



ORACLE



# Moving Databases to OCI-

## Methods & Best Practices

### L200

Bal Sharma

Oracle Cloud Infrastructure

October 2019

## Safe harbor statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions.

The development, release, timing, and pricing of any features or functionality described for Oracle's products may change and remains at the sole discretion of Oracle Corporation.

# Agenda

- Oracle Databases in the Oracle Cloud
- Move to the Oracle Cloud – Migration Scenarios
- Oracle Database Cloud Migration Solutions

ORACLE

# Part 1. Move to the Oracle Cloud- Oracle Database Cloud Services & Considerations for Cloud Migration

# Oracle Database Cloud Services



**ORACLE**  
Database Cloud Service  
Virtual Machines



**ORACLE**  
Database Cloud Service  
Bare Metal



**ORACLE**  
Database Cloud Service  
Exadata Cloud Service



**ORACLE**  
Database Cloud Service  
Exadata Cloud at Customer



**ORACLE**  
Autonomous Transaction Processing  
Serverless



**ORACLE**  
Autonomous Transaction Processing  
Dedicated Deployments



**ORACLE**  
Autonomous Data Warehouse



# Cloud Migration Best Practice



Understand which Oracle Database Cloud Service is best for your use case



# Cloud

Single instance or RAC-enabled choices, Oracle Cloud Infrastructure offers elastic database virtual machine services for application development, test, and production deployment.



**ORACLE**  
Database  
Cloud Service

Virtual  
Machines

<b>Memory</b>	Up to 640 Gb of RAM
<b>Cores</b>	Scale up to 48 Cores
<b>Storage</b>	Up to 40 TB of remote NVMe SSD Block Volumes
<b>Database</b>	Standard or Enterprise Edition   11.2, 12.1, 12.2, 18c, 19c
<b>Migration Solutions</b>	ZDM, SQL Developer, RMAN, Data Pump, MAA, Plug/Unplug, Remote Cloning



# ORACLE®

## Cloud

Oracle Cloud is the only Cloud providing dedicated bare metal servers for the Oracle Database, offering the best in class performance.



**ORACLE®**  
Database  
Cloud Service

**Bare  
Metal**

<b>Memory</b>	Up to 768 Gb of RAM
<b>Cores</b>	Scale up to 52 Cores
<b>Storage</b>	Up to 51.2 TB of local NVMe SSD Database Storage
<b>Database</b>	Standard or Enterprise Edition   11.2, 12.1, 12.2, 18c, 19c
<b>Migration Solutions</b>	ZDM, SQL Developer, RMAN, Data Pump, MAA, Plug/Unplug, Remote Cloning



# ORACLE®

## Cloud

Oracle highest-performance engineered system, catering for all your enterprise needs, supporting OLTP, Data Warehouse and real-time analytic and mixed database workloads.



**ORACLE®**

Database  
Cloud Service

Exadata  
Cloud Service

<b>Memory</b>	Up to 5.7 TB of RAM & over 300 TB of NVMe Flash Cache
<b>Cores</b>	Scale up to 368 Cores
<b>Storage</b>	Up to 340 TB of Database Storage
<b>Database</b>	Enterprise Edition   11.2, 12.1, 12.2, 18c, 19c
<b>Migration Solutions</b>	ZDM, SQL Developer, RMAN, Data Pump, MAA, Plug/Unplug, Remote Cloning

# ORACLE®

## Cloud

Oracle highest-performance engineered system, catering for all your enterprise needs, supporting OLTP, Data Warehouse and real-time analytic and mixed database workloads, in your data center and managed by Oracle.



<b>Memory</b>	Up to 5.7 TB of RAM & over 300 TB of NVMe Flash Cache
<b>Cores</b>	Scale up to 368 Cores
<b>Storage</b>	Up to 340 TB of Database Storage
<b>Database</b>	Enterprise Edition   11.2, 12.1, 12.2, 18c, 19c
<b>Migration</b>	ZDM, SQL Developer, RMAN, Data Pump, MAA, Plug/Unplug, Remote Cloning
<b>Solutions</b>	



# Autonomous Database Cloud



PDB  
Optimized for Analytics  
Columnar  
Large PGA  
Statistics maintained during bulk loads



- PDB
- Optimized for OLTP
- Row based
- Large SGA
- Stats gathering triggered by DML

↳  
**Migration Solutions**

DBMS\_CLOUD, SQL Developer, MAA, Data Pump, SQL\*Loader, MV2ADB

[Data Loading for Autonomous Data Ware House](#)

[Data Loading for Autonomous Transaction Processing Serverless Deployments](#)

[Data Loading for Autonomous Transaction Processing Dedicated Deployments](#)

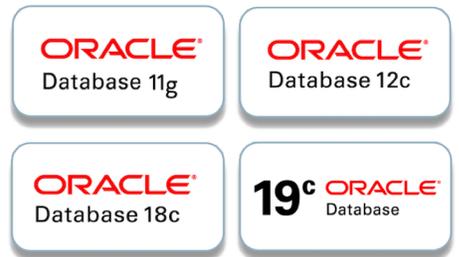


# Cloud Migration Best Practice



Understand your Cloud Migration Landscape

# Cloud Migration Scenarios

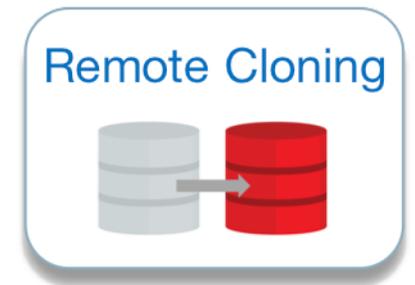
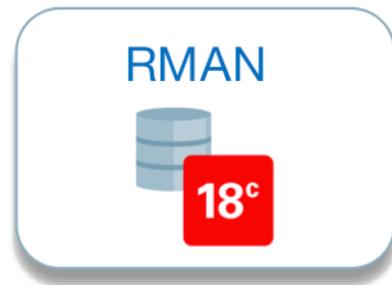
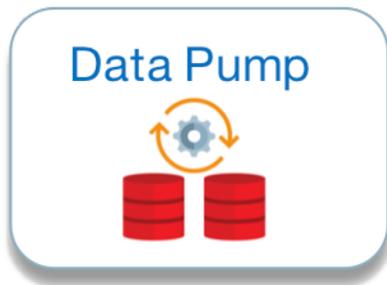


# Cloud Migration Best Practice

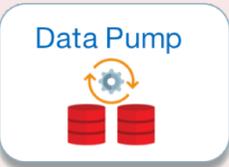


Understand the available Cloud Migration Solutions and determine which best suits your needs

# Oracle Database Cloud Migration Solutions



# Oracle Database Cloud Migration Solutions

Method	Logical / Physical	Online / Offline	Database Size
 ZDM	Physical	Online	Any
 MV2ADB	Logical	Online	Any
 MAA	Physical	Online	Any
 Data Pump	Logical & Physical	Online / Offline	Any

# Oracle Database Cloud Migration Solutions

Method	Logical / Physical	Online / Offline	Database Size
	Logical	Online	Small to Medium
	Physical	Online / Offline	Any
	Physical	Online / Offline	Any
	Physical	Online	Small to Medium



# Cloud Migration Best Practice



For Autonomous Database use MV2ADB



For all other use cases use ZDM when applicable



ZDM will integrate MV2ADB in a single tool



If not applicable, use manual methods according on your requirements

ORACLE

# Part 2. Move to the Oracle Cloud-

## Migrating to Autonomous Databases using MV2ADB

# Introducing MOVE to the Oracle Cloud

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



## Move to the Oracle Cloud

Move your Database to the Oracle Cloud

**Simple & Efficient**

Oracle automated tools make it seamless to move your on-premises database to the Oracle Cloud with virtually no downtime. Using the same technology and standards on-premises and in the Oracle Cloud, you can facilitate the same products and skills to manage your cloud-based Oracle Databases as you would on any other platform.

**Flexible**

You can directly migrate your Oracle Database to the Oracle Cloud from various source databases into different target cloud deployments depending on your requirements and business needs. A well-defined set of tools gives you the flexibility to choose the method that best applies to your needs.

**Cost Effective**

The same flexibility that lets you directly migrate your Oracle Database to the Oracle Cloud is applied to finding the most cost effective solution for the purpose and duration of the migration. Even if the automated tools determine that an Oracle licensable product should be used to optimize your migration, Oracle will provide a cost neutral solution.

**Highly Available & Scalable**

The tight integration of all migration tools with the Oracle Database lets you maintain control and gain better efficiency when moving your databases to the Oracle Cloud, while the Maximum Availability Architecture (MAA)-approved tools as well as Zero Downtime Migration (ZDM)-based migrations ensure that your migration is handled as smoothly as possible.



**Cloud Migration Advisor**

# Autonomous Cloud | General Migration Path



**On  
Premises**

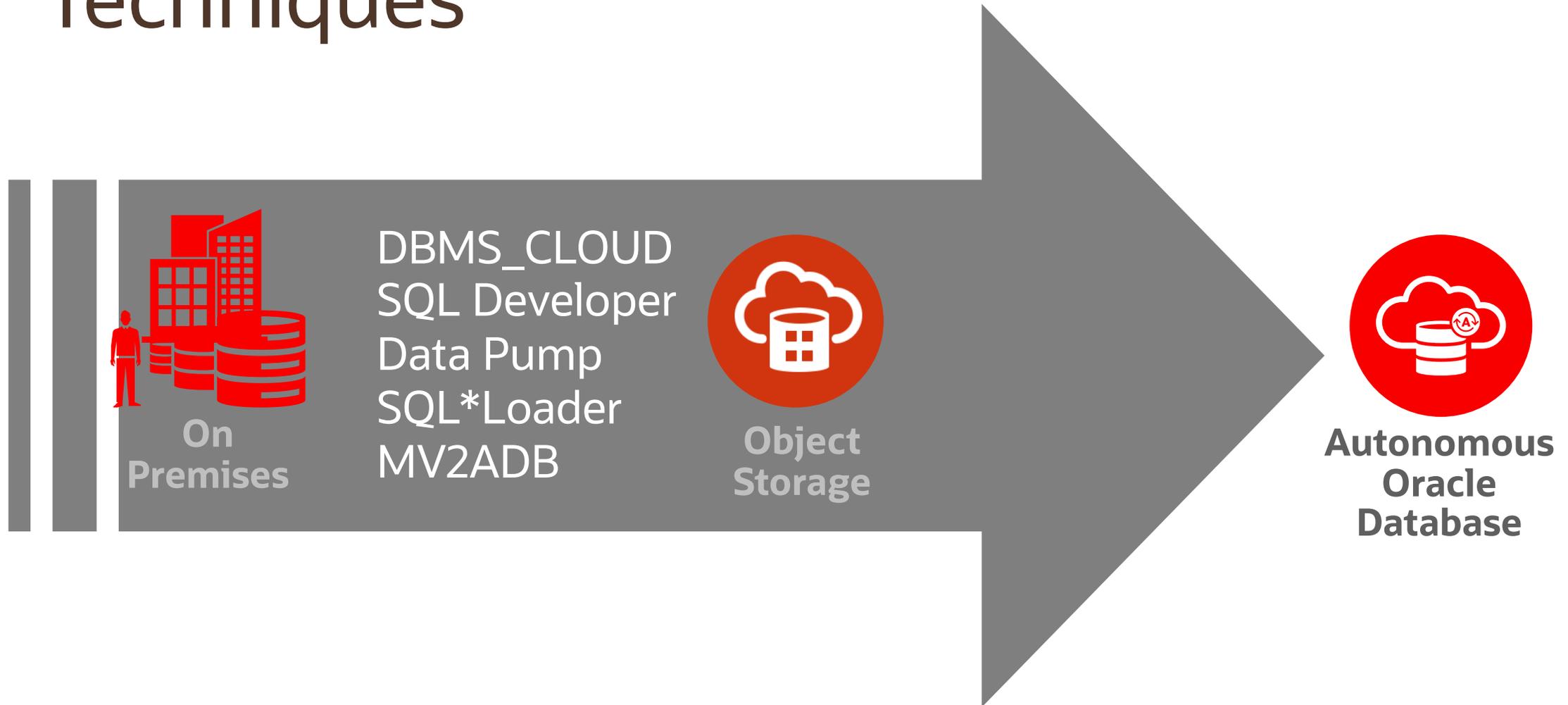


**Object  
Storage**



**Autonomous  
Oracle  
Database**

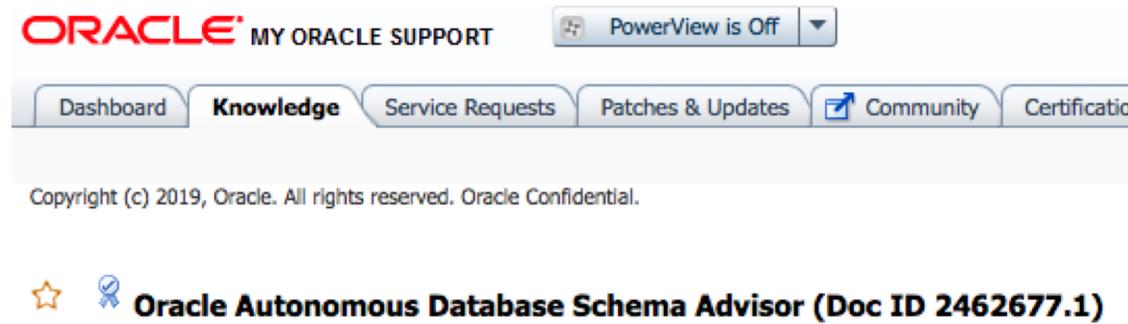
# Autonomous Cloud | General Migration Techniques



**How To Load Data To ADW/ATP Using DBMS\_CLOUD.COPY\_DATA Method And Find/Validate The Inputs Required (Doc ID 2493502.1)**

# Cloud Migration Best Practice

Use the [Schema Advisor](#) when migrating to Oracle Autonomous Database



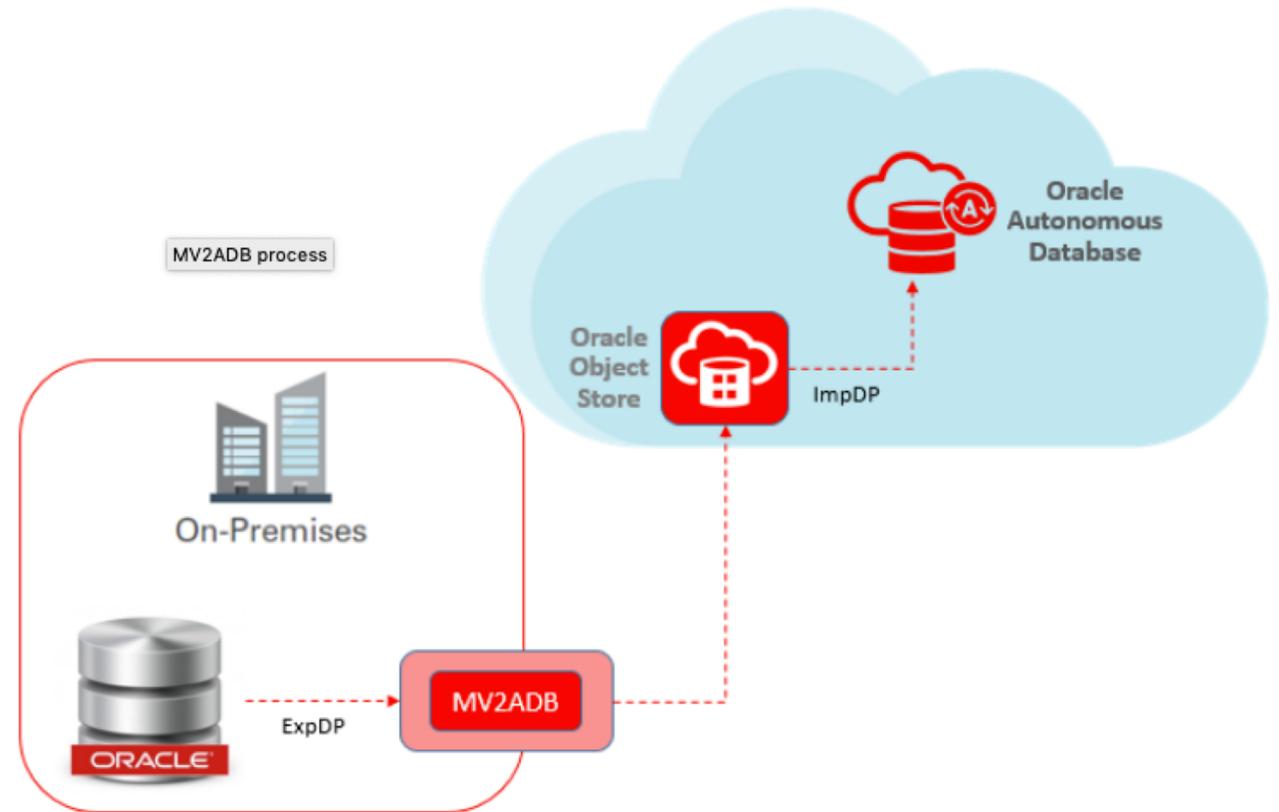
# Cloud Migration Best Practice

Use [MV2ADB](#) when migrating to Oracle Autonomous Database

# Migration Tools | MV2ADB

## MOS Note: [2463574.1](#)

MV2ADB:  
Move to Autonomous Database



# Migration Tools | MV2ADB - Prerequisites

OCI Command Line Interface must be installed

<https://github.com/oracle/oci-cli>

Command Line Interface for Oracle Cloud Infrastructure <https://cloud.oracle.com/cloud-infras...>

bare-metal

cloud

infrastructure

cli

108 commits

57 branches

49 releases

11 contributors

View license

Branch: master

New pull request

Find File

Clone or download

rajeshad Releasing version 2.5.10

scripts Releasing version 2.5.10

services Releasing version 2.5.10

src/oci\_cli Releasing version 2.5.10

tests Releasing version 2.5.10

Clone with HTTPS

Use Git or checkout with SVN using the web URL.

<https://github.com/oracle/oci-cli.git>

Open in Desktop

Download ZIP

# Migration Tools | MV2ADB - Download

[MOS Note:2463574.1](#)

[MV2ADB: move data to Autonomous Database in "one-click"](#)

[MV2ADB: Migrate to Autonomous Database Cloud within "1-Click"](#)

[Loading data with autonomous database cloud](#)

[MV2ADB features & operations](#)

[MV2ADB - Auto Operation](#)

[MV2ADB - Expdp Operation](#)

[MV2ADB - Impdp Operation](#)

[MV2ADB – createbucket Operation](#)

[MV2ADB – deletebucket Operation](#)

[MV2ADB – listbuckets Operation](#)

[MV2ADB – putdump Operation](#)

[MV2ADB – getdump Operation](#)

[MV2ADB – deldump Operation](#)

[MV2ADB – listdump Operation](#)

[MV2ADB – report Operation](#)

[MV2ADB – encpass Operation](#)

[MV2ADB Command Option](#)

[MV2ADB Configuration File](#)

[MV2ADB Installation](#)

[MV2ADB De-installation](#)

## ▼ Attachments



mv2adb - 20190409 - \$Revision: 2.0.1.38 \$ (29.37 KB)

# Migration Tools | MV2ADB

## Operation Modes

### Operation modes

auto

expdp

impdp

### OCI object storage bucket operations:

createbucket

delbucket

listbucket

### OCI object storage object operations:

deldump

getdump

listdump

putdump

1. expdp from source (schemas based)
2. upload dump to Oracle Object Store
3. impdp into Autonomous Database Cloud

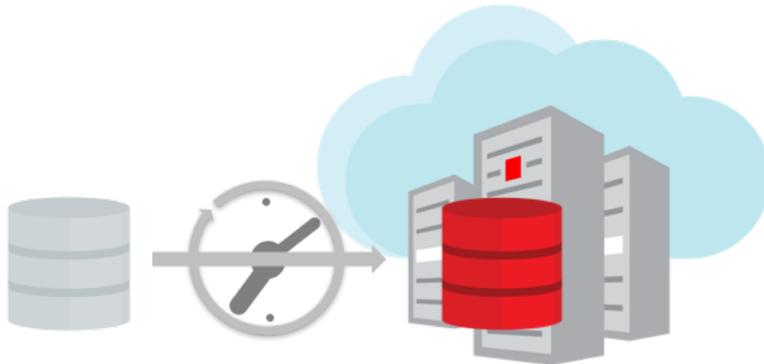
```
mv2adb auto {-conf <conf file path> |
  {-bmchost <REST endpoint>
  -bmctenant <tenant name>
  -bmclid <user ID>
  -bmcbucket <bucket name>
  [-proxyHost <host> -proxyPort <port> [-proxyID <user ID> -proxyPass <password>]]} |
  {-oci
  -bmctenant <tenant name>
  -bmcbucket <bucket name>
  -dumpfiles <comma separated dump name> [-size <size Mb> -parallel <count>]}
  {-adbname <ADB database name>
  -cfile <ADB credential zip file>
  -ohome <Oracle Home>
  -ichome <Instant Client Home>
  -dbcs <Source DB connect string>
  -schemas <Database schemas to export>
  -dumpfile <comma separated expdp dump file name>
  [-encryption [-enctype AES128 | AES192 | AES256]]}
```

# Part 3. Move to the Oracle Cloud- Oracle Zero Downtime Migration

# Zero Downtime Migration

**Simple**

Single Button Approach



Zero Downtime Migration

**Comprehensive**

MAA Compliant

Extensive Pre/Post-checks

Resumable

Rollback enabled

Dry-run option

Customizable Workflow

**Fleet Scale**

Centralized

Scheduled Operations

Command Deck

Audit Trail

Migrations in Parallel

Jobs Framework

# Zero Downtime Migration

## Sources

**ORACLE®**  
Database 11g

**ORACLE®**  
Database 12c

**ORACLE®**  
Database 18c

## Targets

**ORACLE®**  
Database 11g

**ORACLE®**  
Database 12c

**ORACLE®**  
Database 18c

## Same Version / Platform



**Zero Downtime Migration**



**ORACLE®**  
Database  
Cloud Service  
Virtual  
Machines



**ORACLE®**  
Database  
Cloud Service  
Bare  
Metal



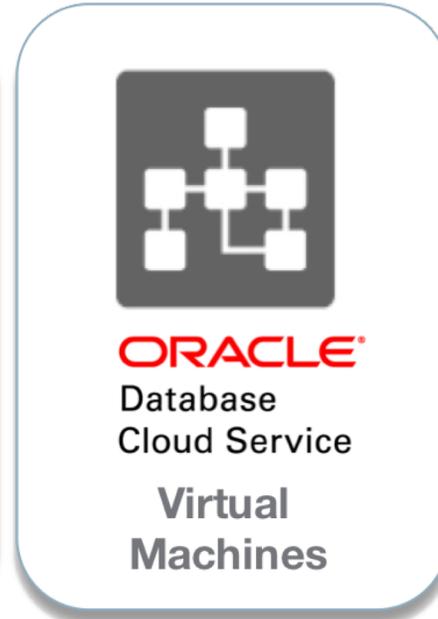
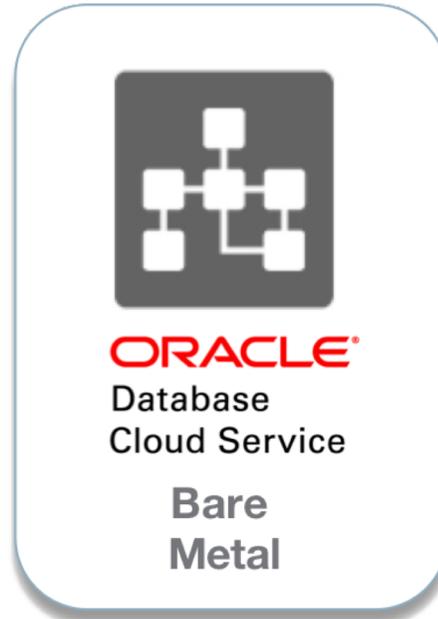
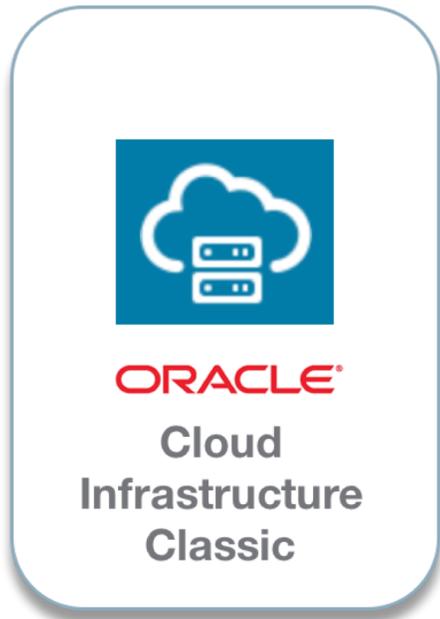
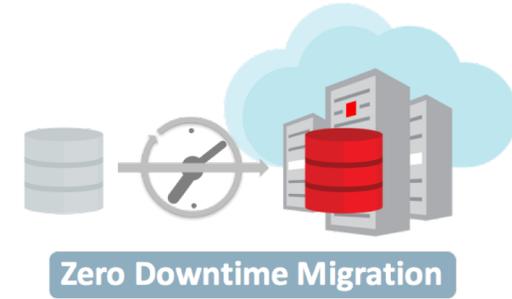
**ORACLE®**  
Database  
Cloud Service  
Exadata  
Cloud Service

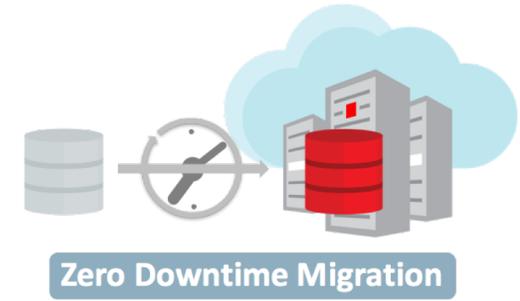


**ORACLE®**  
Database  
Cloud Service  
Exadata  
Cloud at Customer

# ZDM

## Migration from OCI-C to OCI



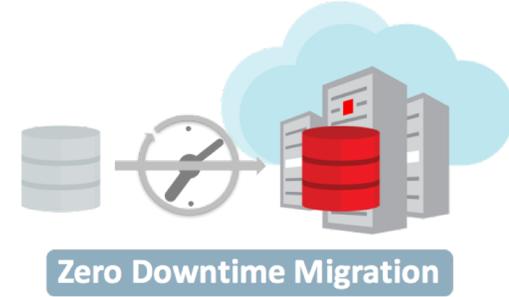


# Oracle Zero Downtime Migration

Step by Step Migration workflow

# Zero Downtime Migration

## Operational Phases



- Workflow is defined in 4 categories divided in operational phases
- Workflow can be customized by inserting plug-ins on each phase
- Migration can be paused and resumed at most operational phases

**Analysis &  
Preparation**

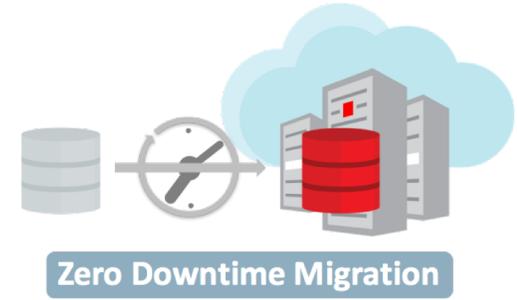
**Migration**

**Switch**

**Finalize**

# Zero Downtime Migration

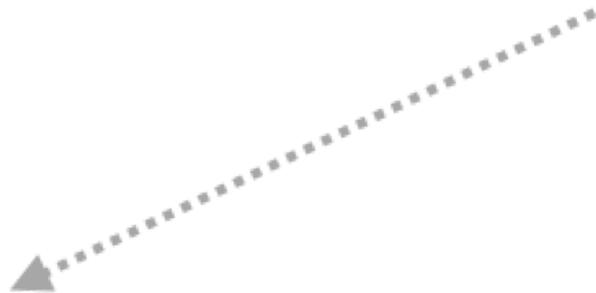
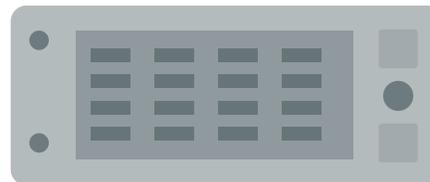
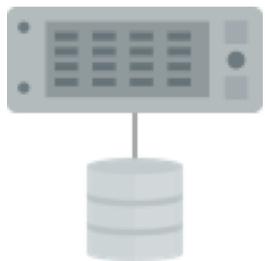
Workflow



Download &  
Configure ZDM

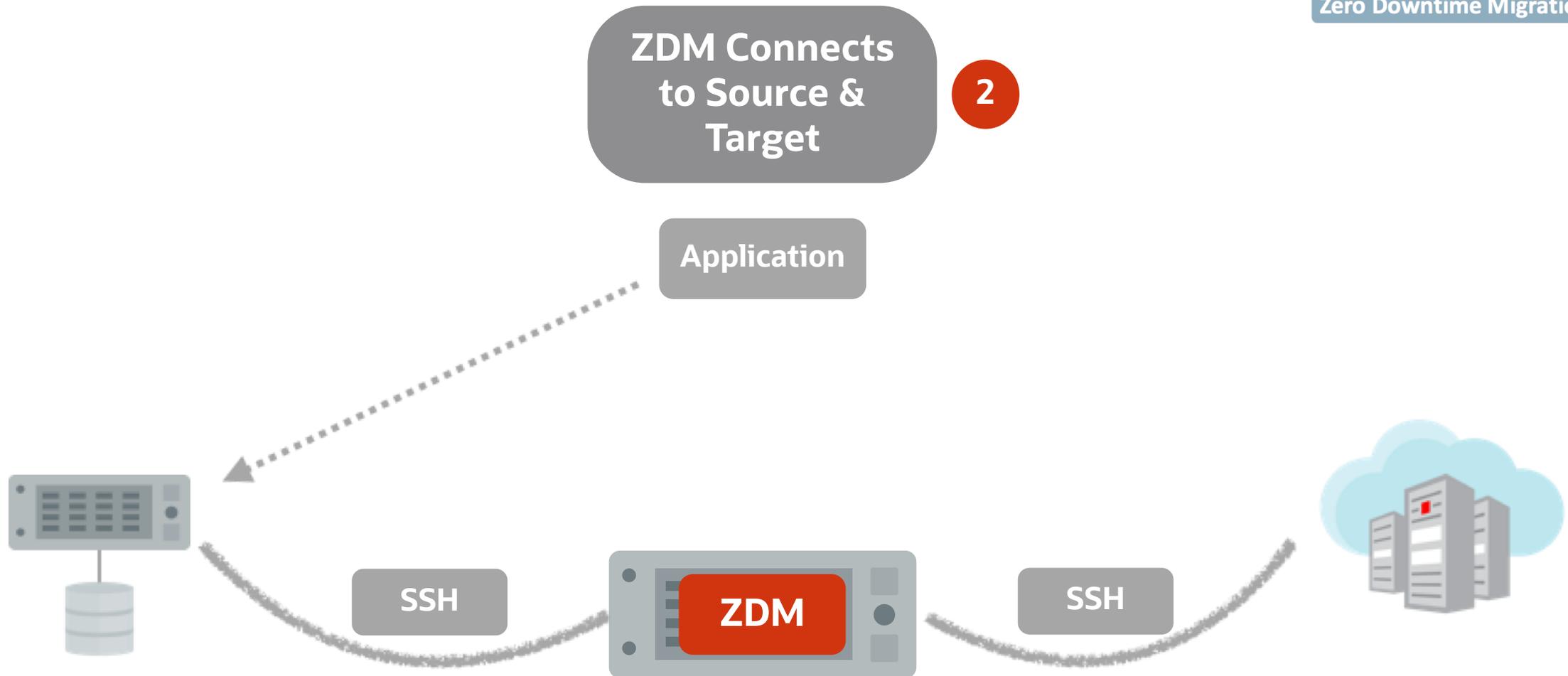
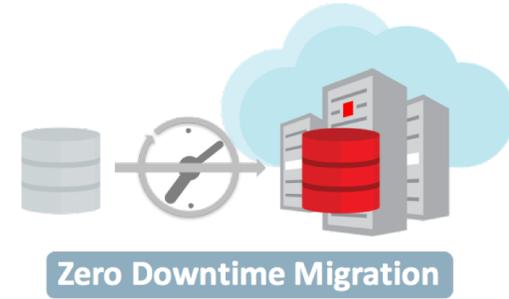
1

Application



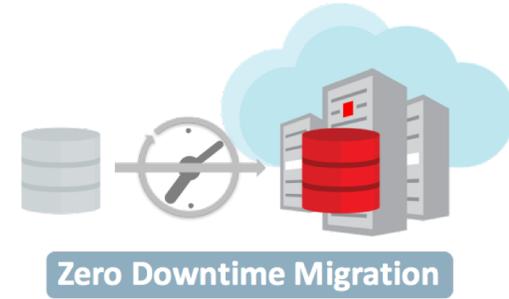
# Zero Downtime Migration

## Workflow



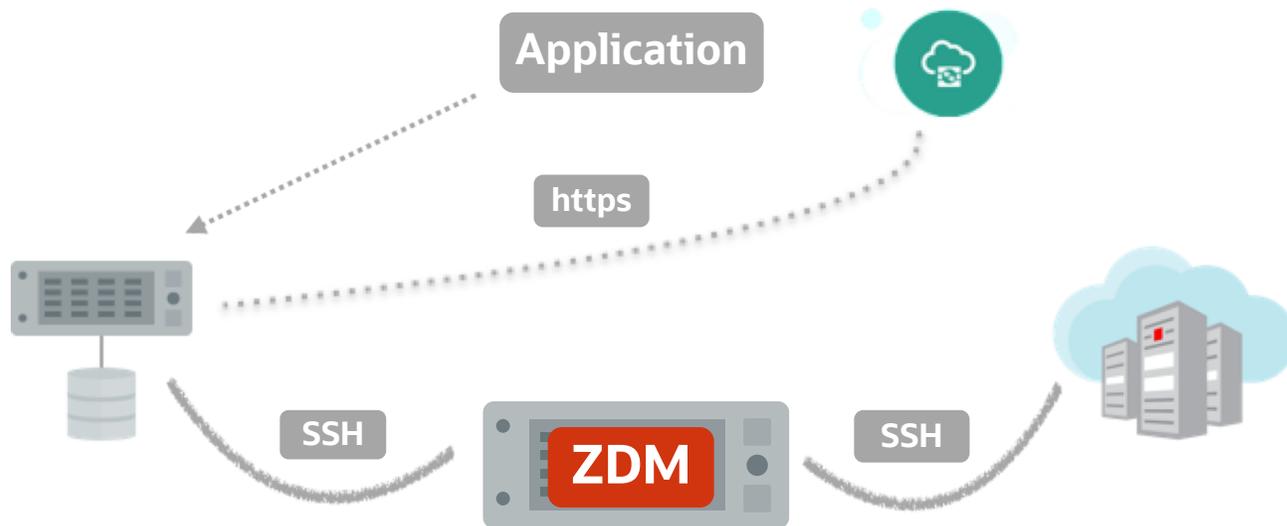
# Zero Downtime Migration

Workflow



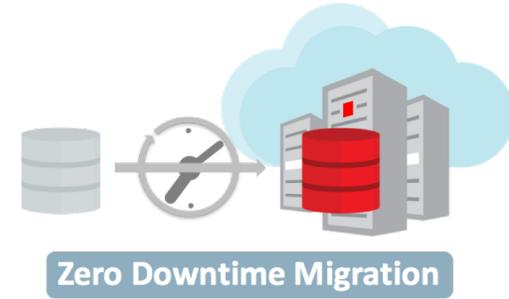
ZDM Connects  
Source to Object  
Store

3



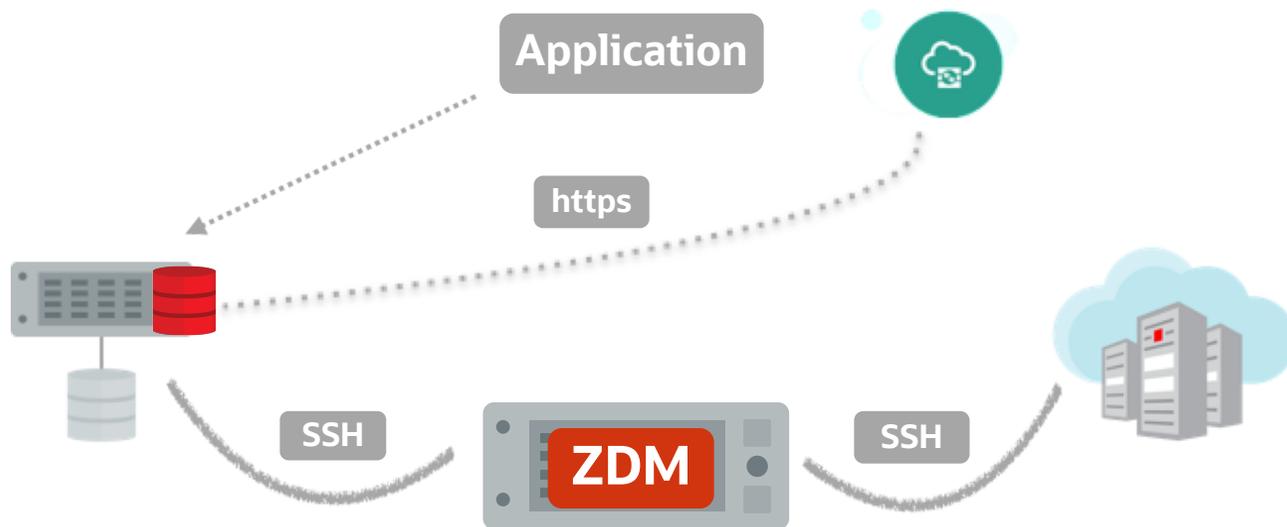
# Zero Downtime Migration

## Workflow



ZDM Transfers  
DB Files

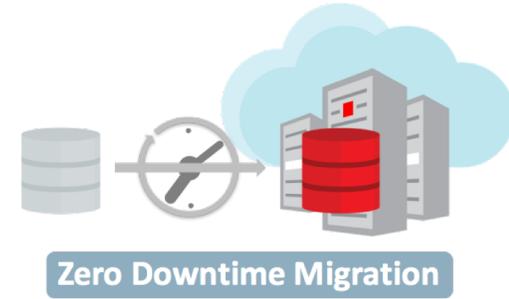
4



- Database Files
- Full Backup
- Including Incremental Archives

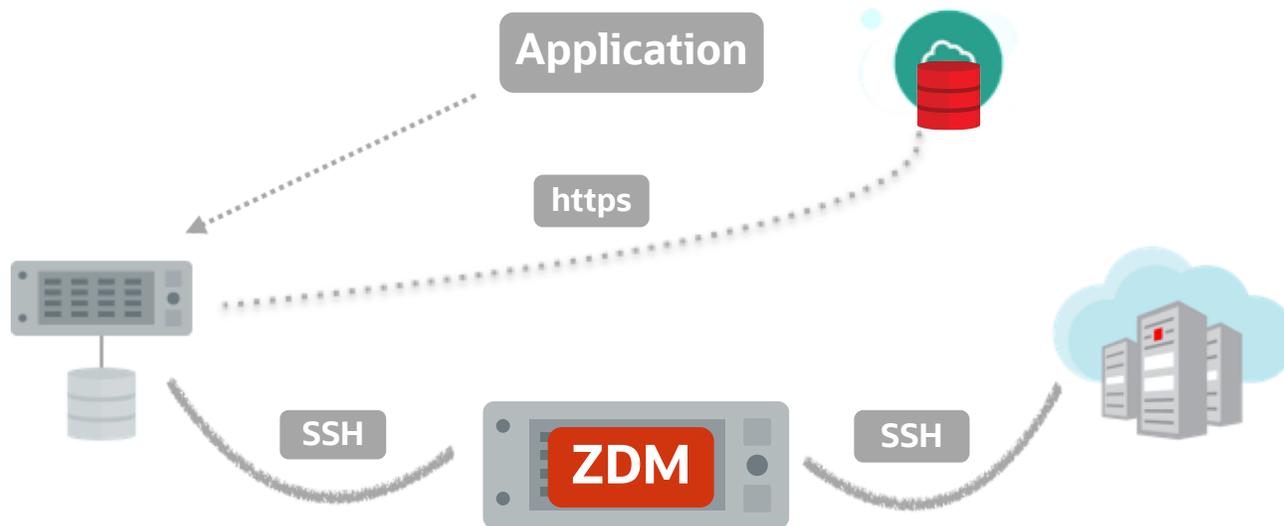
# Zero Downtime Migration

## Workflow



ZDM  
Instantiates  
Standby

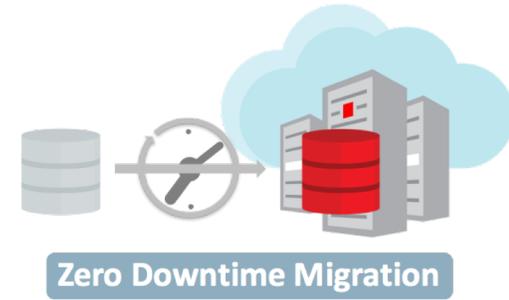
5



- Standby on target initiates with the backup files transferred to the Object Store

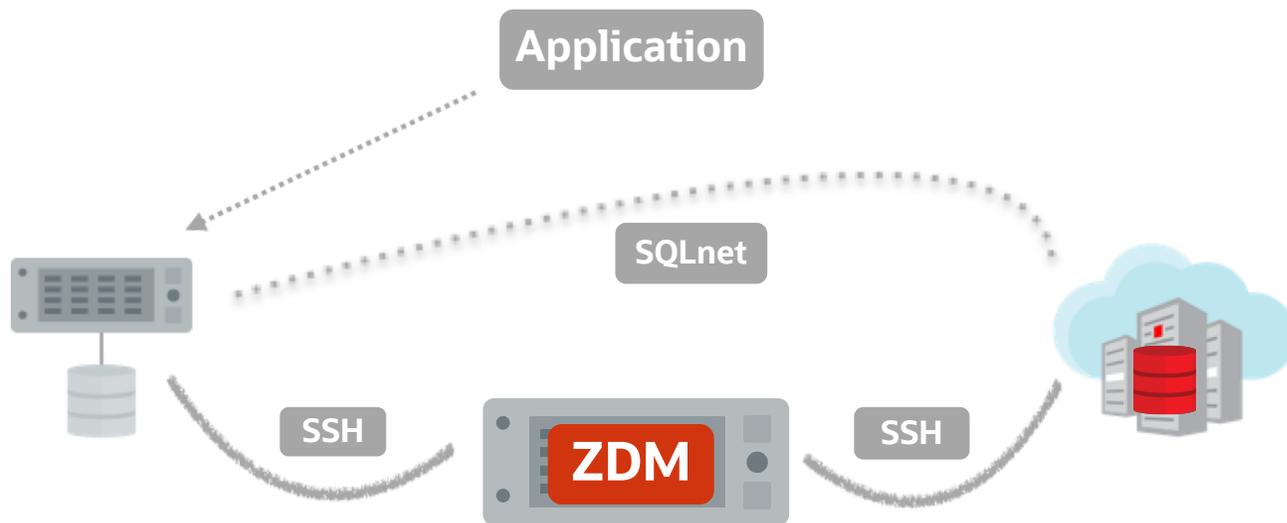
# Zero Downtime Migration

## Workflow



ZDM  
Synchronizes  
Primary &  
Standby

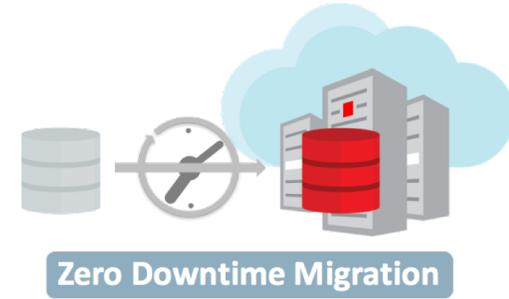
6



- SQLnet connectivity is established between source & target
- Synchronization between Primary and Standby starts

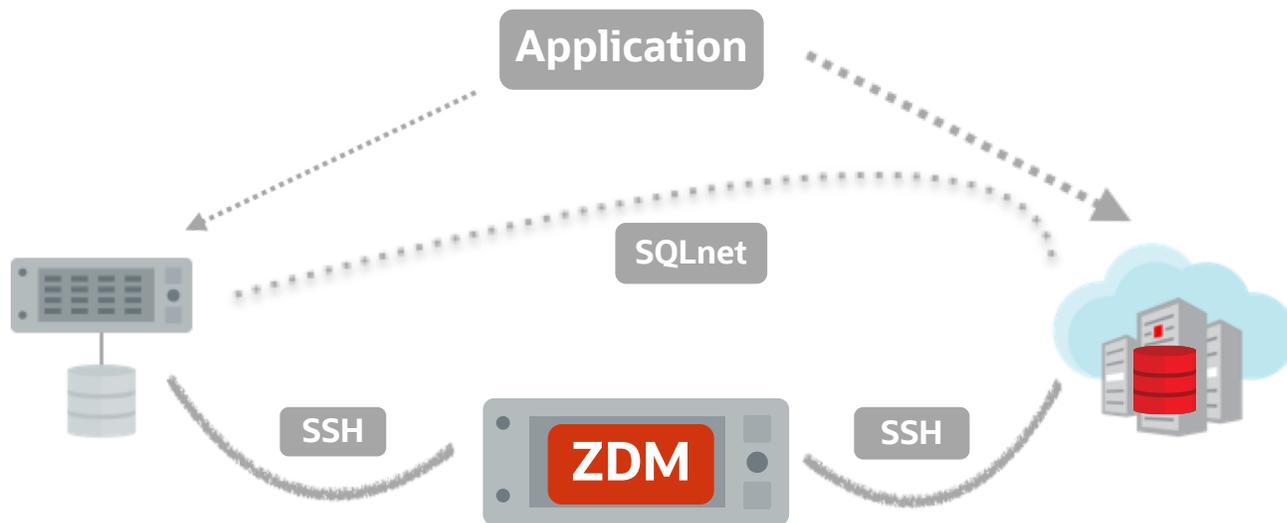
# Zero Downtime Migration

## Workflow



ZDM Switches over and Role Swaps

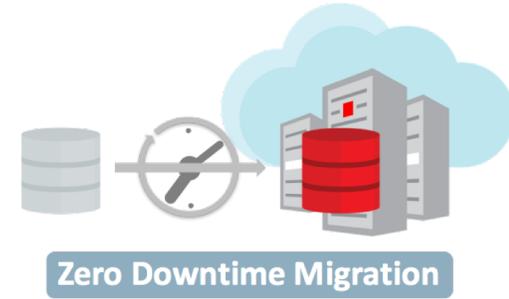
7



- Switchover
- Role swap between Primary and Standby

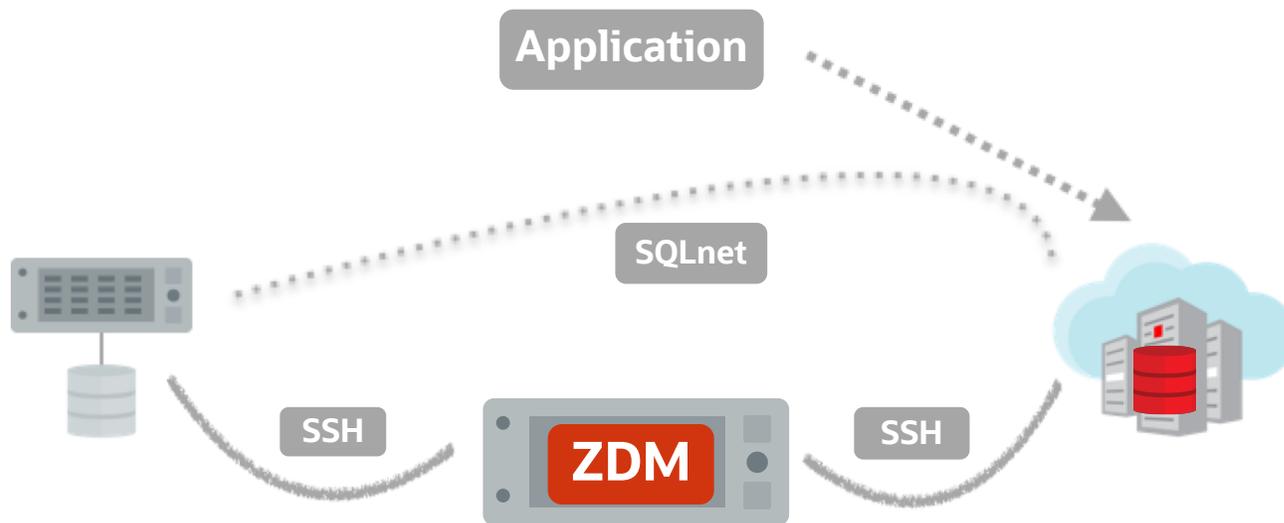
# Zero Downtime Migration

## Workflow



User Finalizes at Will

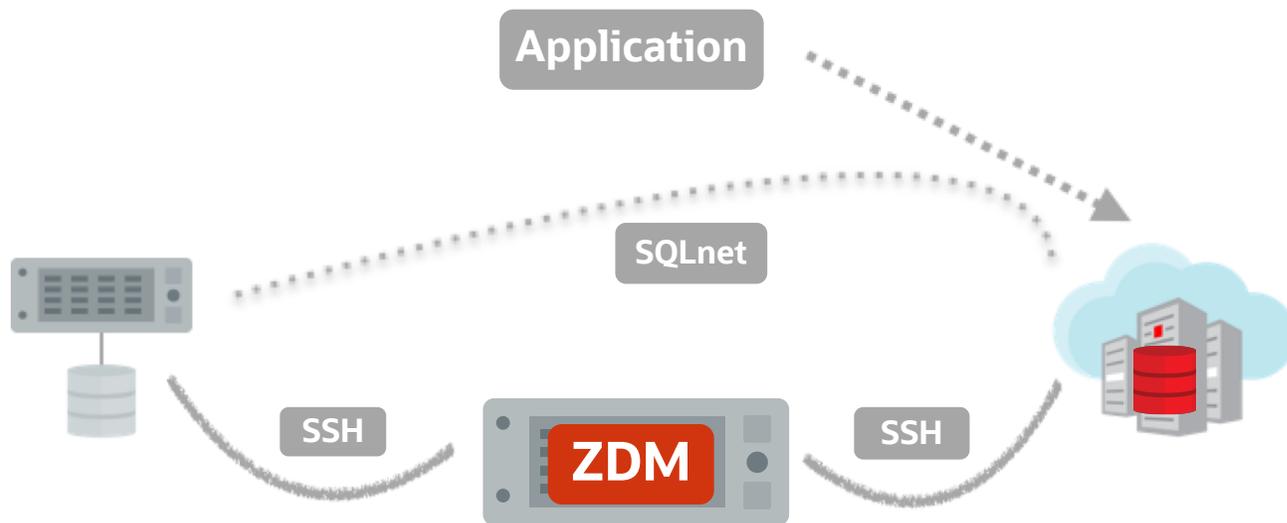
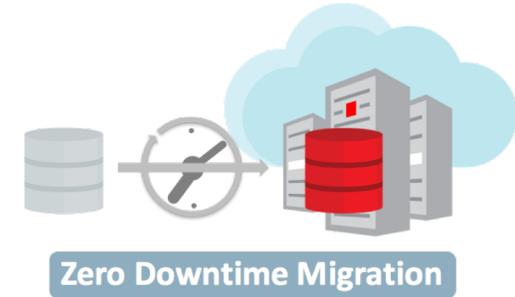
8



- ZDM keeps the standby on-premises synchronized.
- User decides when to stop this process in case fall back is required.

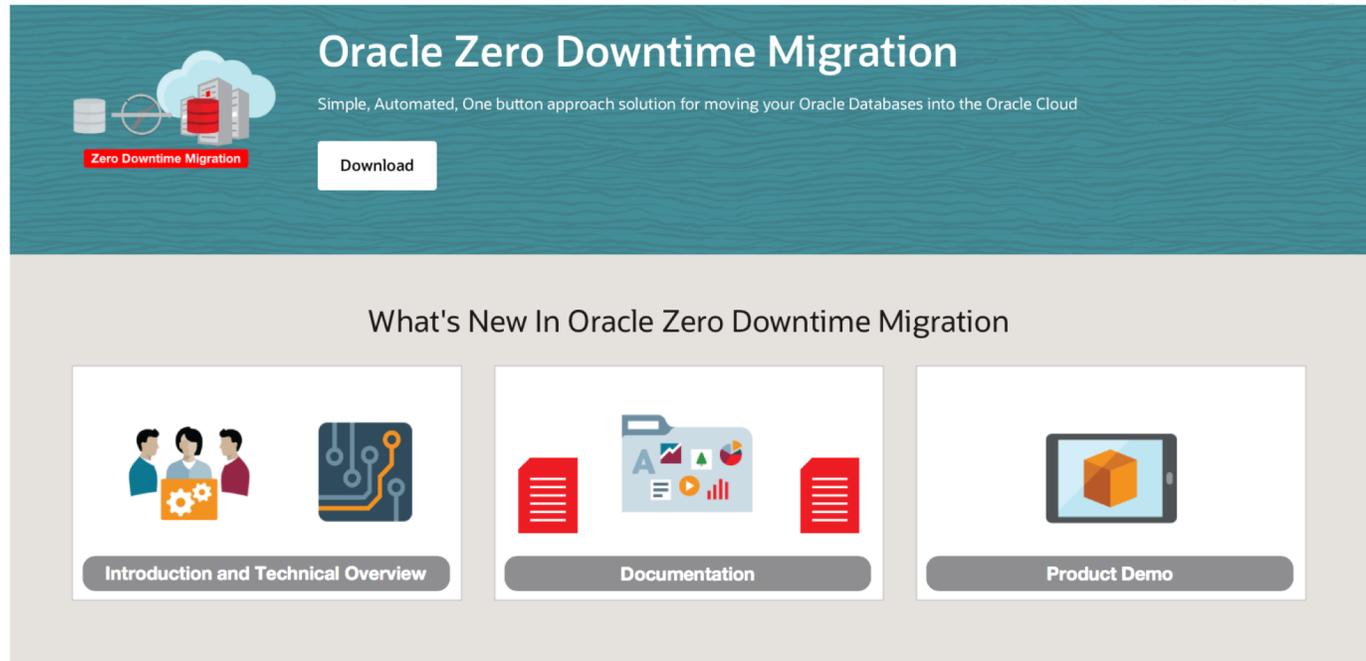
# Zero Downtime Migration

## Workflow



- 1 Download ZDM
- 2 Connects to Source & Target
- 3 Connects to Object Store
- 4 Transfers DB Files
- 5 Instantiates Standby
- 6 Syncs Primary & Standby
- 7 Switches Over & Role Swaps
- 8 User Finalizes at Will

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



**Oracle Zero Downtime Migration**  
Simple, Automated, One button approach solution for moving your Oracle Databases into the Oracle Cloud

**Zero Downtime Migration** [Download](#)

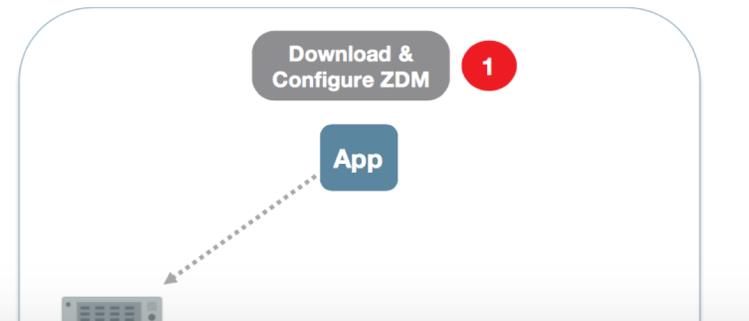
### What's New In Oracle Zero Downtime Migration

- Introduction and Technical Overview**
- Documentation**
- Product Demo**

Oracle Zero Downtime Migration

## 8 Simple Automated Steps

-  **User Downloads and Configures ZDM**
-  **ZDM Starts Database Migration**
-  **ZDM Connects to Object Store**
-  **ZDM Transfers Database Files**



# Cloud Migration Best Practice



“Switch Over” at will.

Always test your new environment and applications after migrating and before performing the final switch over

# Summary

After completing this module you should have learnt :

- Oracle Databases in the Oracle Cloud
- Methods to move to the Oracle Cloud – Migration Scenarios
- Oracle Database Cloud Migration Solutions



ORACLE

**Oracle Cloud always free tier:**

[oracle.com/cloud/free/](https://oracle.com/cloud/free/)

**OCI training and certification:**

[oracle.com/cloud/iaas/training](https://oracle.com/cloud/iaas/training)

[oracle.com/cloud/iaas/training/certification](https://oracle.com/cloud/iaas/training/certification)

[education.oracle.com/oracle-certification-path](https://education.oracle.com/oracle-certification-path)

**OCI hands-on labs:**

[ocitraining.qcloudable.com/provider/oracle](https://ocitraining.qcloudable.com/provider/oracle)

**Oracle learning library videos on YouTube:**

[youtube.com/user/OracleLearning](https://youtube.com/user/OracleLearning)