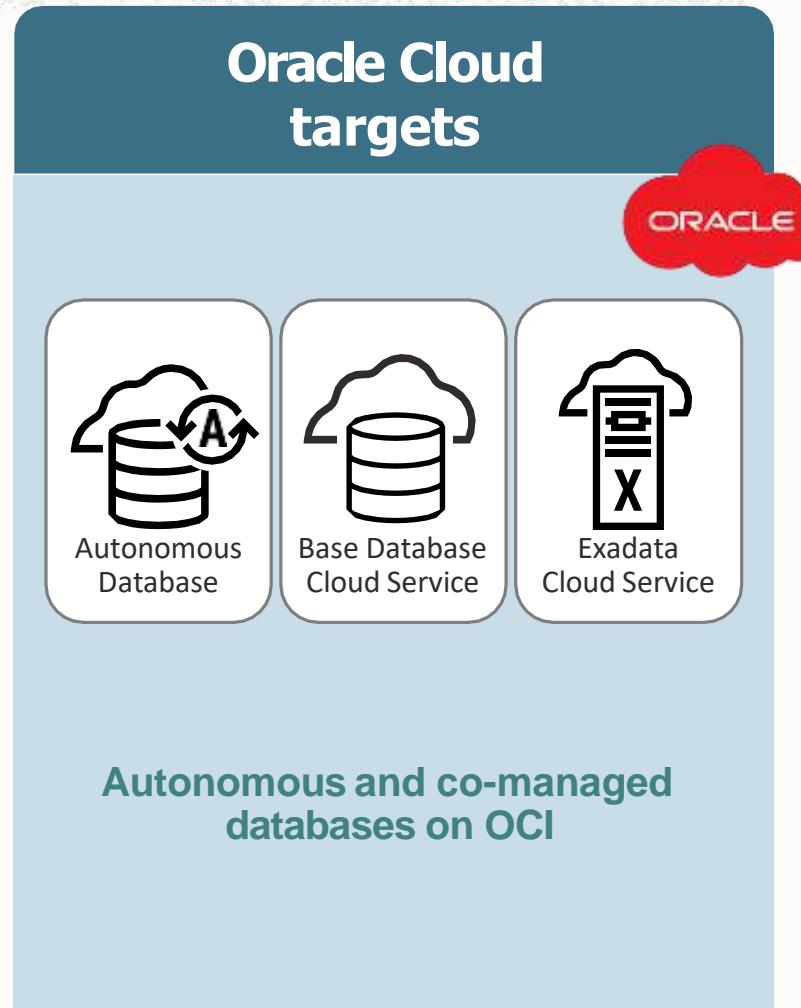


# OCI Database Migration – Native OCI Cloud Service

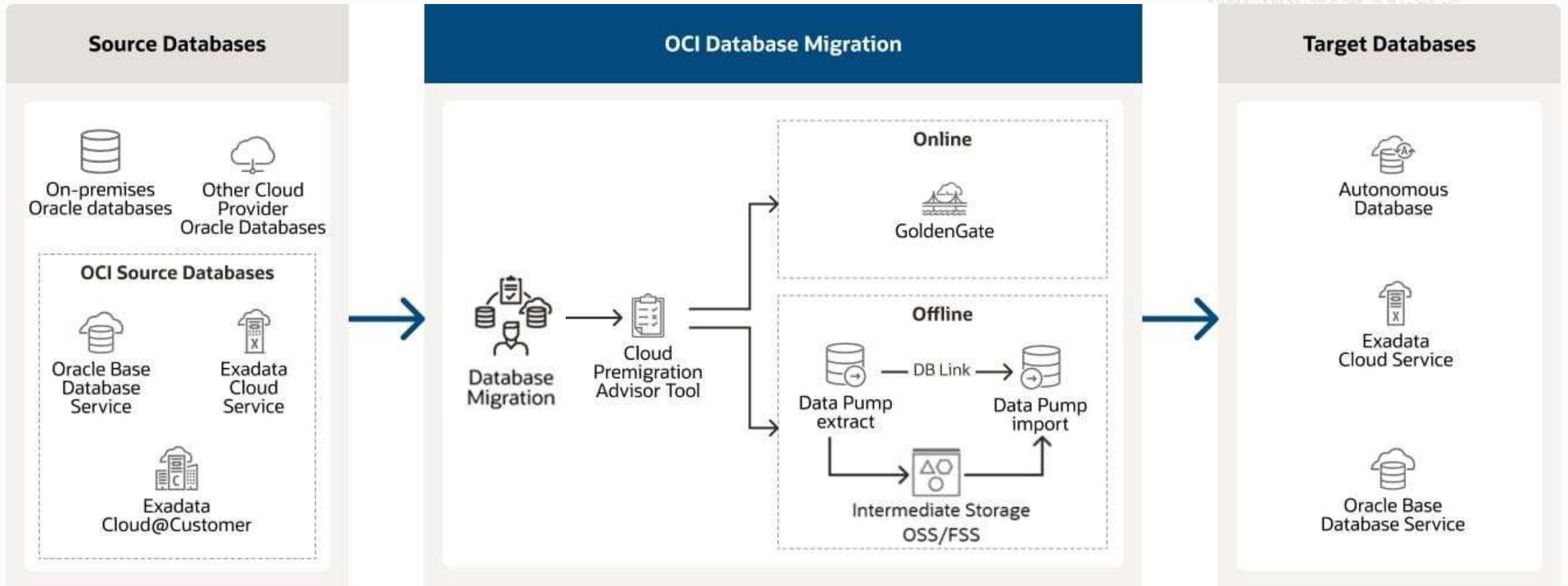
Supported sources, database versions, and targets



- ✓ CDB or Non-CDB
- ✓ Cross-version  
(11.2.0.4 → 21c)
- ✓ Cross - endian



# How OCI Database migration works



# Migration Steps : Direct Online Migration

## 1. Configure all prerequisites:

- Set up VPN or FastConnect to access source DB
- Provision Target DB
- Provision OGG VM, Object Store, and Vault
- Configure source and target DBs for replication

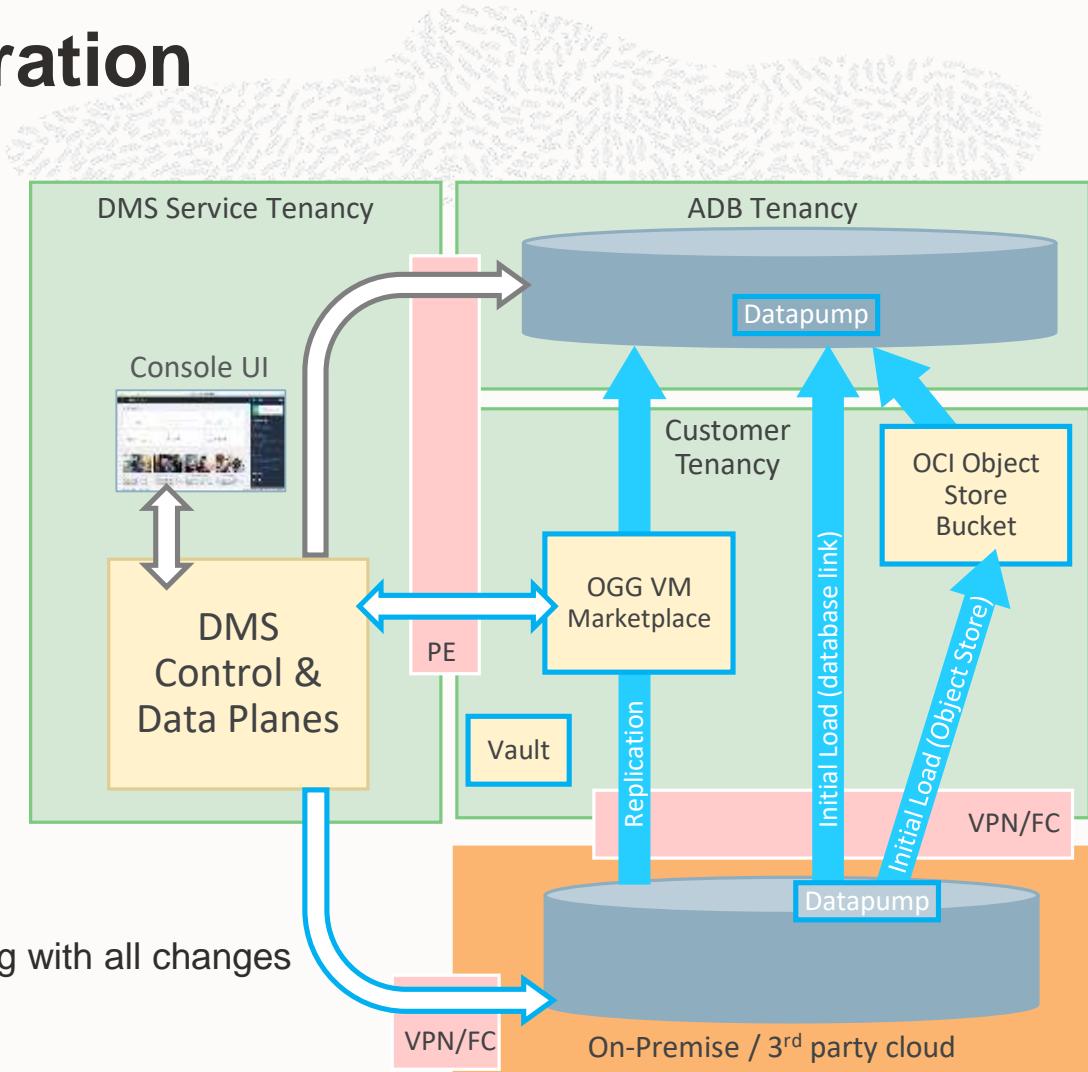
## 2. Create Migration in DMS

## 3. Evaluate Migration

## 4. Start Migration

- a. Export source DB to target DB using Datapump over dblin
- b. Create and start OGG replication from source DB to target DB starting with all changes after initial load

## 5. Complete Migration



# Migration Steps : Indirect Offline Migration

## 1. Configure all prerequisites:

- Provision Target DB
- Create OSS Stream
- Object Store Bucket

## 2. Download and install DMS Agent onsite

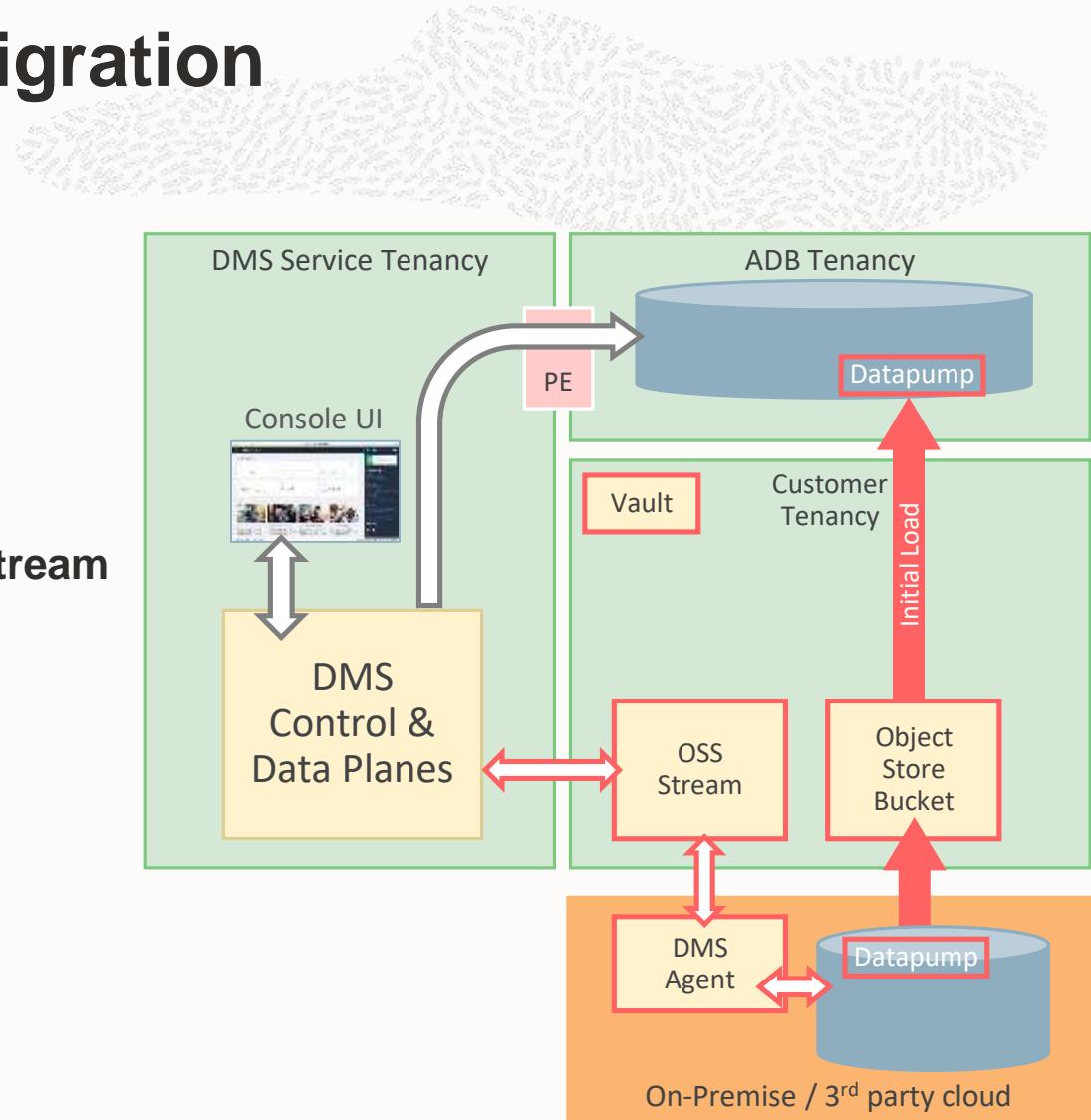
## 3. Configure connectivity for Agent to DMS Service and OSS Stream

## 4. Create Migration in DMS

## 5. Evaluate Migration

## 6. Start Migration

- a. Export source DB to Object Store using Datapump
- b. Import to target DB using Datapump



# Step 1: Open Database Migration on the OCI Console

The screenshot shows the OCI console interface. At the top, there is a navigation bar with the ORACLE Cloud logo, a Cloud Classic link, and a search bar. On the left, a sidebar lists various service categories: Networking, Oracle Database, Databases, Analytics & AI, Developer Services, Identity & Security, Observability & Management, Hybrid, Migration & Disaster Recovery (which is highlighted with a red box), Billing & Cost Management, Governance & Administration, Marketplace, and OCI Classic Services. The main content area is titled "Migration & Disaster Recovery". It contains three main sections: "Data Transfer" (with Import and Export links), "Cloud Migrations" (with Overview, Migrations, Remote Connections, Discovery, and Inventory links), and "Database Migration" (which is further expanded into Overview, Migrations, Database Connections, and Agents, all enclosed in a red box). Below these is another section titled "Disaster Recovery" (with Overview and DR Protection Groups links).



# Step 2: Register Source and Target Databases

Register Database Help

**1 Database Details** **2 Connection Details**

Name: MySourcePDB

Compartment: DMS\_LA  
ggsstage (root)/DMS\_LA

Vault in DMS\_LA [\(Change Compartment\)](#)  
DMS\_Vault

Encryption Key in DMS\_LA  
[\(Change Compartment\)](#)  
DMS\_Key

Select Database  Manually Configure Database

Database Type: Database (Bare Metal, VM, Exadata)

Database System in DMS\_LA  
[\(Change Compartment\)](#)  
SourceDB

Register Database Help

**1 Database Details** **2 Connection Details**

Name: MyTargetATP

Compartment: DMS\_LA  
ggsstage (root)/DMS\_LA

Vault in DMS\_LA [\(Change Compartment\)](#)  
DMS\_Vault

Encryption Key in DMS\_LA  
[\(Change Compartment\)](#)  
DMS\_Key

Select Database  Manually Configure Database

Database Type: Autonomous Database

Database in DMS\_LA [\(Change Compartment\)](#)  
TargetATP

# Step 3: Create Migration

Create migration Help

**1 Add details**

Name: TestMigration  
Compartment: jorge  
ggsstage (root)/DMS/jorge  
 Direct connection to source database  
The source database is directly accessible from the Cloud  
 No direct connection to source database  
Requires you to download and install an agent to use as a bridge to the source database  
Vault in jorge (Change compartment)  
DMSVault  
Encryption key in jorge (Change compartment)  
DMSSKey

**2 Select databases**

**3 Migration options**

Next Cancel

Create migration Help

**1 Add details**

**2 Select databases**

**3 Migration options**

**Source database**  
Database connection in jorge (Change compartment)  
SourcePDB  
 Database is pluggable database (PDB)  
Container database connection in jorge (Change compartment)  
SourceCDB

**Target database**  
Database connection in jorge (Change compartment)  
TargetADB

Previous Next Cancel

Create migration Help

**1 Add details**

**2 Select databases**

**3 Migration options**

Transfer medium for initial load  
 Data Pump via database link  
Use a direct SQL\*Net connection between the source and the target databases.  
 Data Pump via object storage  
Use Data Pump to temporarily store the exported database in an Object Storage bucket.  
 Data Pump via file storage  
Use a shared NFS mount between the source and the target databases using the File Storage Service.

**Source database**  
Export directory object name (i) Export directory object path (i)  
dumpdir /u01/app/oracle/dt

Object storage bucket in jorge (Change compartment)  
DMSStorage  
 Use online replication (i)

Previous Create Cancel



# Step 4 : Validate Migration

The screenshot shows two main panels. On the left, the 'TestMigration' panel has a green circular icon with 'DM' and the word 'ACCEPTED'. It includes tabs for 'Validate' (which is highlighted with a red box), 'Start', 'Clone', and 'Move resources'. Below these are migration details: OCID, Compartment, Created date, Encryption vault, and Encryption key. On the right, the 'JOB' panel has a red circular icon with 'JOB' and the word 'FAILED'. It shows a message about CPAT blockers, a job ID, and buttons for Resume, Abort, Download log, Add tags, and Delete. Below this are sections for 'Job information', 'Tags', 'Resources' (with 'Excluded objects'), and 'Phases'. The 'Phases' table lists three rows: 'Validate target' (Completed, 12 s), 'Validate source' (Completed, 13 s), and 'Validate premigration advisor' (Failed, 19 s). A large blue arrow points from the 'CPTA' section of the 'Phases' table towards the bottom right. The entire interface has a light gray background with a faint watermark of a brain.

TestMigration

DM  
ACCEPTED

Validate Start Clone Move resources

Migration information Notifications

OCID: ...khho4q Show Copy  
Compartment: ggsstage (root)/DMS/jorge  
Created: Wed, Feb 14, 2024, 21:16:26 UTC  
Encryption vault: DMS\_Vault  
Encryption key: DMS\_Key Edit

JOB  
FAILED

An attempt to migrate a database with zero downtime failed because execution of CPAT found blockers. The accompanying messages provide detailed information.

job-20240226225210

Resume Abort Download log Add tags Delete

Job information Tags

OCID: ...uijja Show Copy Migration: CPATChecks2SSH  
Created: Mon, Feb 26, 2024, 22:52:10 UTC Compartment: ggsstage (root)/DMS/jorge  
Type: Evaluation

Resources Excluded objects

Phases

Name	Status	Duration	More
Validate target	● Completed	12 s	⋮
Validate source	● Completed	13 s	⋮
Validate premigration advisor	● Failed	19 s	⋮

CPTA

Copyright © 2024, Oracle and/or its affiliates

Embedded CPAT rules evaluate source database for issues.

Validation fails when issues need user attention.

# Step 4 : Validate Migration – Resolve CPTA issues

### Validate premigration advisor

AR  
FAILED

Advisor report information

Action required count: 12  
Review required count: 2  
Review suggested count: 4

#### Resources

#### Checks

A check is a compatibility test for source database objects in the target database environment. Checks are categorized by their status: action required, review suggested, review required, or failed result. [Learn more](#)

Name	Result	Reviewed
Has columns with media data types adb	Action required	No
Has noexport object grants	Review required	No
Gg.not unique bad col no	Review required	No
Do has low streams pool size	Passed	No

**Issue** → **Action plan**

The advisor displays the *Issue*, *Impact*, and available *Actions*. In this case, the problematic object is excluded from the migration.

### View check details

**Name:** Has columns with media data types adb  
**Result:** Action required  
**Reviewed:** No  
**Issue:** Multimedia object types such as those from ORDSYS cannot be used in Autonomous databases.  
**Impact:** Columns with Media data types are not allowed in Autonomous Database. Migration of tables with multimedia columns will fail.  
**Action:** Follow the instructions in the Oracle Multimedia README.txt file in <ORACLE\_HOME>/ord/im/admin/README.txt, or Oracle Support Document ID 2555923.1 to determine if Oracle Multimedia methods and packages are being used. If Oracle Multimedia is being used, refer to Oracle Support Document ID 2347372.1 for suggestions on replacing Oracle Multimedia. Refer to Oracle Support Document ID 2375644.1 "How To Migrate Data From Oracle Multimedia Data Types to BLOB columns" for information on how to move data stored in Oracle Multimedia object types to SecureFiles LOBs.

**Objects:**

	Exclude all	Exclude selected	Include selected		
<input checked="" type="checkbox"/>	OWNER	TABLE_NAME	COLUMN_NAME	DATA_TYPE	Is excluded
<input checked="" type="checkbox"/>	HR01	IMAGE_TABLE	IMAGE	ORDIMAGE	No

1 selected      Showing 1 item    < Page 1 >

# Step 4 : Validate Migration - Validation Succeeded

The screenshot shows the Oracle Cloud Infrastructure Migration Service (OCM) interface. On the left, there is a large green circle with 'DM' in white, labeled 'ACCEPTED'. Above it, the text 'TestMigration' is displayed. A red box highlights the 'Validate' button in the top navigation bar. Below the navigation, there are tabs for 'Migration information', 'Notifications', and 'Tags'. Under 'Migration information', details are shown: OCID: ..., compartment: ggsstage (root)/DM, created: Wed, Feb 14, 2024, 21:1, encryption vault: DMS\_Vault, and encryption key: DMS\_Key. On the right, there is a large green circle with 'JOB' in white, labeled 'SUCCEEDED'. Above it, the text 'job-20240214211656' is displayed. A red box highlights the 'Delete' button in the top navigation bar of the job view. Below the job view, there are sections for 'Resources' (Phases and Excluded objects) and 'Phases'. The 'Phases' section contains three rows: 'Validate target' (Completed, 7 s), 'Validate source' (Completed, 5 s), and 'Validate premigration advisor' (Completed, 15 s). A large green arrow points from the 'Validate' button in the migration view to the 'Validate premigration advisor' row in the phases table.

After repairs, the validation runs again. When validation succeeds, the migration continues to the next phase.

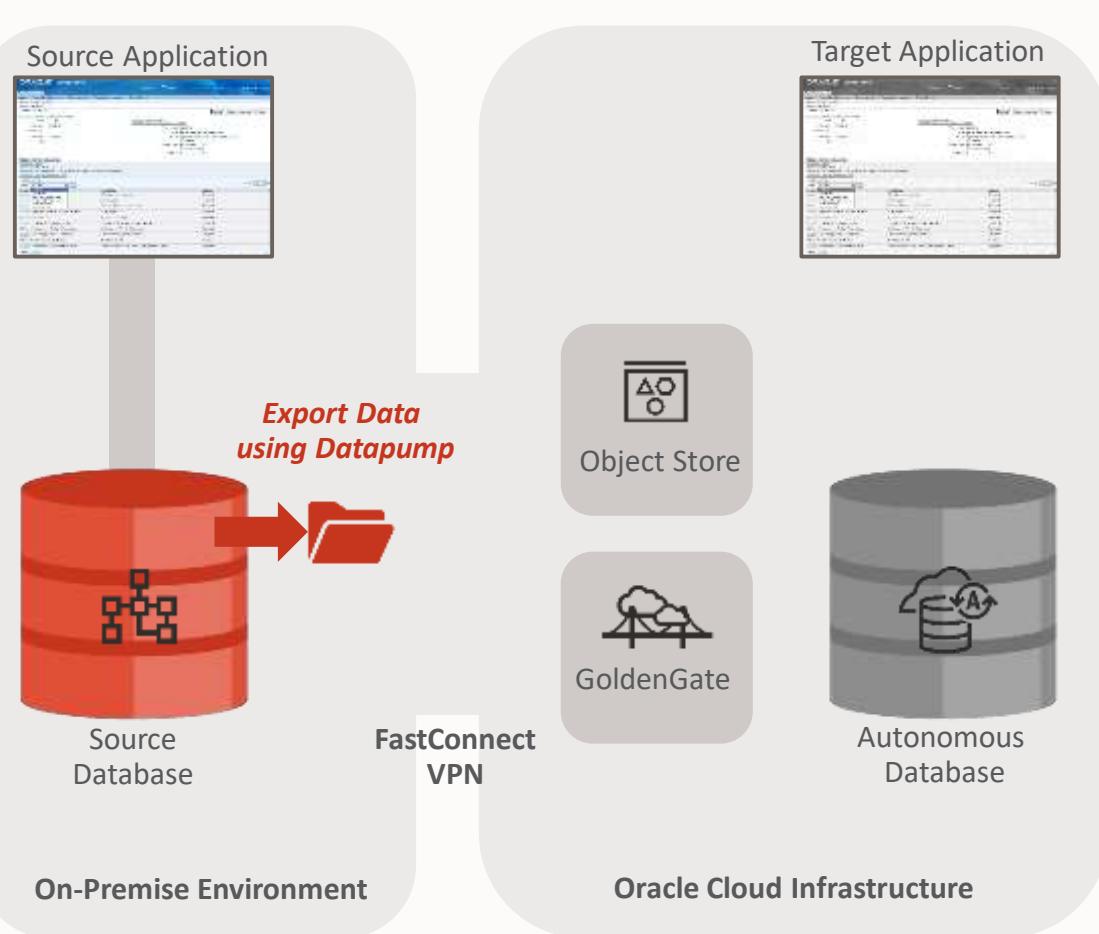
# Step 5: Start Migration

The screenshot shows the Oracle Cloud Infrastructure Migration Service console. On the left, there is a large green circle with 'DM' in white, labeled 'ACCEPTED'. To its right, the migration job is titled 'TestMigration'. The top navigation bar includes 'Validate', 'Start' (which is highlighted with a red box), 'Clone', 'Move resource', and 'More actions'. Below the title, 'Migration information' details are shown: OCID: ...khho4q, Compartment: ggsstage, Created: Wed, Feb 14, Encryption vault: DM, and Encryption key: DMS. A large orange circle in the center contains the word 'JOB' in white, with 'IN PROGRESS' written below it. A status message above the job ID says 'Migration in progress at phase "Validate" (Phase 1 of 7)'. The job ID is 'job-20240228003617'. Below the job ID are buttons for 'Resume', 'Abort', 'Download log', 'Add tags', and 'Delete'. A tab bar shows 'Job information' (selected) and 'Tags'. Under 'Job information', details include OCID: ...hic5ea, Migration: CPATChecks2, Created: Wed, Feb 28, 2024, 00:36:17 UTC, Compartment: ggsstage (root)/DMS/jorge, and Type: Migration. At the bottom, there are sections for 'Resources' and 'Phases'. The 'Phases' table has columns for 'Name', 'Status', and 'Duration'. It lists two phases: 'Validate' (Started, 5 s 55 ms) and 'Prepare' (Pending). The 'Resources' section includes tabs for 'Excluded objects' and 'Metrics'.

Phases	Name	Status	Duration
Excluded objects	Validate	Started	5 s 55 ms
Metrics	Prepare	Pending	—

# Start Migration – Export Initial Load

Current DB state is exported to files using datapump

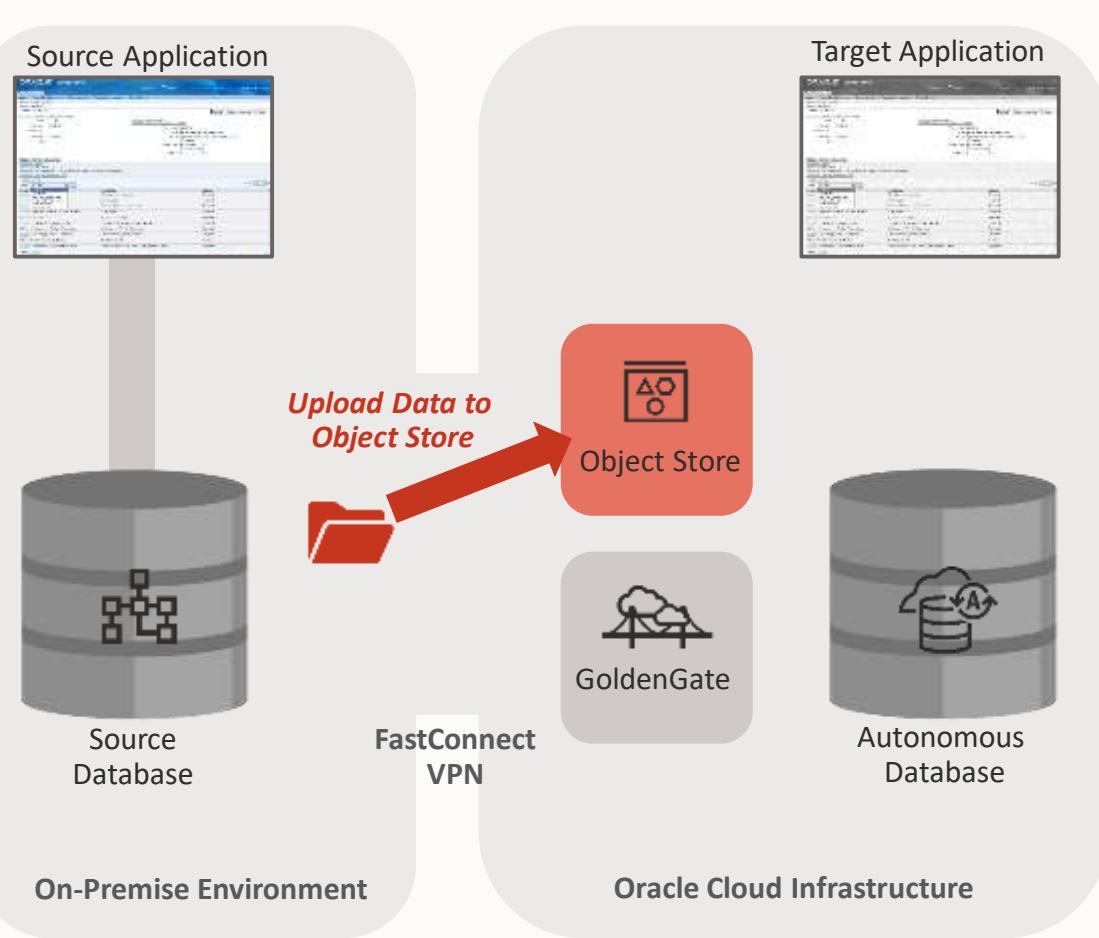


Name	Status	Duration
Validate	Completed	1 m 11 s
Prepare	Completed	2 m 43 s
Export Initial Load	Started	3 m 38 s
Upload Data	Pending	—
Import Initial Load	Pending	—
Post Initial Load	Pending	—
Prepare Replication Target	Pending	—
Monitor Replication Lag	Pending	—
Switchover	Pending	—
Cleanup	Pending	—

Showing 10 Items < 1 of 1 >

# Start Migration – Upload Data

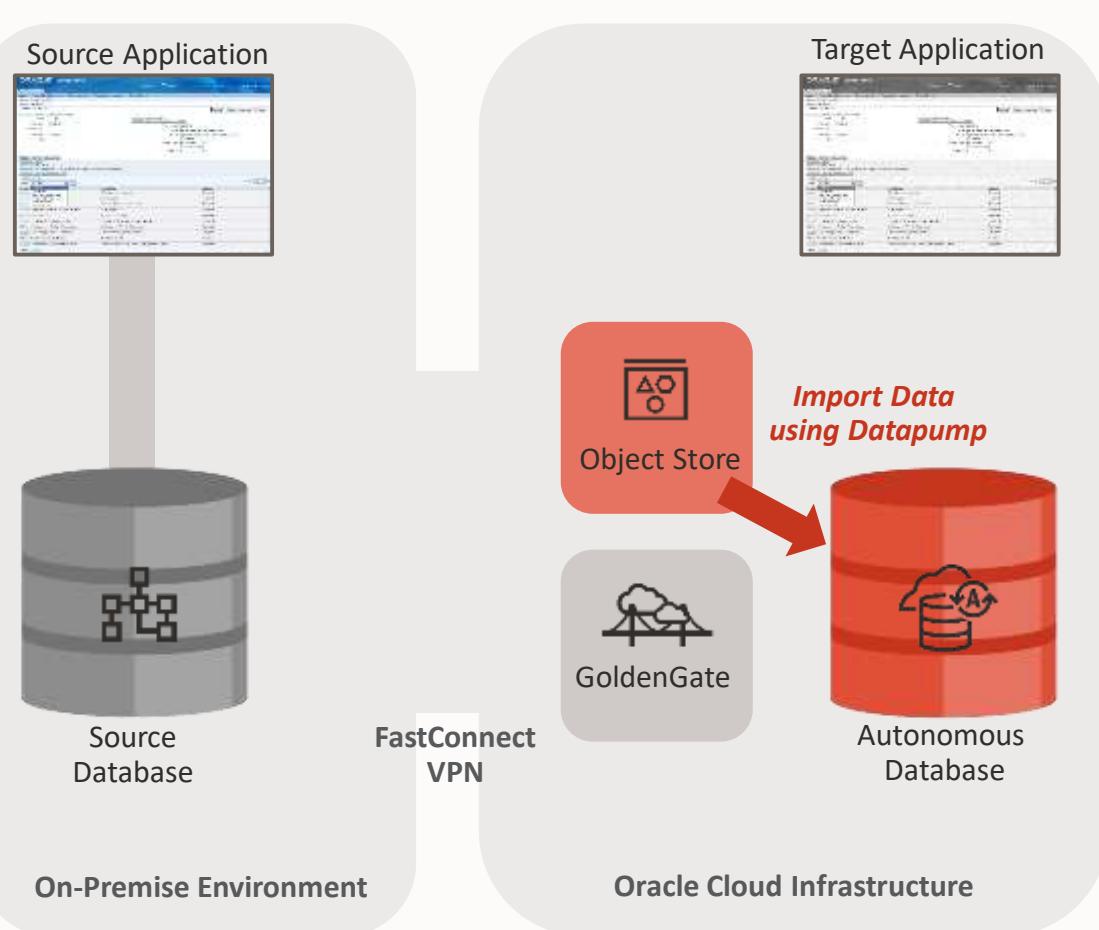
Datapump export is uploaded to Object Store



Phases		
Name	Status	Duration
Validate	Completed	1 m 11 s
Prepare	Completed	2 m 43 s
Export Initial Load	Completed	9 m 30 s
Upload Data	Started	26 s
Import Initial Load	Pending	—
Post Initial Load	Pending	—
Prepare Replication Target	Pending	—
Monitor Replication Lag	Pending	—
Switchover	Pending	—
Cleanup	Pending	—

# Start Migration – Import Initial Load

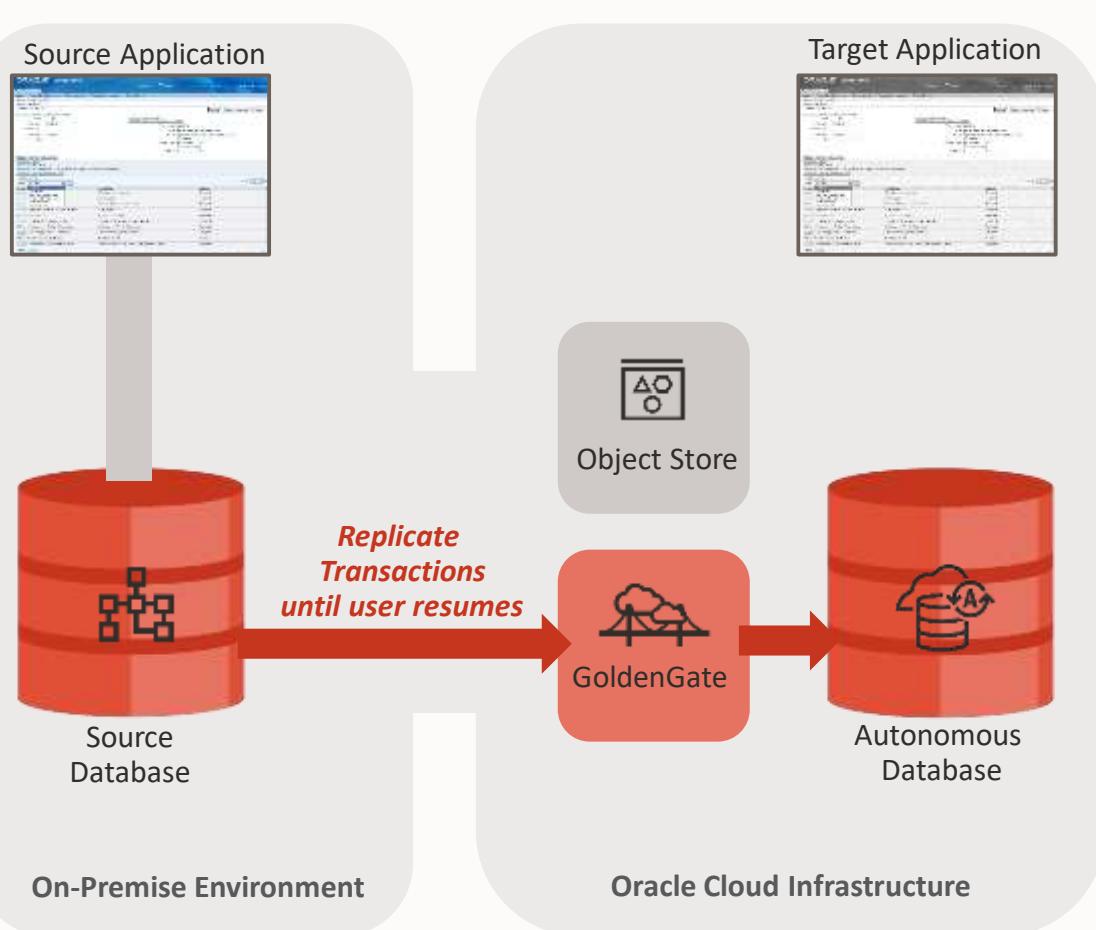
Exported dump files are imported to ADB



Phases		
Name	Status	Duration
Validate	Completed	1 m 11 s
Prepare	Completed	2 m 43 s
Export Initial Load	Completed	9 m 30 s
Upload Data	Completed	1 m 13 s
Import Initial Load	Started 50%	3 m 30 s
Post Initial Load	Pending	—
Prepare Replication Target	Pending	—
Monitor Replication Lag	Pending	—
Switchover	Pending	—
Cleanup	Pending	—

# Start Migration – Replication

DB transactions are replicated using GoldenGate until user resumes the next phase



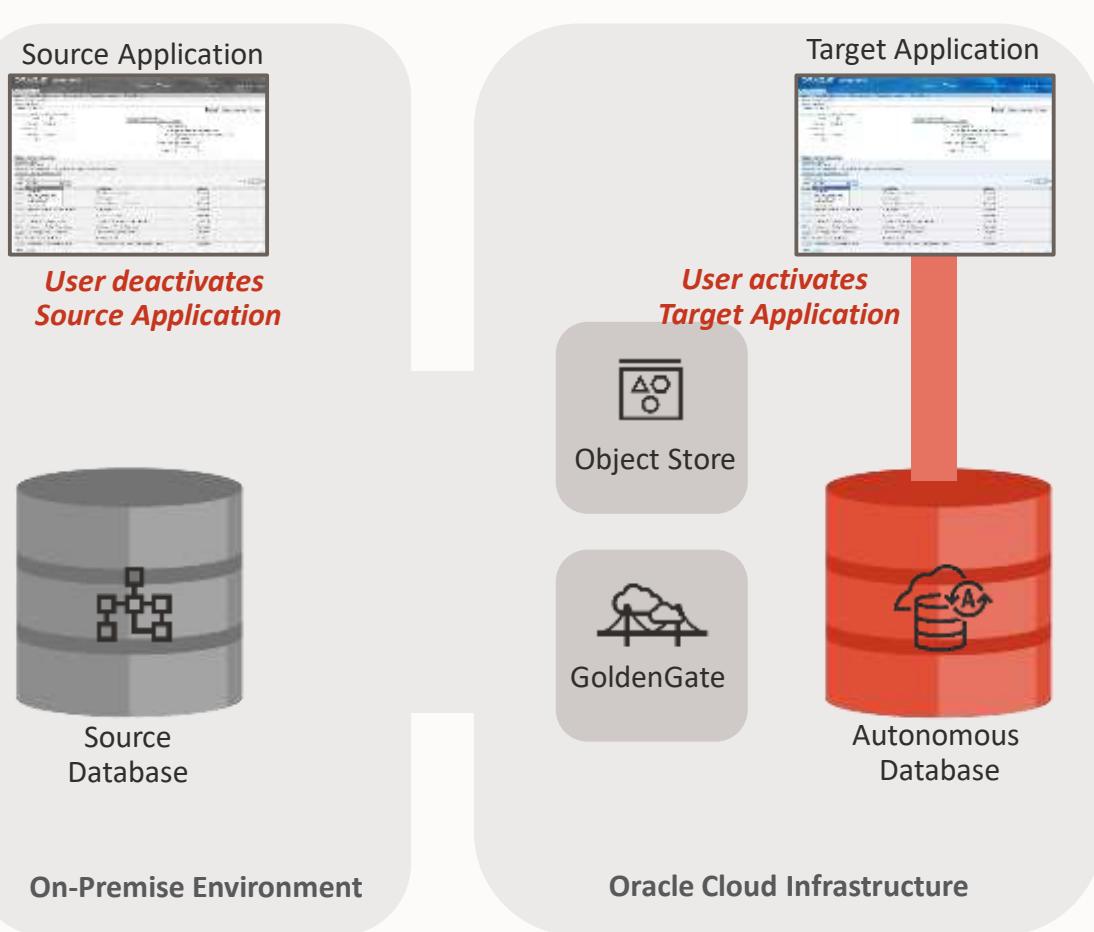
## Phases

Name	Status	Duration
Validate	Completed	1 m 11 s
Prepare	Completed	2 m 43 s
Export Initial Load	Completed	9 m 30 s
Upload Data	Completed	1 m 13 s
Import Initial Load	Completed	5 m 33 s
Post Initial Load	Completed	3 s
Prepare Replication Target	Completed	2 m 11 s
Monitor Replication Lag	Completed	2 s
Switchover	Pending	—
Cleanup	Pending	—

Showing 10 Items < 1 of 1 >

# Start Migration – Switchover

Wait until last transaction is replicated to let user switch over applications



Phases		
Name	Status	Duration
Validate	Completed	1 m 11 s
Prepare	Completed	2 m 43 s
Export Initial Load	Completed	9 m 30 s
Upload Data	Completed	1 m 13 s
Import Initial Load	Completed	5 m 33 s
Post Initial Load	Completed	3 s
Prepare Replication Target	Completed	2 m 11 s
Monitor Replication Lag	Completed	2 s
Switchover	Completed	1 m 26 s
Cleanup	Pending	—
Showing 10 Items < 1 of 1 >		

# Migration Succeeded!



### job-20240103044437

**JOB**  
SUCCEEDED

Resume Abort Download log Add tags Delete

Job information Tags

OCID: ...5ujwba Show Copy Migration: GREENBUTTON  
Created: Wed, Jan 3, 2024, 04:44:37 UTC Compartment: ggsstage (root)/DMS/jorge  
Type: Migration

Resources	Phases
Excluded objects	Name Status Duration
Metrics	Initialize replication infrastructure Completed 14 m 12 s 527 ms
	Validate Completed 4 m
	Prepare Completed 6 m
	Export initial load Completed 6 m
	Upload data Completed 55 m
	Import initial load Completed 45 m
	Post initial load Completed 15 m
	Prepare replication target Completed 4 m
	Monitor replication lag Completed 48 m
	Switchover Completed 6 m
	Cleanup Completed 4 m

Showing 11 items < 1 of 1 >

# Pricing: DMS is FREE for all common use cases



## Included:

- DMS cloud service/software that operates the migration
- On-premises agent, ZDM for optional use cases
- OCI managed infrastructure that DMS runs on
- GoldenGate Marketplace license for DMS migration

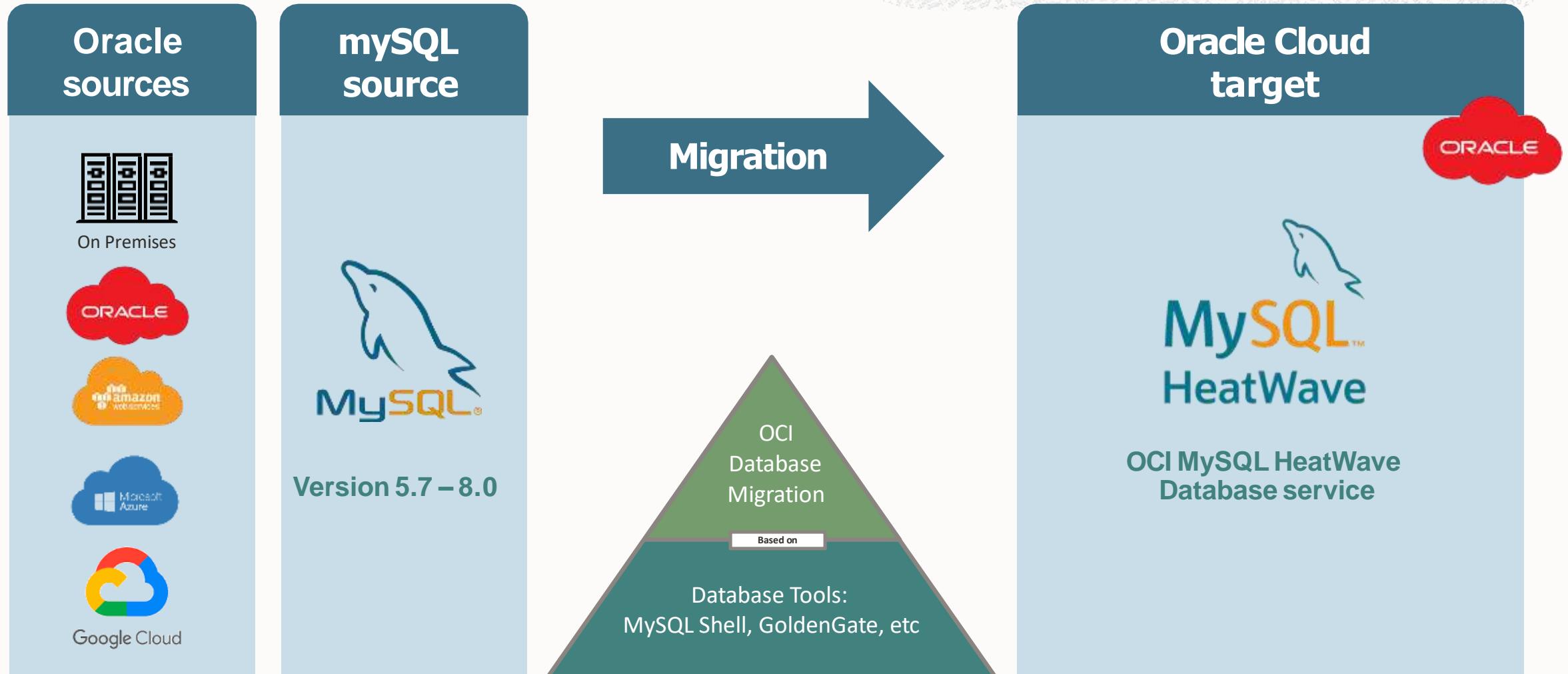
## Not included:

- Customer managed OCI resources used for DMS operation:
  - *compute used for GoldenGate, Object Store, Oracle Stream Service*
- FastConnect or other on-premise to cloud network connectivity
- Source or target database service costs

## Exceptions:

- Migrations that run more than 183 days(6 months) after they have been created
- Migrations running for more than 60 days idle (no data transferred)
- Billing starts after time limits have been exceeded with \$0.20 / hour per migration

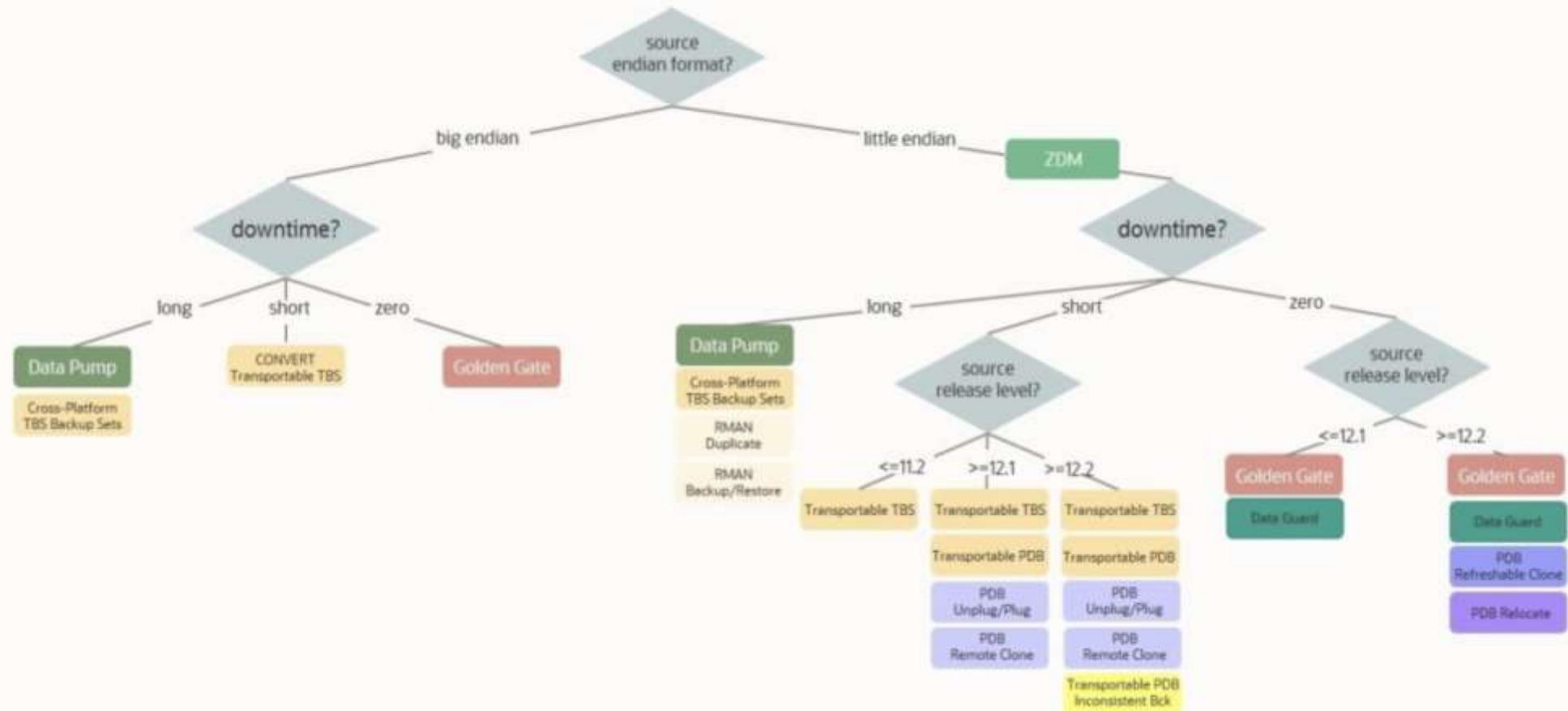
# MySQL in OCI Database Migration - SOON



# Resources



# Database Migration Decision Tree



- **Migration and Integration workshop (Oracle University)**

<https://mylearn.oracle.com/ou/course/oracle-db-cloud-migration-and-integration-workshop/122248/168832>

- **Oracle Lift Services site**

<https://www.oracle.com/br/cloud/cloud-lift/>

- **Frequently Asked Questions (FAQs) for Oracle Cloud Lift Services**

<https://www.oracle.com/br/a/ocom/docs/cloud/faq-oracle-cloud-lift.pdf>

- **Mike Dietrich – Upgrade your Database now**

<https://www.oracle.com/br/a/ocom/docs/cloud/faq-oracle-cloud-lift.pdf>



## Oci Database Migration (DMS) – Link's

- OCI Database Migration product page

<https://www.oracle.com/cloud/database-migration/>

- OCI Database Migration Documentation

<https://docs.oracle.com/en/cloud/paas/database-migration/dmsus/getting-started-oracle-cloud-infrastructure-database-migration.html#GUID-30481DFD-08D7-4D38-A952-3D81138AB71C>



## Oracle Recovery Manager (Rman) – Links

- **Getting Started with Recovery Manager (RMAN) (Doc ID 360416.1)**

<https://support.oracle.com/epmos/faces/DocumentDisplay?id=360416.1>

- **Oracle Database 19c Backup and Recovery user guide**

<https://docs.oracle.com/en/database/oracle/oracle-database/19;bradv/index.html#Oracle%C2%AE-Database>

- **Oracle Database 19c Multitenant Administrator guide**

<https://docs.oracle.com/en/database/oracle/oracle-database/19/multi/index.html#Oracle%C2%AE-Multitenant>

# Zero Downtime Migration (ZDM) - Links

- Zero Downtime migration product page

<https://www.oracle.com/database/zero-downtime-migration/>

- Zero Downtime Migration 21.4 documentation

<https://www.oracle.com/database/zero-downtime-migration/>

- Migrating and Upgrading Oracle Databases to OCI with Oracle Zero Downtime Migration (ZDM) demo

<https://www.youtube.com/watch?v=WPkqwnXGSjo>

- Zero Downtime Migration Release Notes

<https://docs.oracle.com/en/database/oracle/zero-downtime-migration/21.4/zdmrn/index.html#GUID-A1A467DC-FC06-4409-AF7F-BF0186CD8C54>

- Zero Downtime Migration Licensing Information User Manual

<https://docs.oracle.com/en/database/oracle/zero-downtime-migration/21.4/zdmlri/index.html#GUID-0E273386-149E-4A98-823A-388C60752632>

- livelabs - Zero Downtime Migration: Logical Online Migration to Oracle Autonomous Database

<https://apexapps.oracle.com/pls/apex/dbpm/r/livelabs/view-workshop?wid=937>

- **livelabs - Zero Downtime Migration - Logical Offline Migration to ADB**  
<https://apexapps.oracle.com/pls/apex/dbpm/r/livelabs/view-workshop?wid=850>
- **livelabs - Zero Downtime Migration : Physical Offline Migration to Co-Managed Databases in OCI**  
<https://apexapps.oracle.com/pls/apex/r/dbpm/livelabs/view-workshop?wid=3568>
- **Oracle Zero Downtime Migration (ZDM) & Oracle Advanced Cluster File System**  
<https://www.oracle.com/a/tech/docs/oracle-zdm-logical-migration-acfs.pdf>
- **Oracle Zero Downtime Migration – Logical Migration Performance Guidelines**  
<https://www.oracle.com/a/tech/docs/zdm-gg-performance.pdf>
- **Oracle Zero Downtime Migration (ZDM)– Logical Online Migration from On-Premises to Oracle Autonomous(ADB)**  
<https://www.oracle.com/a/tech/docs/oracle-zdm-logical-migration-to-autonomous-guide.pdf>
- **Oracle Zero Downtime Migration (ZDM) - Logical Migration Upgrade from On-Premises to DBCS and ExaCS**  
<https://blogs.oracle.com/maa/post/oracle-zero-downtime-migration-214>
- **Oracle Zero Downtime Migration (ZDM) Physical Migration Step by Step Guide**  
<https://www.oracle.com/a/tech/docs/oracle-zdm-step-by-step-guide.pdf>



# Thank you

---

**Marcel Lamarca**

[marcel.lamarca@oracle.com](mailto:marcel.lamarca@oracle.com)



ORACLE

