



Database Migration and Integration 2023

Get Started – Exam 1Z0-931-23

Marcel Lamarca

Exadata Cloud Specialist

Oracle, Alliances and Channels LAD

April, 2024



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 migrations

3

Cloud Migration Tools

4

Resources



1Z0-931-23 : Oracle Cloud Database 2023 Migration and Integration Professional



- Number of Questions **55**
- Format **Multiple Choice**
- Duration **90 minutes**
- Passing Score **70%**
- This exam retires **on July 01, 2024 GMT**

Oracle Cloud Database 2023 Migration and Integration Professional



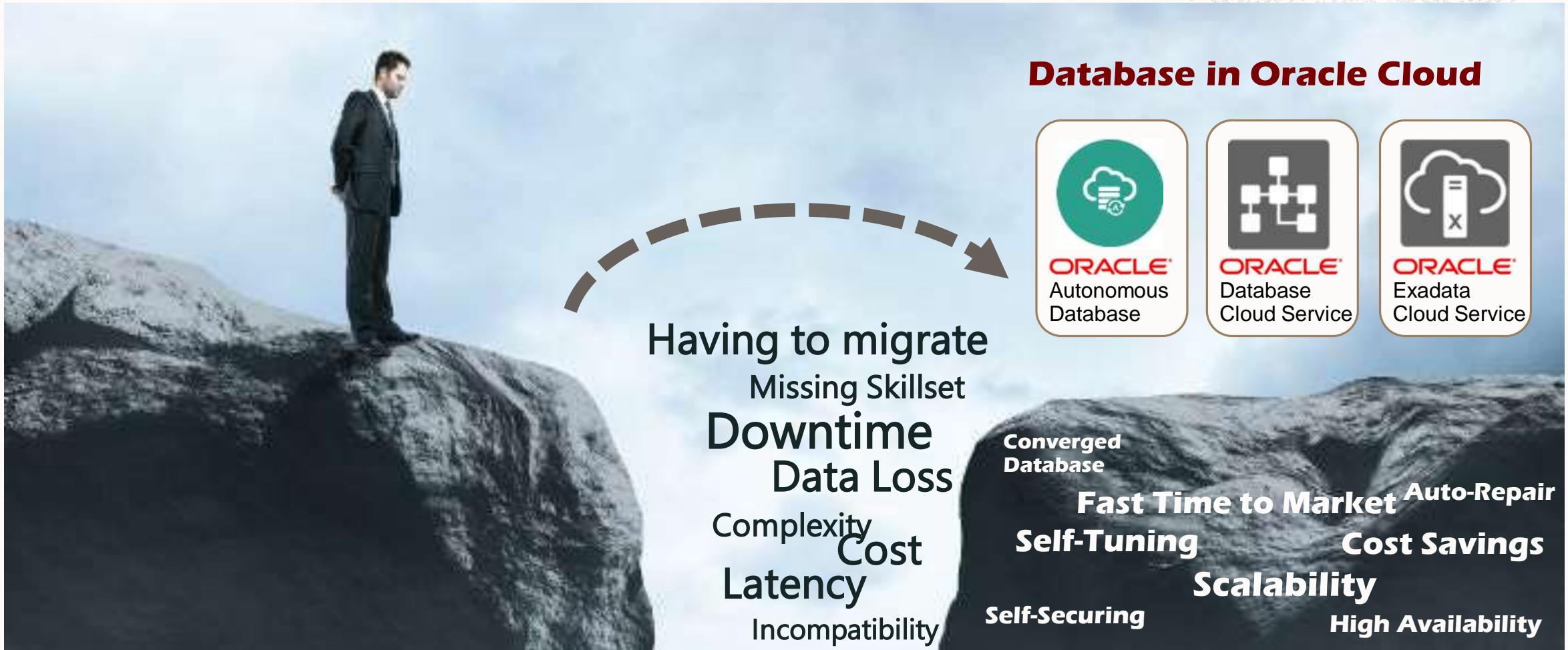
In this Learning Path you will learn to :

- Migrate a Database to Oracle Autonomous Database
- Migrate using Zero Downtime Migration
- Migrate using SQL Developer, Cloud Backup, and GoldenGate
- Migrate to OCI using RMAN, Data Pump and Cloning
- Understand Oracle Data Integration

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 way to success !



Migration requirements and constraints...

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

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



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
Linux IA (64-bit)	Little
Linux x86 64-bit	Little
Microsoft Windows IA (32-bit)	Little
Microsoft Windows IA (64-bit)	Little
Microsoft Windows x86 64-bit	Little
Solaris Operating System (x86)	Little
Solaris Operating System (x86-64)	Little

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
AIX-Based Systems (64-bit)	Big
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
Solaris[tm] OE (32-bit)	Big
Solaris[tm] OE (64-bit)	Big

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

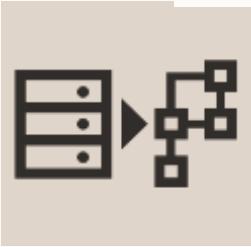
- Logically interpret database contents and copy to database in target format
- Source and target can be different
- Tools: **Datapump**, **GoldenGate**

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.)

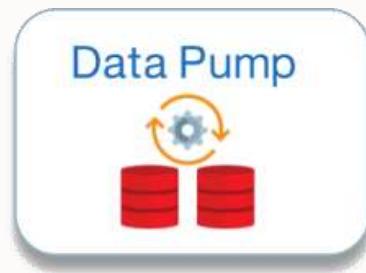
Datapump expdb / impdp

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

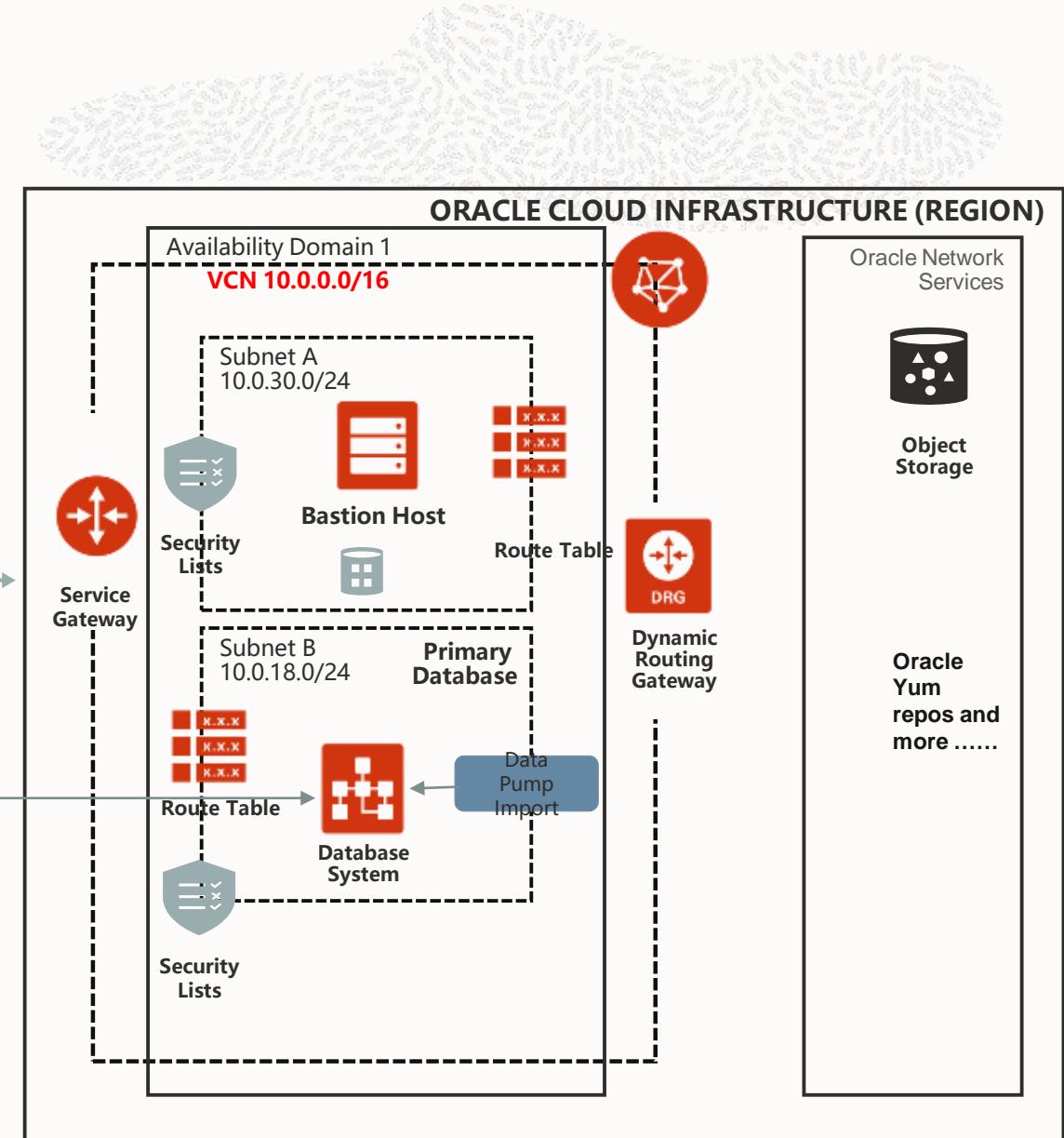
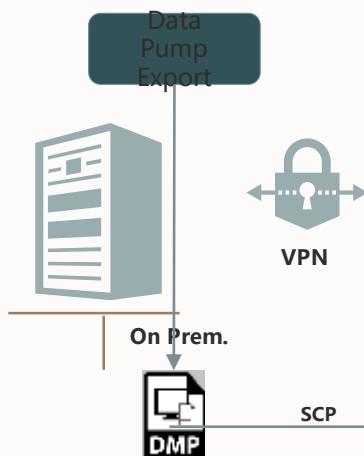


Free

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 import.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

M5 Cross Endian Platform Migration using Full Transportable Export/Import and RMAN Inc Backups (Doc ID [2999157.1](#))

PURPOSE

Cross platform database migration is the process of moving databases to a new platform, including Exadata Database Machine, Exadata Cloud@Customer, Exadata Database Service, etc. This note provides a simple, reliable, and fast migration solution with minimal downtime.

The information below will guide you in performing a cross platform (Big Endian to small Endian, vice versa, or same platform when Data Guard option is not available) database migration.

DETAILS

[Prerequisites](#)

[High level migration workflow](#)

[Detailed migration workflow](#)

[Migration process explained](#)

[Appendix](#)

Cross platform database migration is the process of moving databases to a new platform, including Exadata Database Machine, Exadata Cloud@Customer, Exadata Database Service, etc. This note provides a simple, reliable, and fast migration solution with minimal downtime.

The information below will guide you in performing a cross platform (Big Endian to small Endian, vice versa, or same platform when Data Guard option is not available) database migration.

Note:

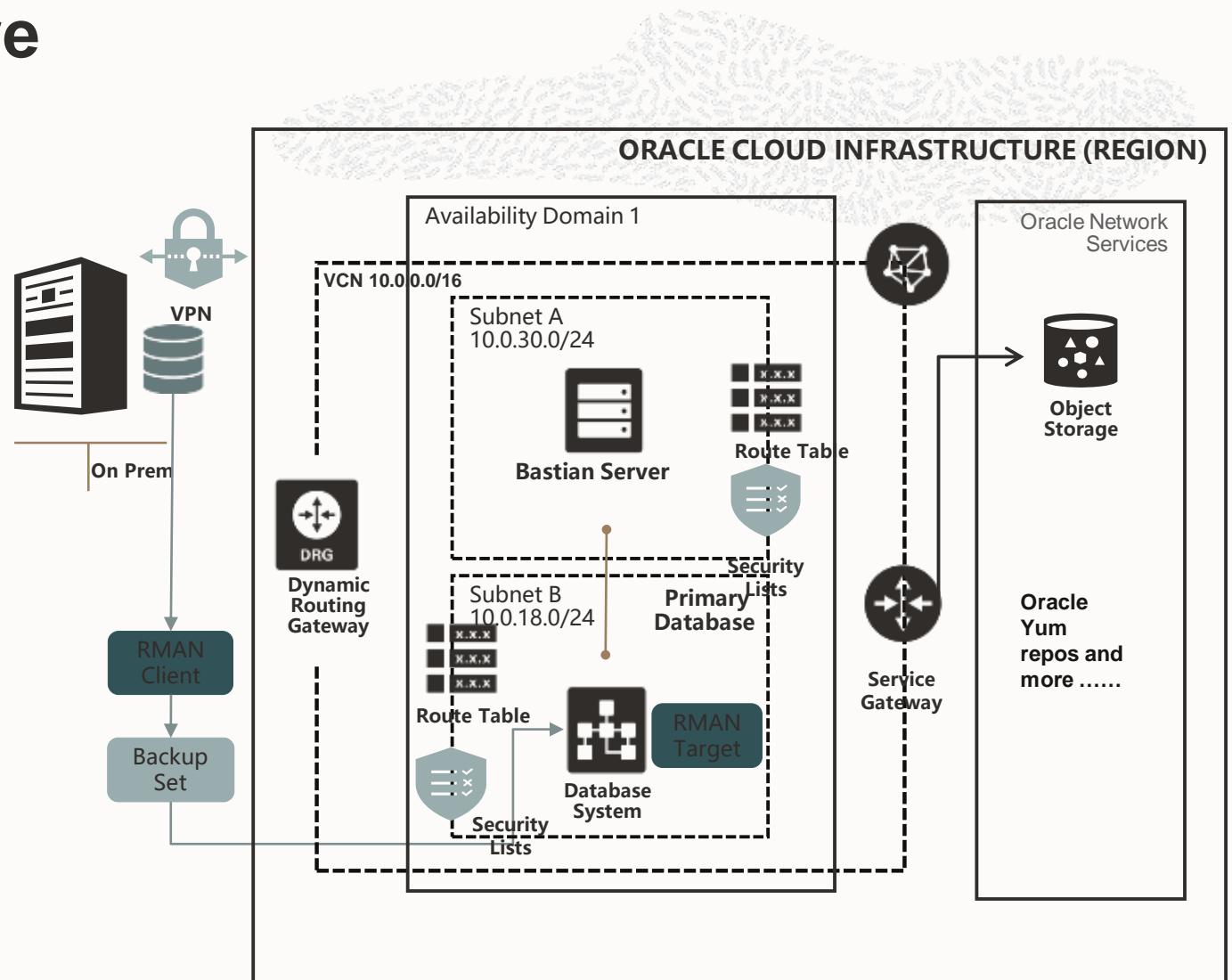
1. This procedure only supports Oracle Database 19.18 or higher on source and destination.



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



RMAN Convert Cross platform process



Big-endian

users01.dbf
users02.dbf
data01.dbf
data02.dbf
...



RMAN Convert Cross platform process



Big-endian

users01.dbf
users02.dbf
data01.dbf
data02.dbf
...



Little-endian

users01.dbf
users02.dbf
data01.dbf
data02.dbf
...

RMAN Convert Datafiles to Little Endian

```
C:\>RMAN TARGET /  
  
Recovery Manager: Release 12.1.0.1.0 - Production  
  
Copyright (c) 1982, 2012, Oracle and/or its affiliates. All rights reserved.  
  
connected to target database: ORAWIN (DBID=3462152886)  
  
RMAN> CONVERT DATAFILE  
2>'C:\Temp\sales_101.dbf',  
3>'C:\Temp\sales_201.dbf'  
4>TO PLATFORM="Microsoft Windows IA (32-bit)"  
5>FROM PLATFORM="Solaris[tm] OE (32-bit)"  
6>DB_FILE_NAME_CONVERT=  
7>'C:\Temp\', 'C:\app\orauser\oradata\orawin\'  
8> PARALLELISM=4;
```



RMAN Convert Tablespaces to Little Endian

```
$ RMAN TARGET /  
  
Recovery Manager: Release 12.1.0.1.0 - Production  
  
connected to target database: salesdb (DBID=3295731590)  
  
RMAN> CONVERT TABLESPACE sales_1,sales_2  
2> TO PLATFORM 'Microsoft Windows IA (32-bit)'  
3> FORMAT '/tmp/%U';  
  
Starting conversion at source at 30-SEP-08  
using channel ORA_DISK_1  
channel ORA_DISK_1: starting datafile conversion  
input datafile file number=00007 name=/u01/app/oracle/oradata/salesdb/sales_101.dbf  
converted datafile=/tmp/data_D-SALESDB_I-1192614013_TS-SALES_1_FNO-7_03jru08s  
channel ORA_DISK_1: datafile conversion complete, elapsed time: 00:00:45  
channel ORA_DISK_1: starting datafile conversion  
input datafile file number=00008 name=/u01/app/oracle/oradata/salesdb/sales_201.dbf  
converted datafile=/tmp/data_D-SALESDB_I-1192614013_TS-SALES_2_FNO-8_04jru0aa  
channel ORA_DISK_1: datafile conversion complete, elapsed time: 00:00:25  
Finished conversion at source at 30-SEP-08
```



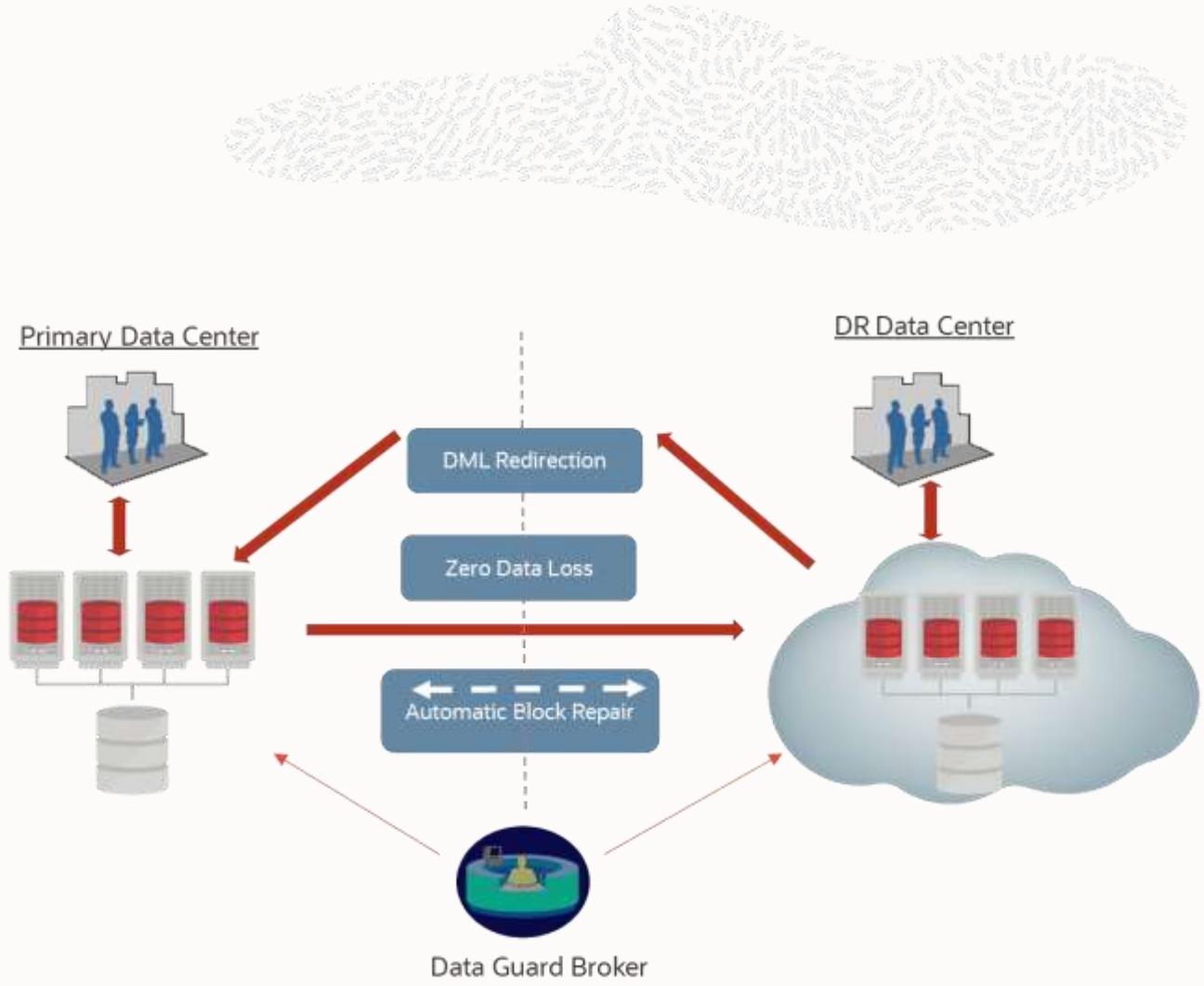
Oracle Data Guard



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 Multitenant

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

Zero Downtime Migration (ZDM)

Oracle Zero Downtime Migration 21.4

Announcing



Oracle Zero Downtime Migration 21.4

Available
Now !

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 !

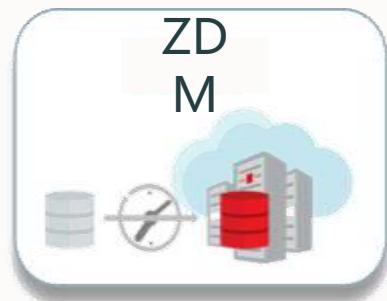
Zero Downtime Migration (ZDM)

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, 21c



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



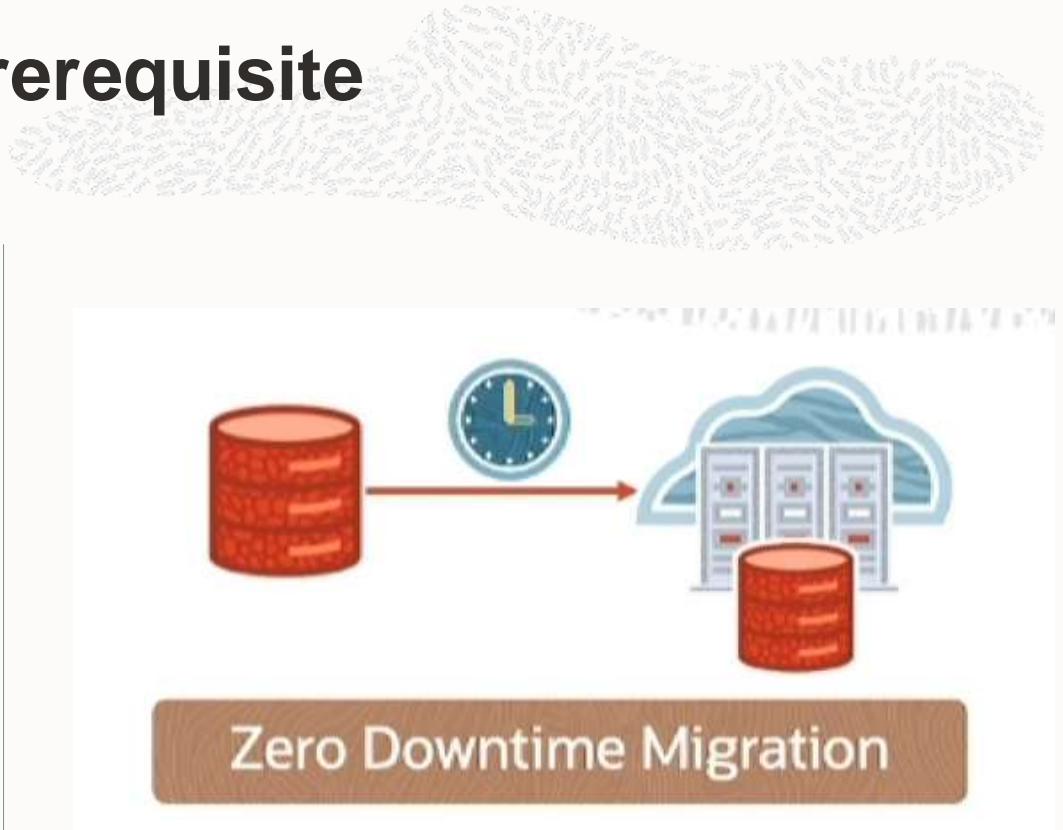
Free

Oracle Zero Downtime Migration Prerequisite

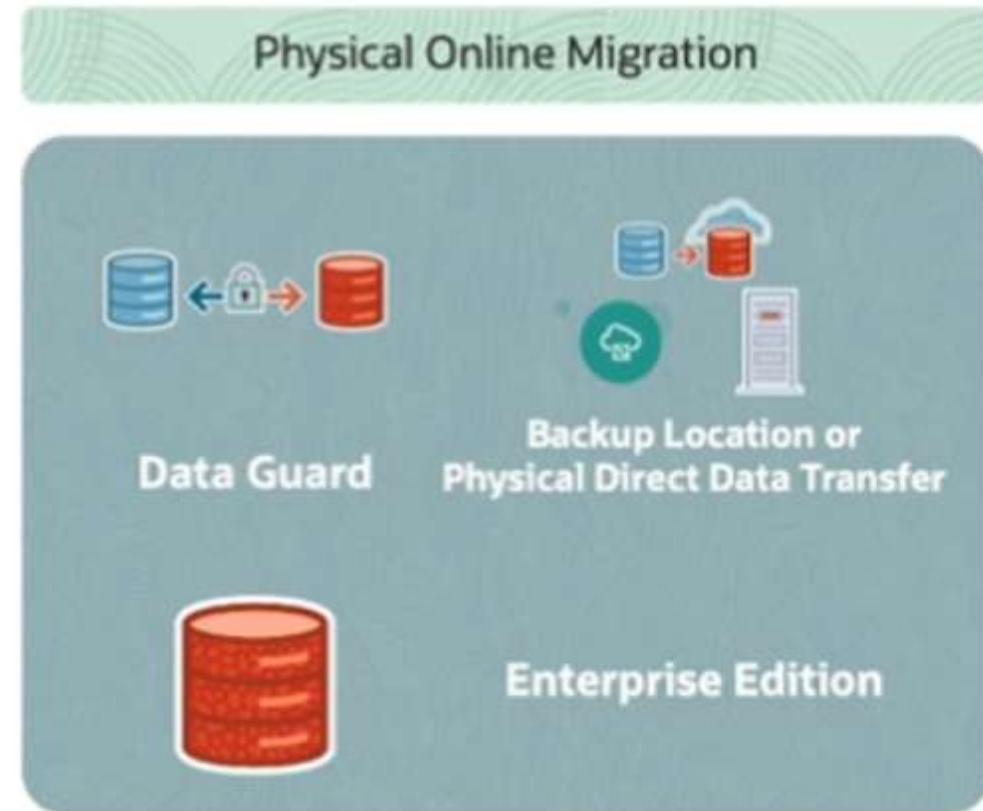
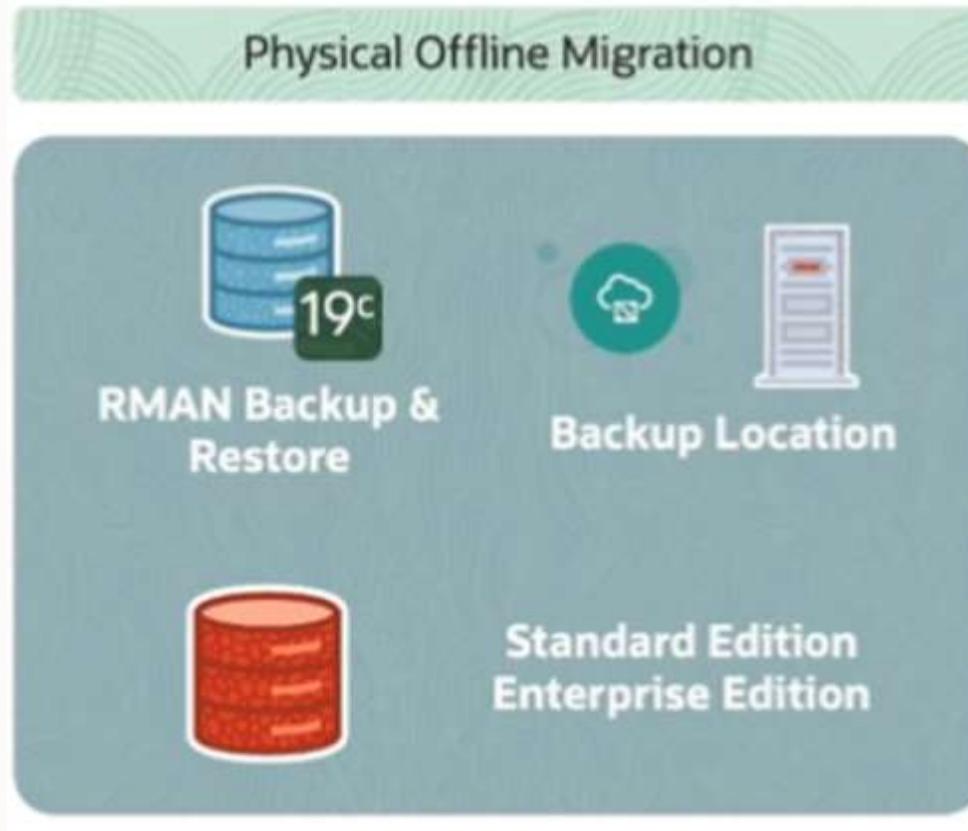
- Linux Host for ZDM node (Oracle Linux 7)
- 100G of local filesystem free storage
- **ZDM group and zdmuser as part of group & glibc-devel and expect packages must be installed**

Installation

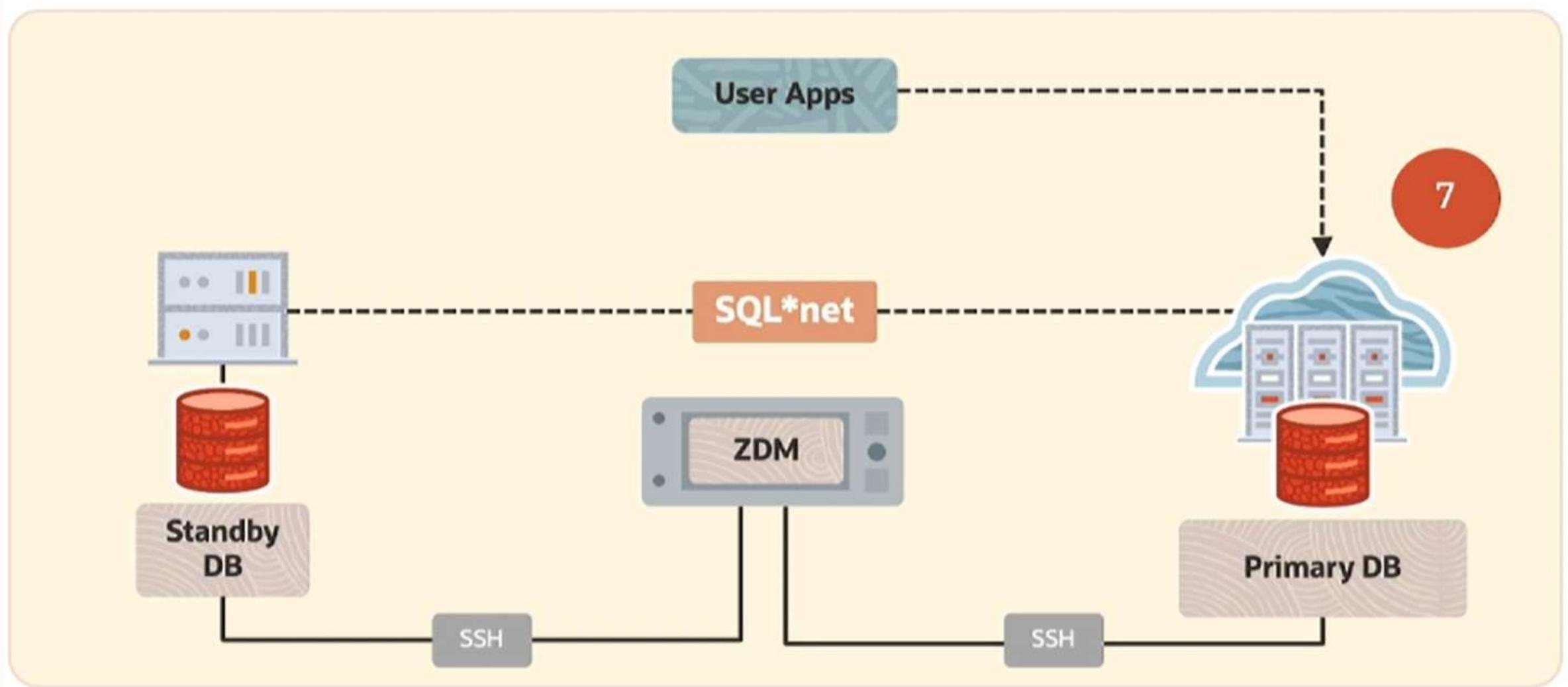
- As zdmuser :
`./zdminstall.sh setup`
oraclehome=zdm_oracle_home
oraclebase=zdm_base_directory
ziploc=zdm_software_location - zdm
- oraclehome **ZDM** toolkit installation home
- oraclebase **ZDM** config files, logs and other artifacts
- ziploc **ZDM** compressed shiphome file



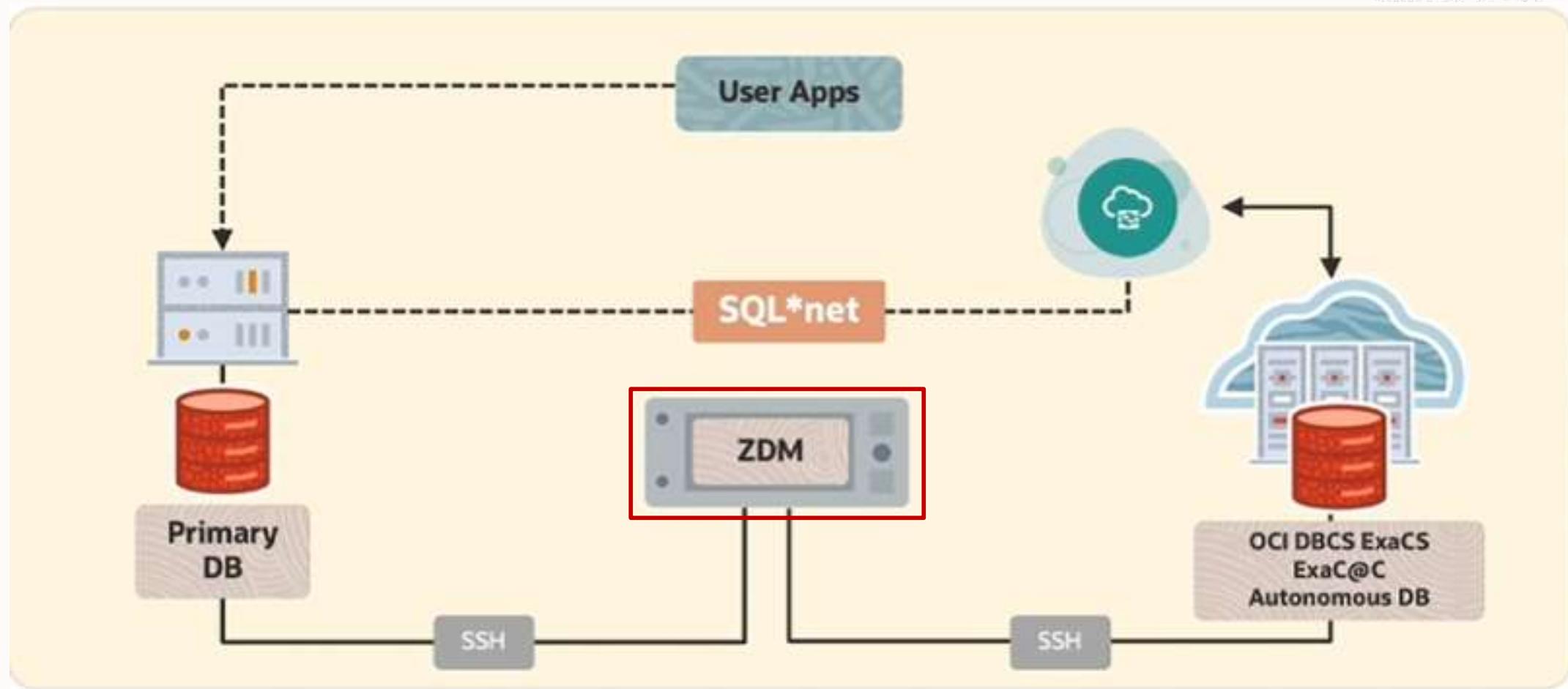
ZDM | Architecture physical Migration



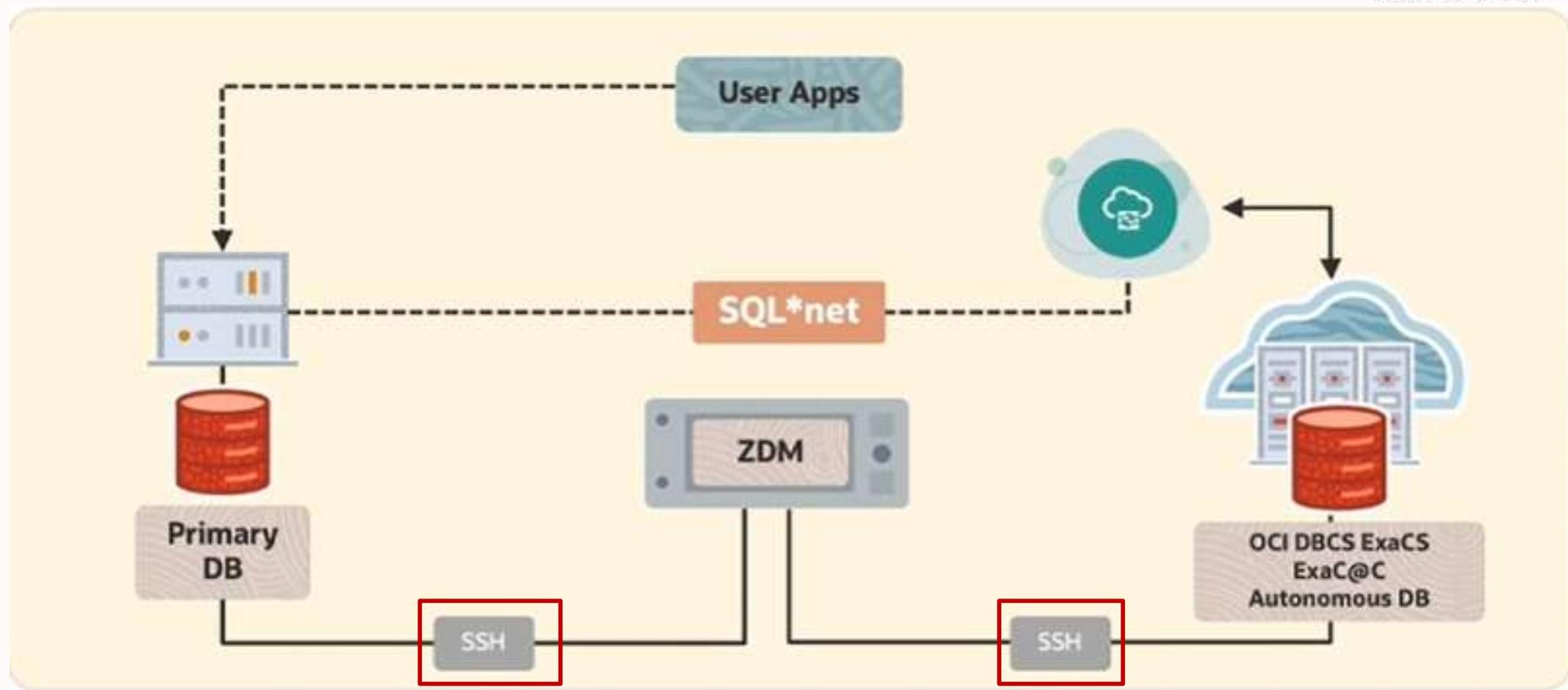
ZDM | Architecture Physical Migration



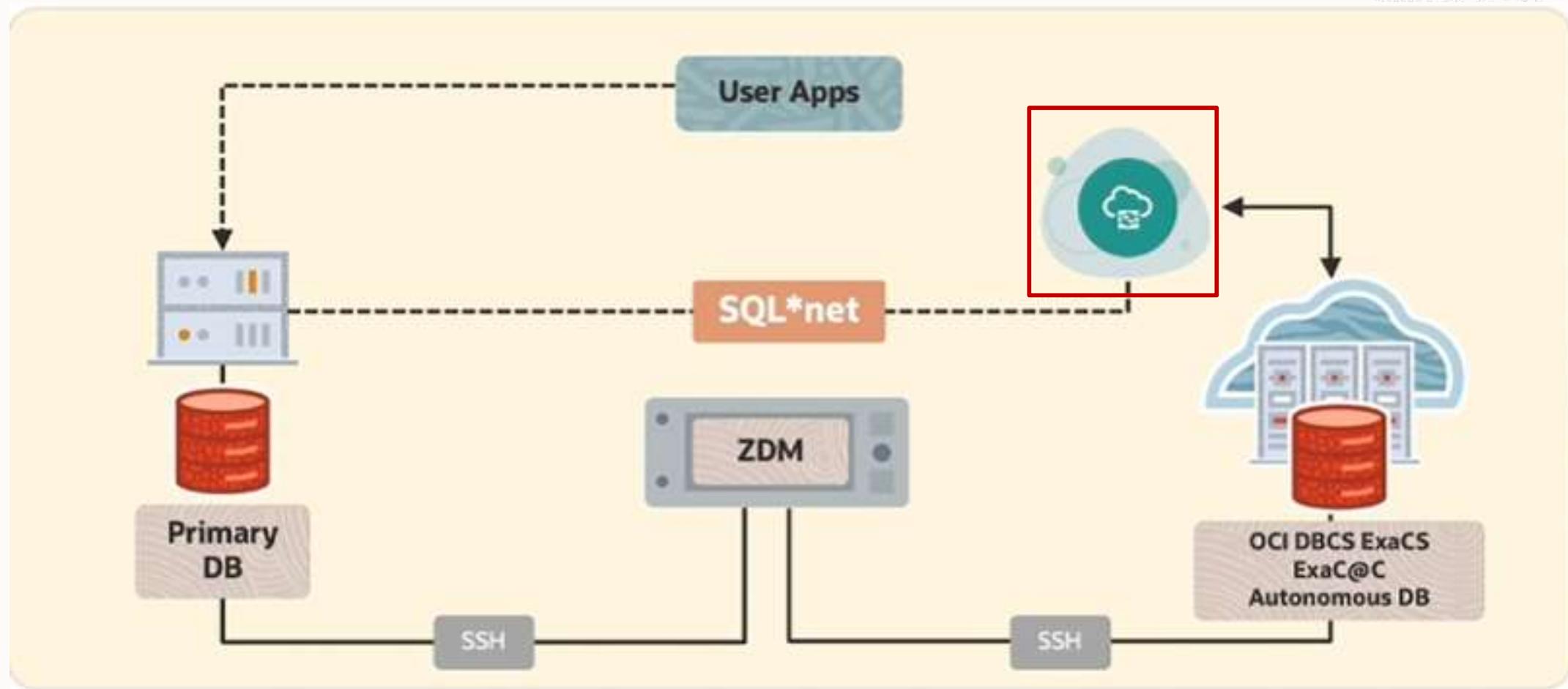
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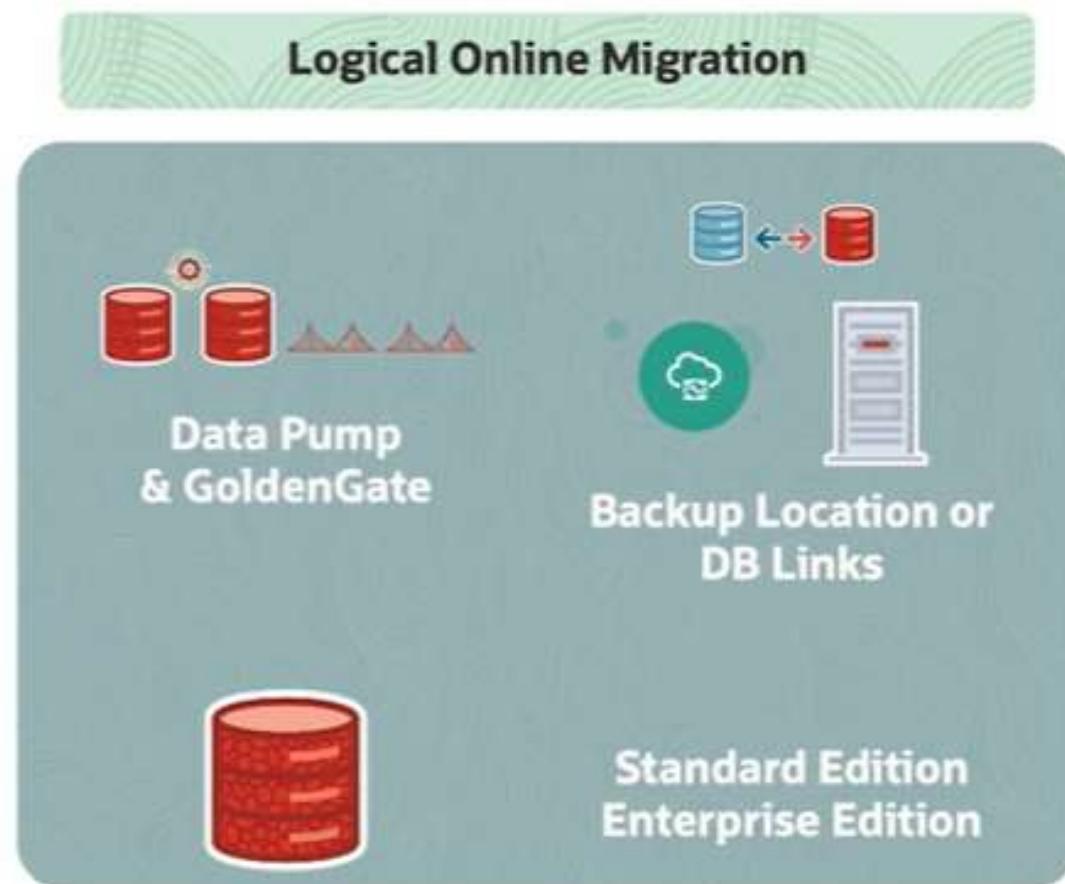
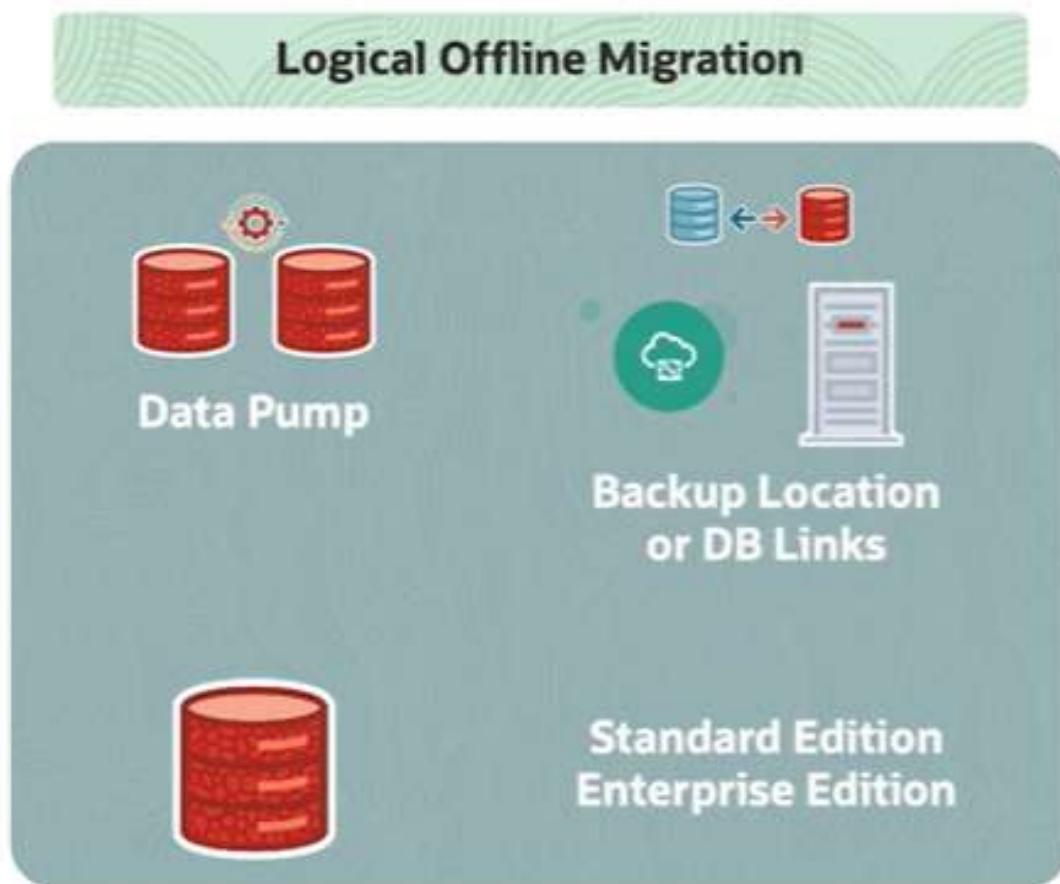
ZDM | Architecture physical Migration



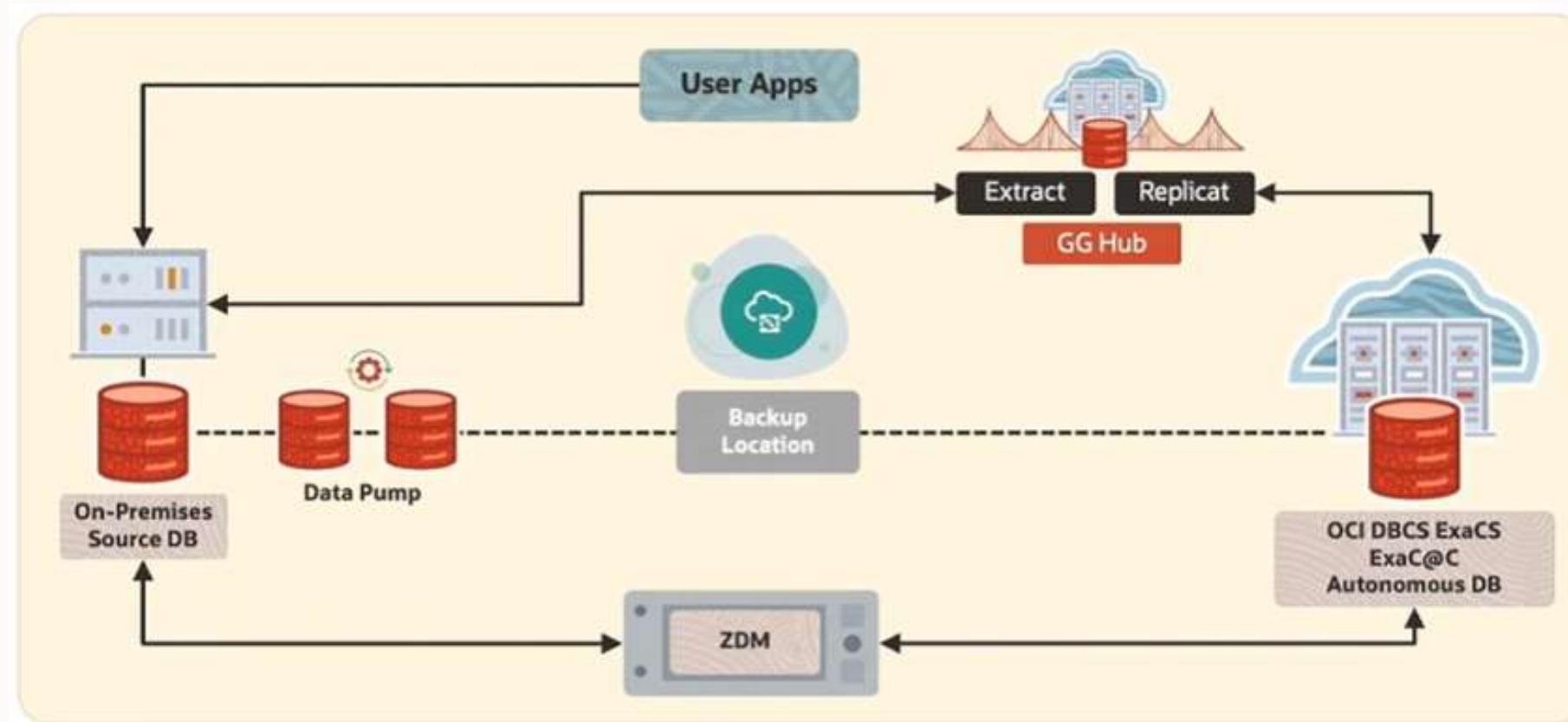
ZDM | Architecture physical Migration



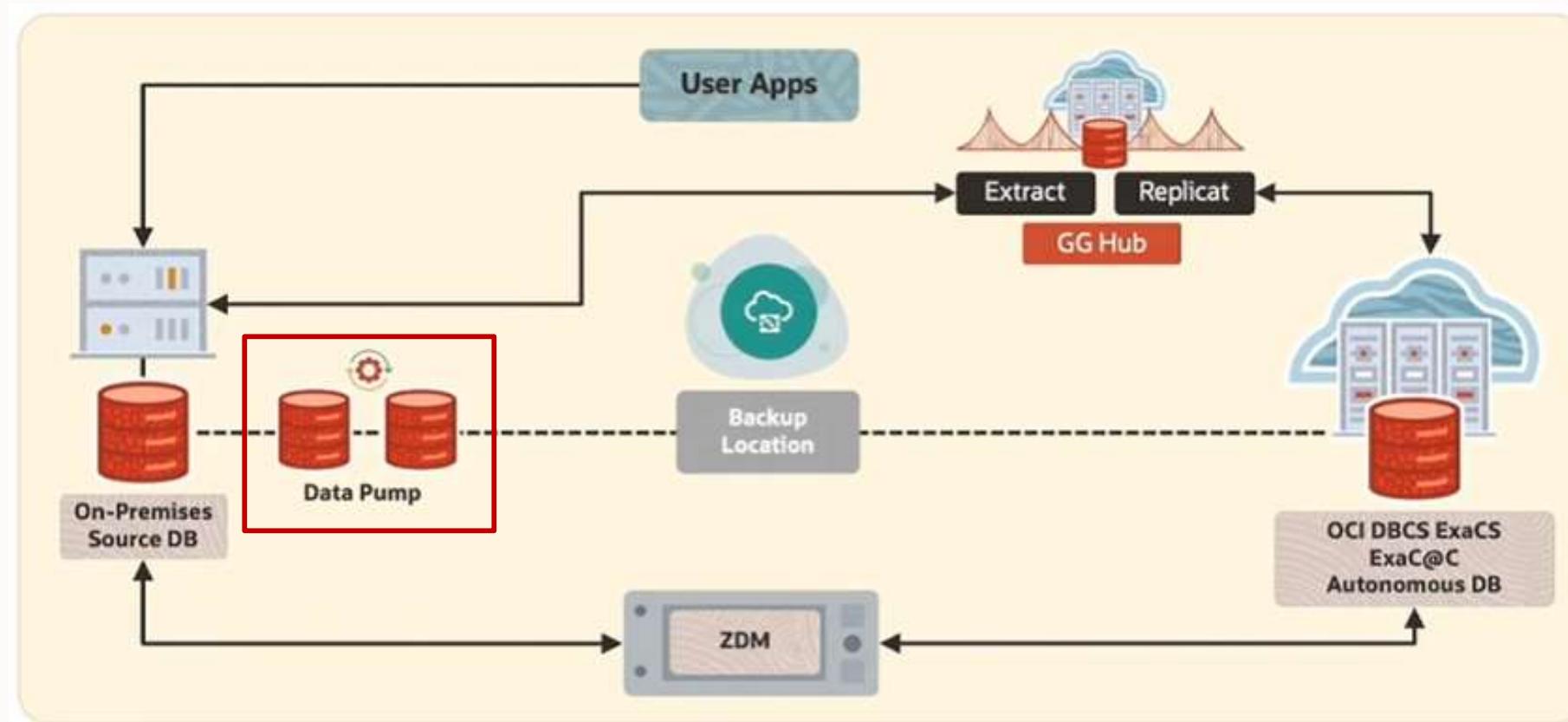
ZDM | Architecture Logical Migration



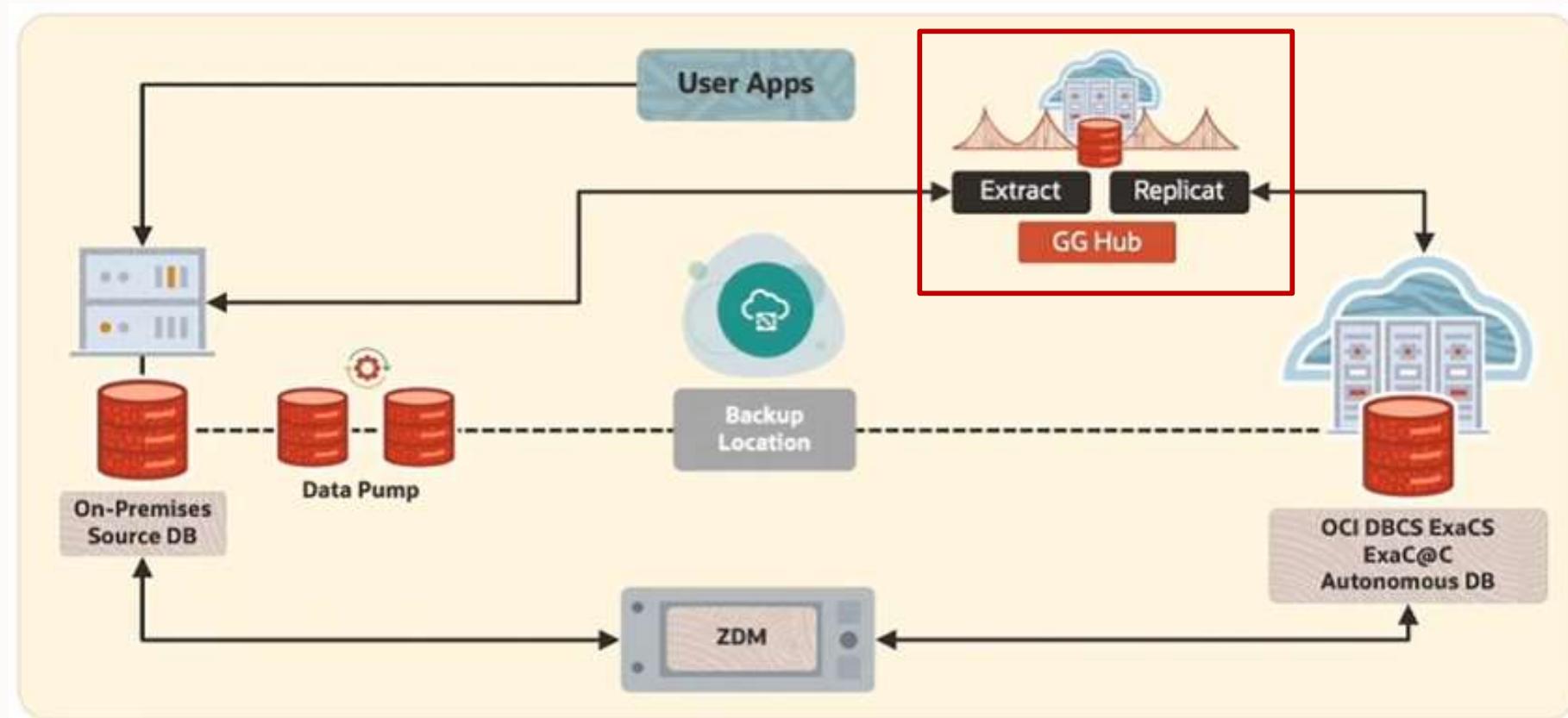
ZDM | Architecture Logical Migration



ZDM | Architecture Logical Migration



ZDM | Architecture Logical Migration



Migration Process using Zero Downtime Migration Tool

Migration Steps

1. Network Configuration

1. Installing ZDM Tool

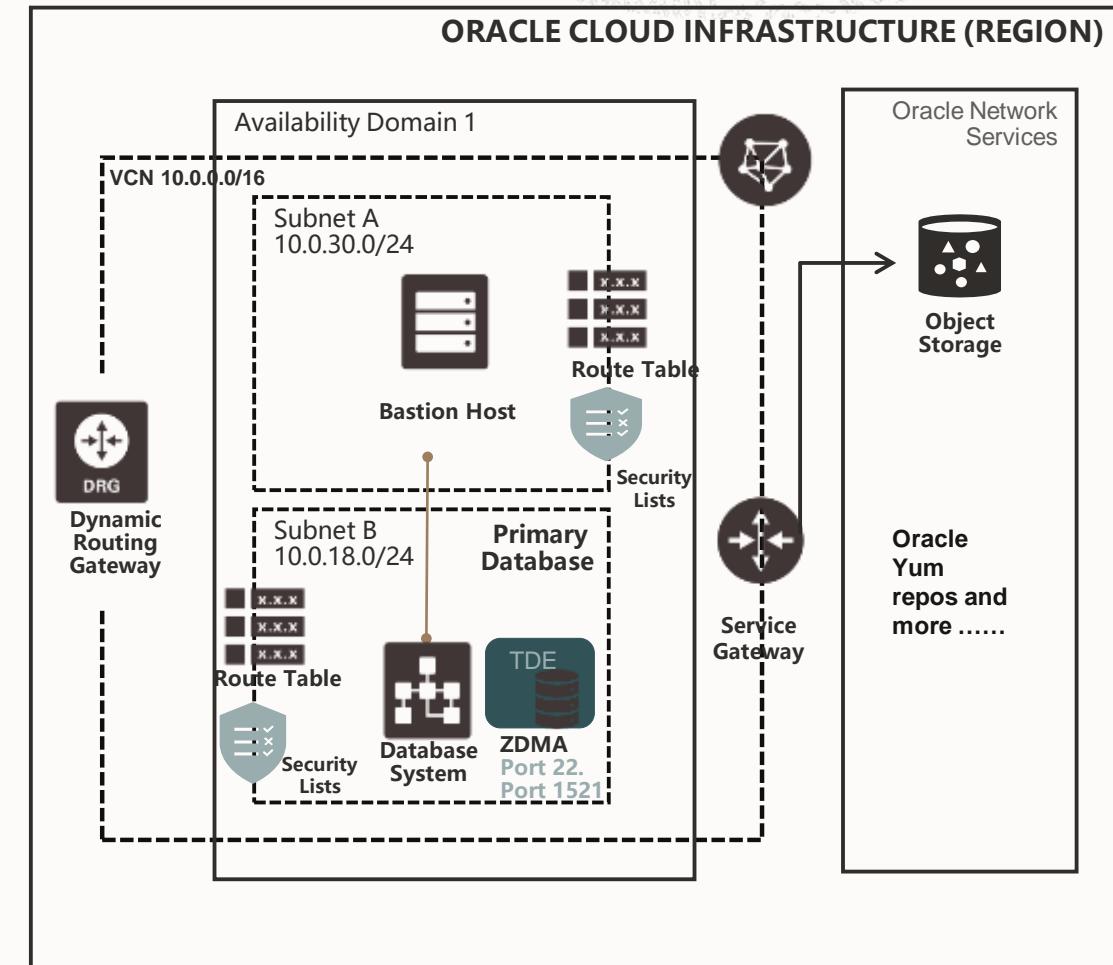
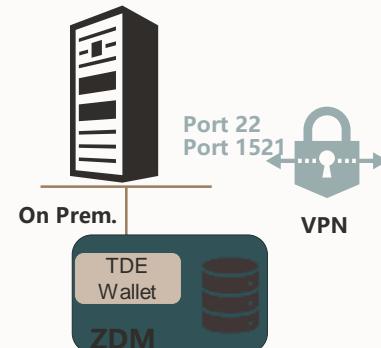
2. Setting up communication

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

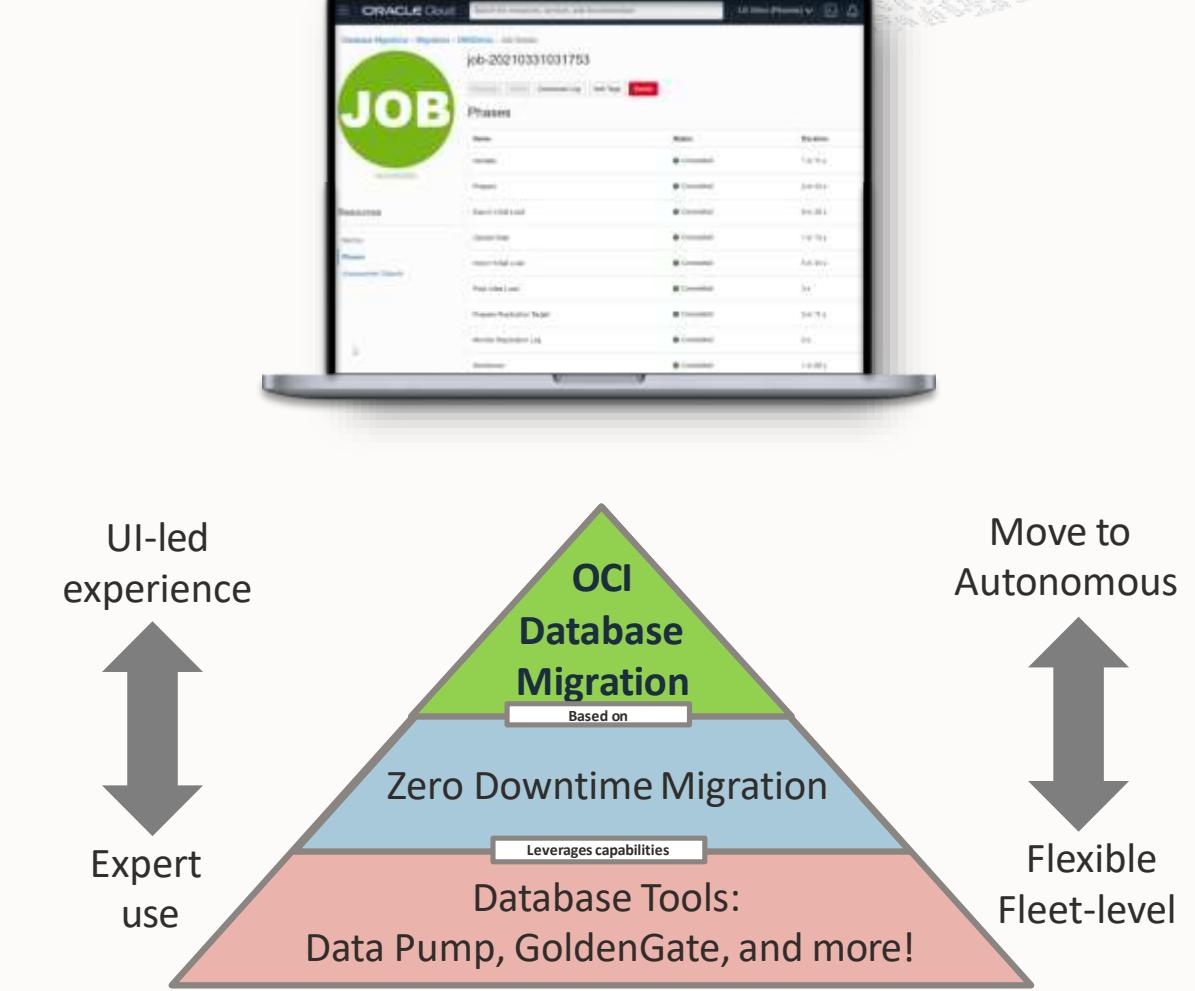
- Reduce cost and improve performance in Oracle Cloud
- Migrate databases, free for 6 months per migration

Core use cases

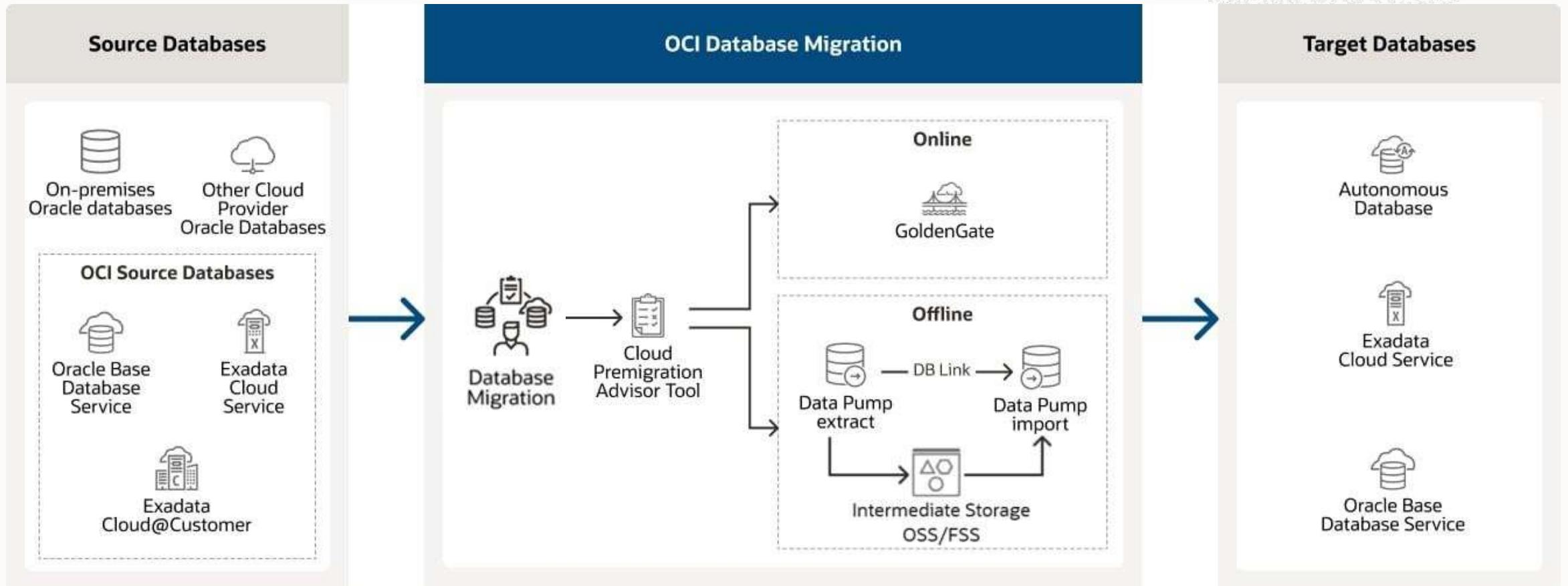
- Machine-assisted migrations for Oracle Databases, Data Marts and Data Warehouses into Oracle Cloud

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



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

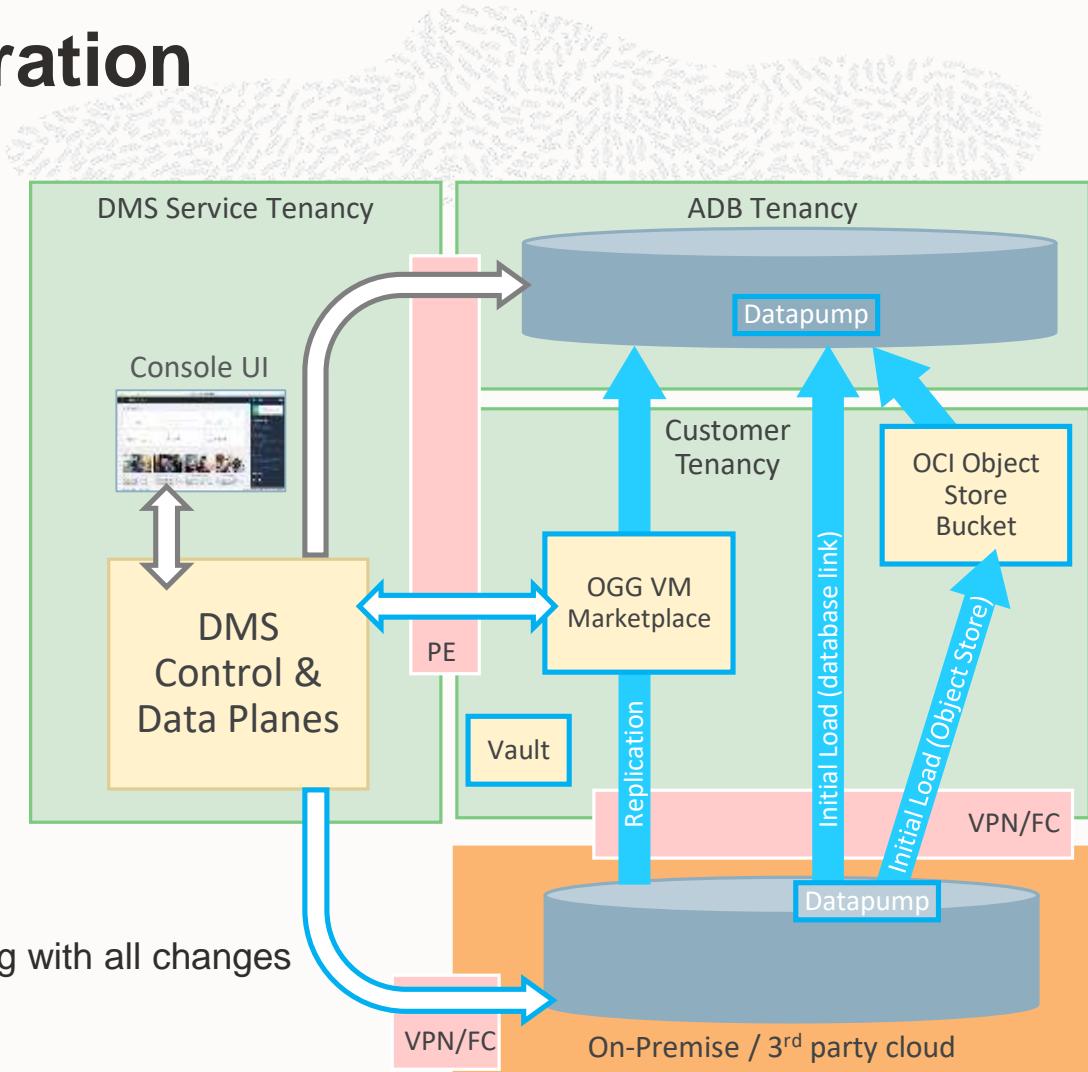
2. Create Migration in DMS

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

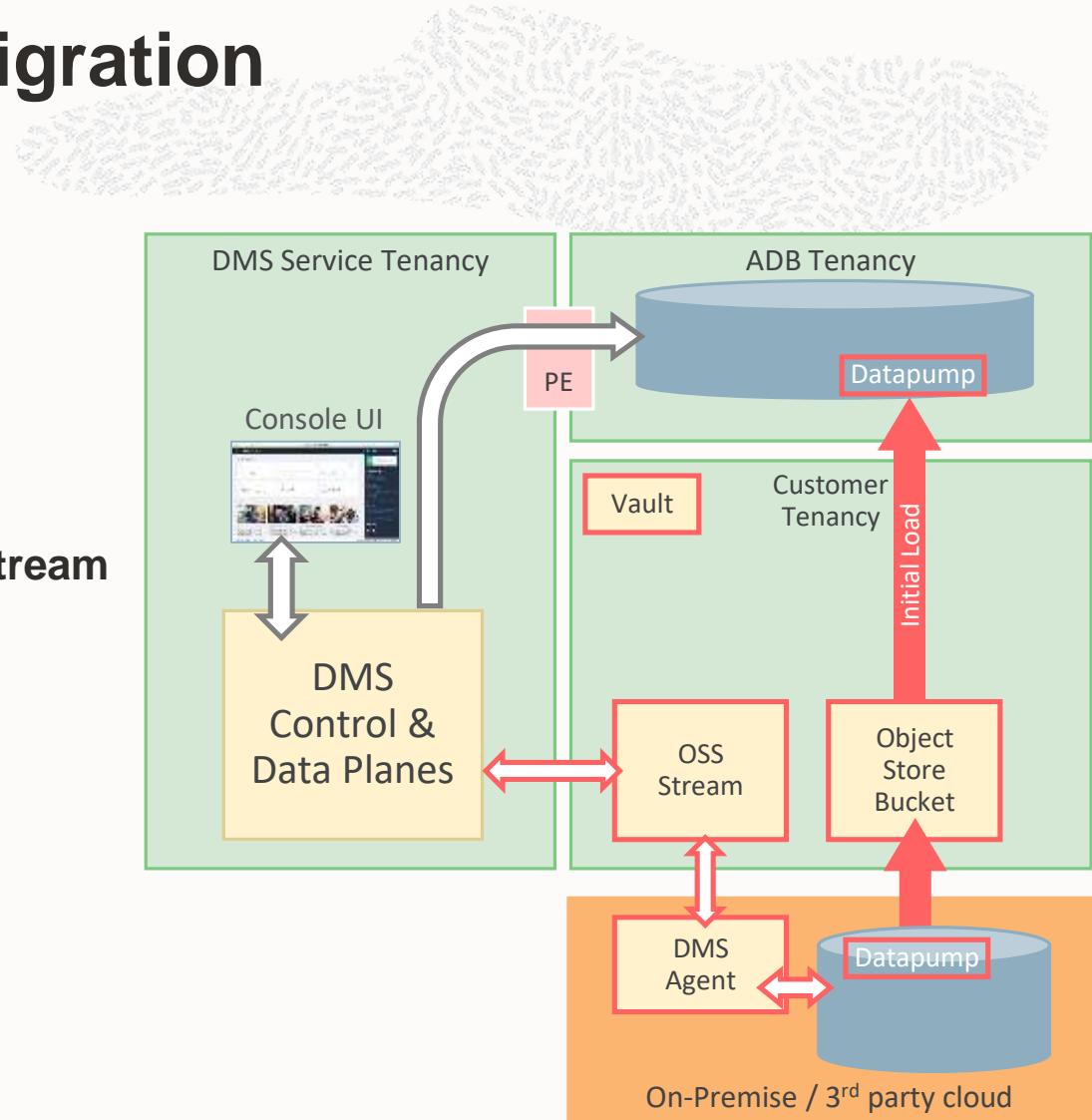
3. Configure connectivity for Agent to DMS Service and OSS Stream

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

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

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)
DMSSStorage
 Use online replication (i)

Previous Create Cancel



Step 4 : Validate Migration

The screenshot displays two main interface panels side-by-side:

- Left Panel (Migration Status):** A large green circle with "DM" and "ACCEPTED" below it. The title is "TestMigration". It includes a "Validate" button (which is highlighted with a red box), "Start", "Clone", and "Move resources" buttons. Below these are migration details:
 - 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](#)
- Right Panel (Job Status):** A large red circle with "JOB" and "FAILED" below it. The title is "job-20240226225210". It includes "Resume", "Abort", "Download log", "Add tags", and "Delete" buttons. Below these are job details:
 - OCID: ...uijja [Show](#) [Copy](#)
 - Migration: CPATChecks2SSH
 - Created: Mon, Feb 26, 2024, 22:52:10 UTC
 - Compartment: ggsstage (root)/DMS/jorge
 - Type: Evaluation

Bottom Left Content:

Embedded CPAT rules evaluate source database for issues.
Validation fails when issues need user attention.

Bottom Right Content:

A teal arrow points from the "CPTA" label to the "Validate premigration advisor" row in the Phases table, which is highlighted with a red box. The table shows the following data:

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

Step 4 : Validate Migration – Resolve CPTA issues

Validate premigration advisor

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 can be suggested, review required, action 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

Filters

Issue 

Action required
 Review required
 Review suggested
 Passed

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: 

	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 >

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

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 a table:

Name	Status	Duration	More
Validate target	Completed	7 s	⋮
Validate source	Completed	5 s	⋮
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.

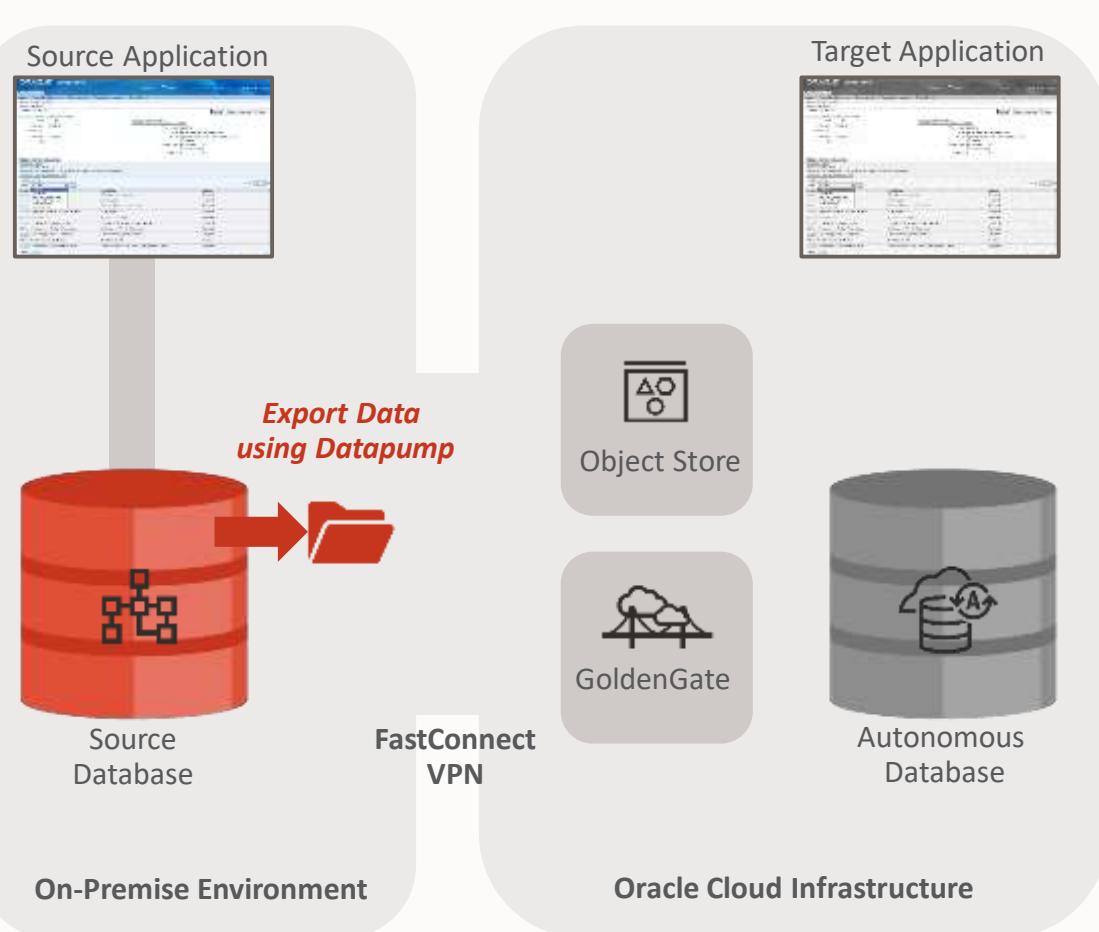
Step 5: Start Migration

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'. A modal window is open, showing a large orange circle with 'JOB' in white, labeled 'IN PROGRESS'. The modal header says 'Migration in progress at phase "Validate" (Phase 1 of 7)' and contains the job ID 'job-20240228003617'. Below the modal are buttons for 'Resume', 'Abort', 'Download log', 'Add tags', and 'Delete'. The main content area shows 'Job information' and 'Tags' tabs. 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. The bottom section is divided into '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 'Excluded objects' and 'Metrics' sections are also visible.

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

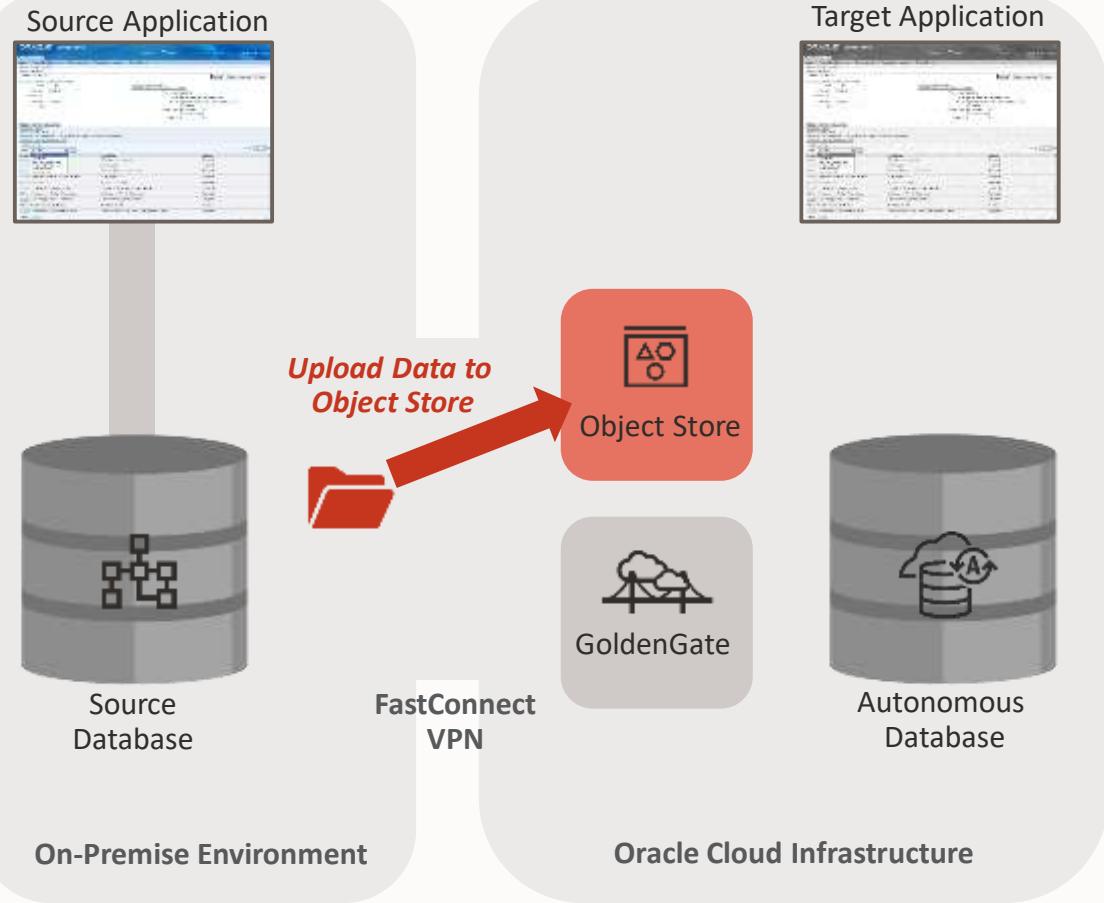


Name	Status	Duration
Validate	Completed	1 m 11 s
Prepare	Completed	2 m 43 s
Export Initial Load	Started	3 m 38 s
Upload Data	Pending	—
Import Initial Load	Pending	—
Post Initial Load	Pending	—
Prepare Replication Target	Pending	—
Monitor Replication Lag	Pending	—
Switchover	Pending	—
Cleanup	Pending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

Showing 10 Items < 1 of 1 >

Start Migration – Upload Data

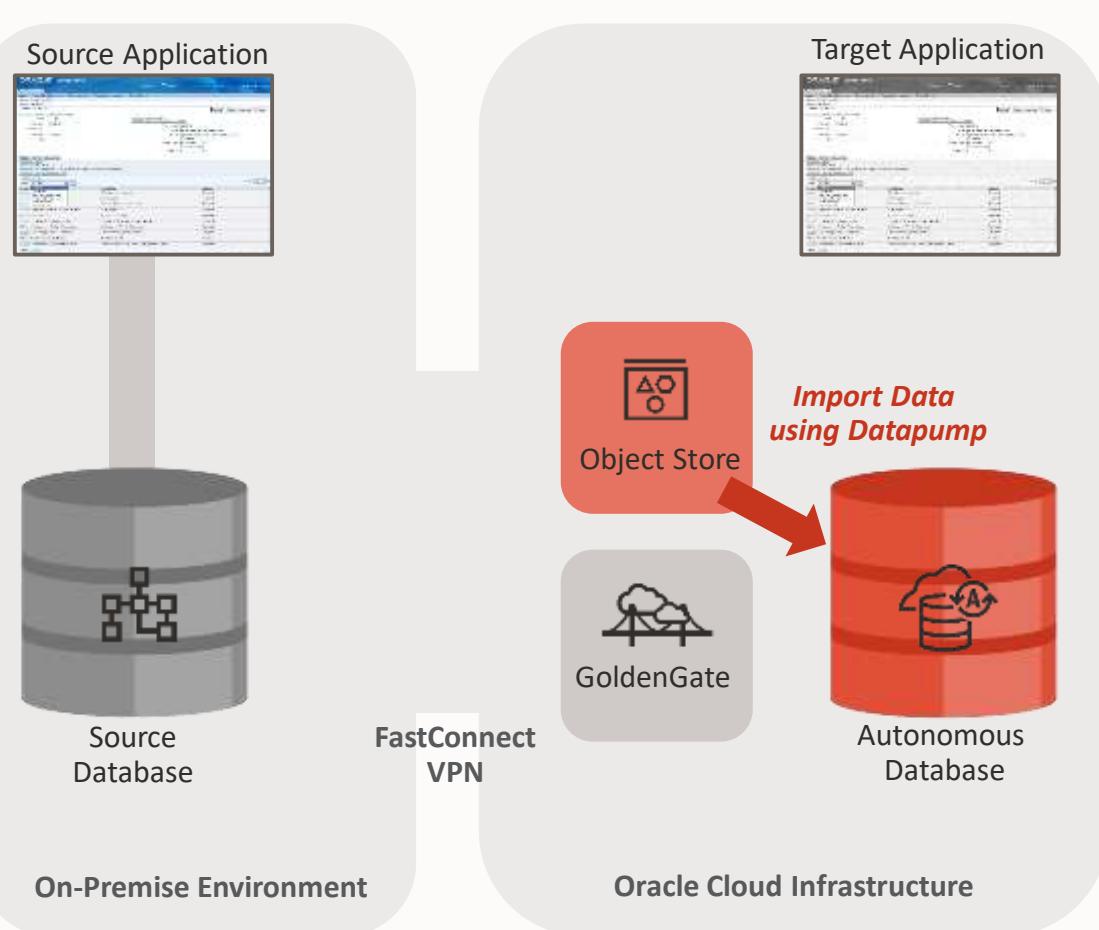
Datapump export is uploaded to Object Store



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

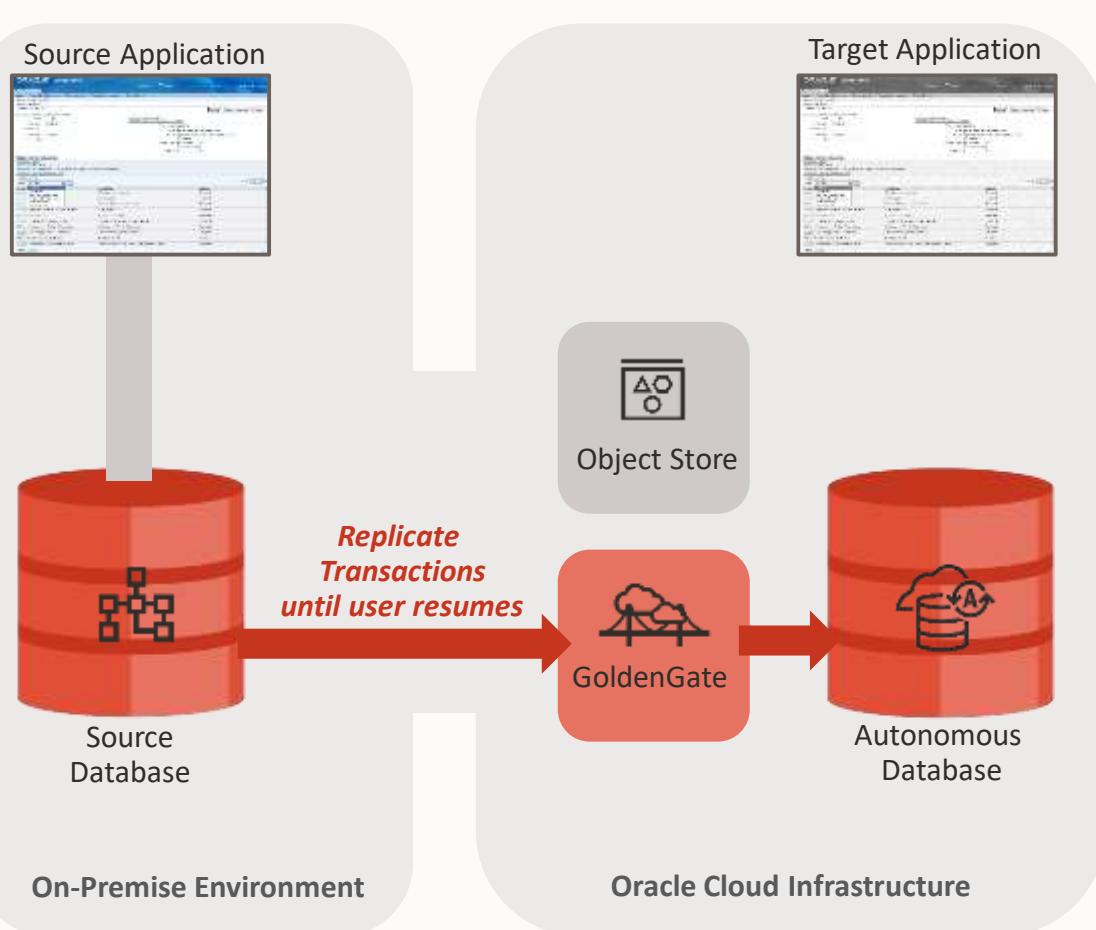
Exported dump files are imported to ADB



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



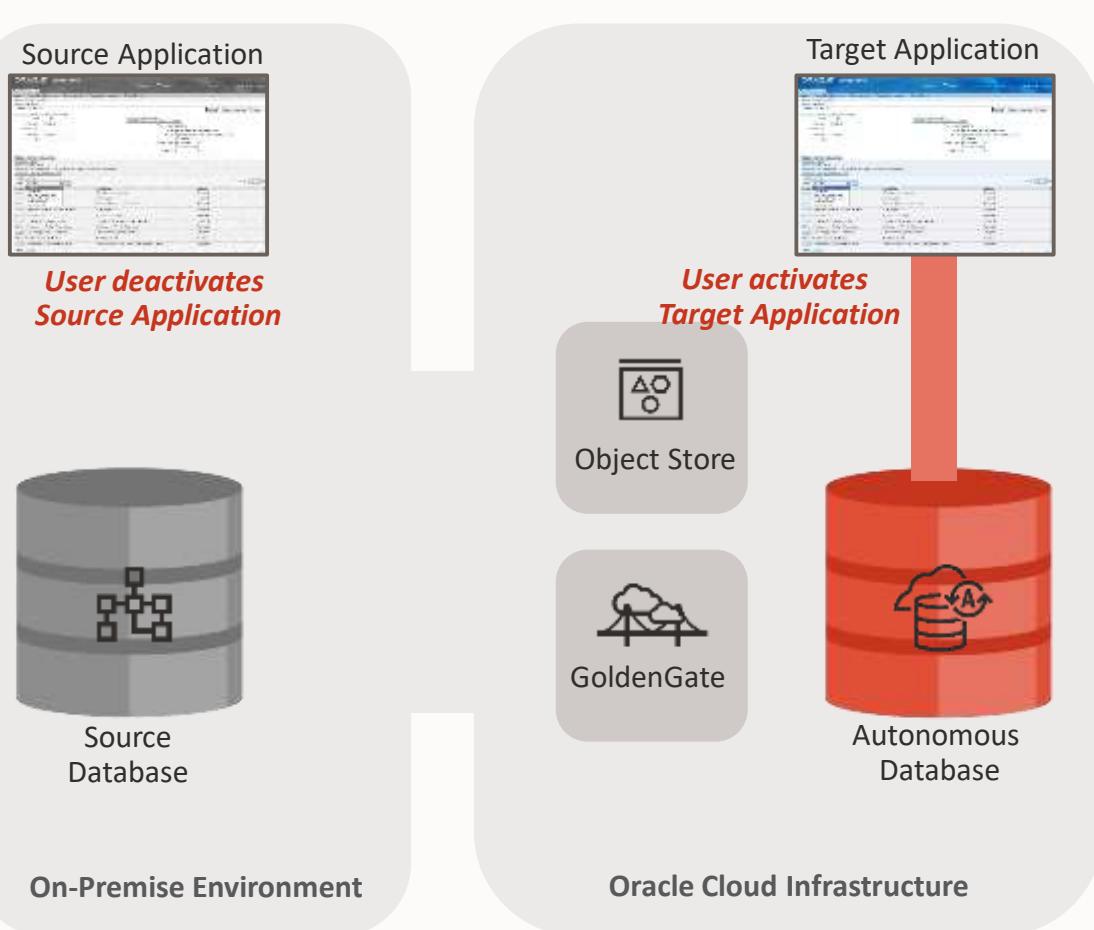
Phases

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

Cloud Premigration Advisor Tool (CPTA)

- 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



CPTA Sample commands

```
./premigration.sh -help

./premigration.sh -version

./premigration.sh -updatecheck

./premigration.sh --connectstring jdbc:oracle:oci:@ --sysdba --targetcloud atpd --pdbname TESTECM_PDB1

./premigration.sh --connectstring jdbc:oracle:oci:@ --sysdba --targetcloud atpd --pdbname TESTECM_PDB1

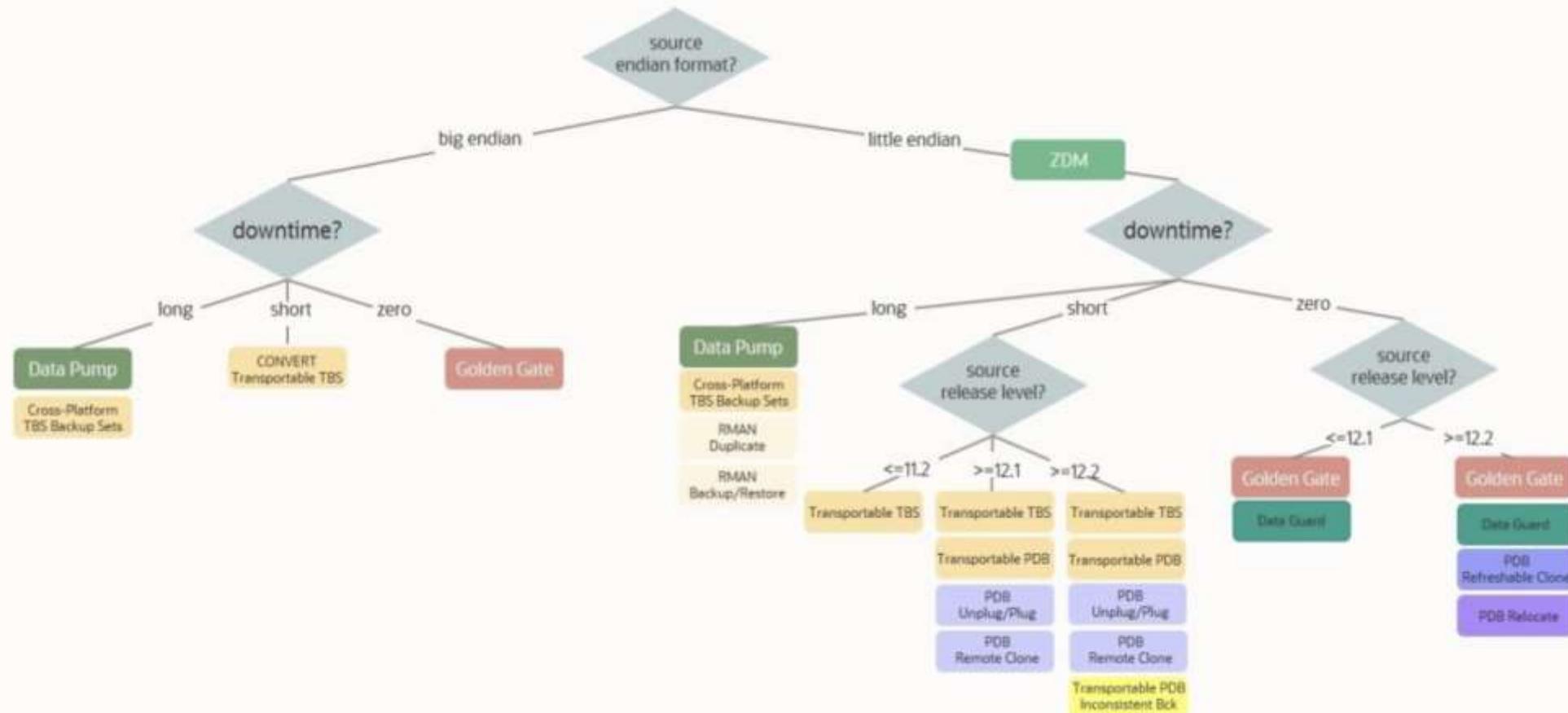
./premigration.sh --connectstring jdbc:oracle:oci:@ --sysdba --targetcloud atpd --pdbname TESTECM_PDB1 --reportformat json

./premigration.sh --connectstring jdbc:oracle:oci:@ --sysdba --targetcloud atpd --pdbname TESTECM_PDB1 --reportformat html
```



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://mikedietrichde.com/>

- **Real Application Test Product Page**

<https://www.oracle.com/manageability/enterprise-manager/technologies/real-application-testing.html>

- **Real Application Test (RAT) Technician Overview**

<https://www.oracle.com/a/otn/docs/enterprise-manager/wp-19c-rat-em.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 Recover 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>

- **M5 Cross Endian Platform Migration using Full Transportable Data Export/Import and RMAN Inc Backups (Doc ID 2999157.1)**

<https://support.oracle.com/epmos/faces/DocumentDisplay?id=2999157.1>

- **Golden Gate Veridata Get started**

<https://docs.oracle.com/en/middleware/goldengate/veridata/12.2.1.4/index.html>



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://docs.oracle.com/en/database/oracle/zero-downtime-migration/21.4/>

- **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/zdqli/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



ORACLE

