Efficiently Migrate Oracle Databases to the Cloud and To Engineered Systems

Oracle Database Cloud & Exadata Migration

Krisztián Fekete

Consulting Member of Technical Staff

Oracle Zero Downtime Migration 21.3

Agenda

1. **Oracle Database Cloud Migration General Overview**

2. **Zero Downtime Migration - Physical Migration**

3. **Summary**

4. **Resources**

Agenda

1. **Oracle Database Cloud Migration General Overview**

2. **Zero Downtime Migration - Physical Migration**

3. **Summary**

4. **Resources**

Oracle Database
Choice and Control

On-Premises choices

Cloud choices

Commodity HW, On-site	Oracle Exadata On-Premises	Exadata Cloud@Customer	DBCS	Exadata Cloud Service	Autonomous Database Shared	Autonomous Database Dedicated

Manual   **Automated**   **Autonomous**

Oracle Database Migration
Stages

Assess / Evaluate

Choose Product

Migrate

Manual

Cloud Premigration Advisor Tool (CPAT)

Zero Downtime Migration (ZDM)

Database Migration Service (DMS)

Assessing / Evaluating a Migration
Cloud Premigration Advisor Tool (CPAT)

Assess / Evaluate

```
1: X O X O X
2: X O
OX
```

CPAT

+

ZDM

CPAT helps determine the suitability of migrating an Oracle database instance to one of Oracle's Cloud offerings

- Warns about any features used by source database that aren't supported in the target

- Makes suggestions for remedial changes and/or parameters to use for the Data Pump and GoldenGate operations

- Optionally generates remedial scripts for failing checks that can be run against the source database

Oracle Database Migration
Migration Products

Choose Products

ZDM

DMS

Customers can choose products and migration workflows based on source/target support and migration requirements

- ZDM works as the main engine supporting most methods/sources/targets and it is based on CLI

- DMS uses ZDM under the covers and allows for logical offline/online migration with a User Interface to OCI Native Database Services
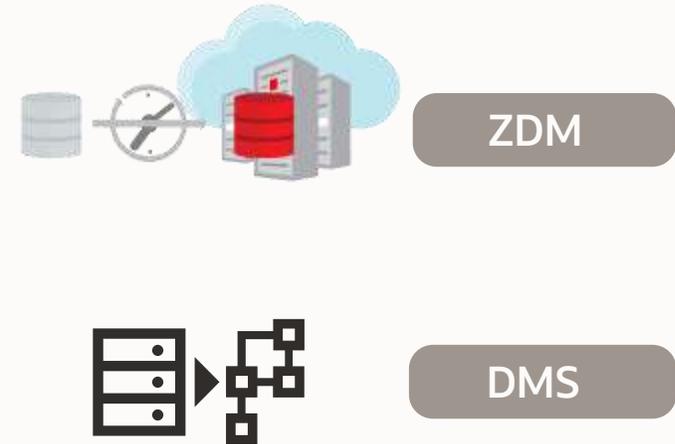
Oracle Zero Downtime Migration
Your Benefits

Simple

End-to-End Automation

Leverages Oracle MAA Best Practices

Zero Data Loss

Free

How it works – Zero Downtime Migration
Product Overview

Simple

Single-button approach

Comprehensive

MAA compliant

Resumable

Dry-run option

Customizable User Actions

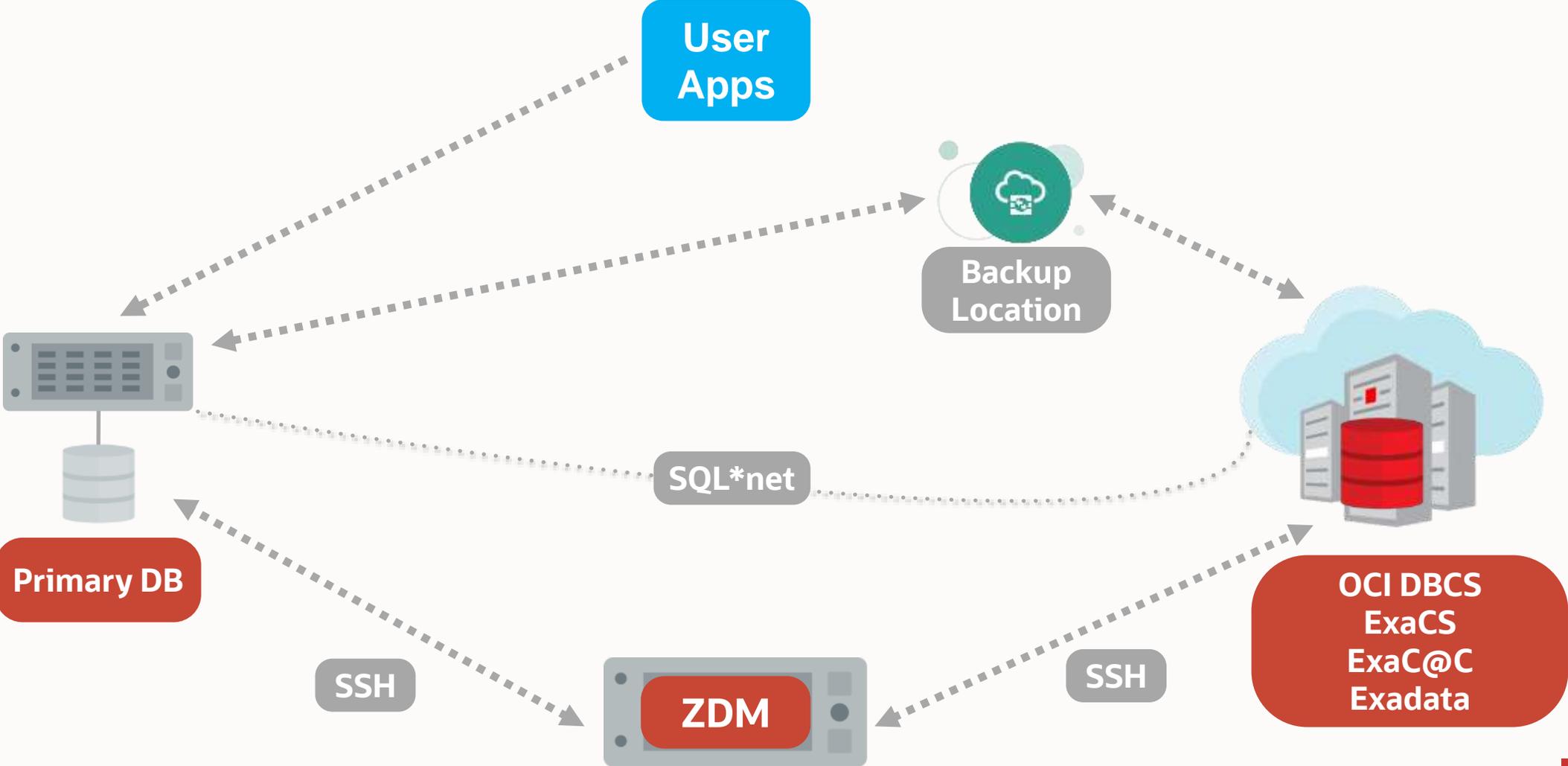**Automated Encryption**

Fleet scale

Centralized

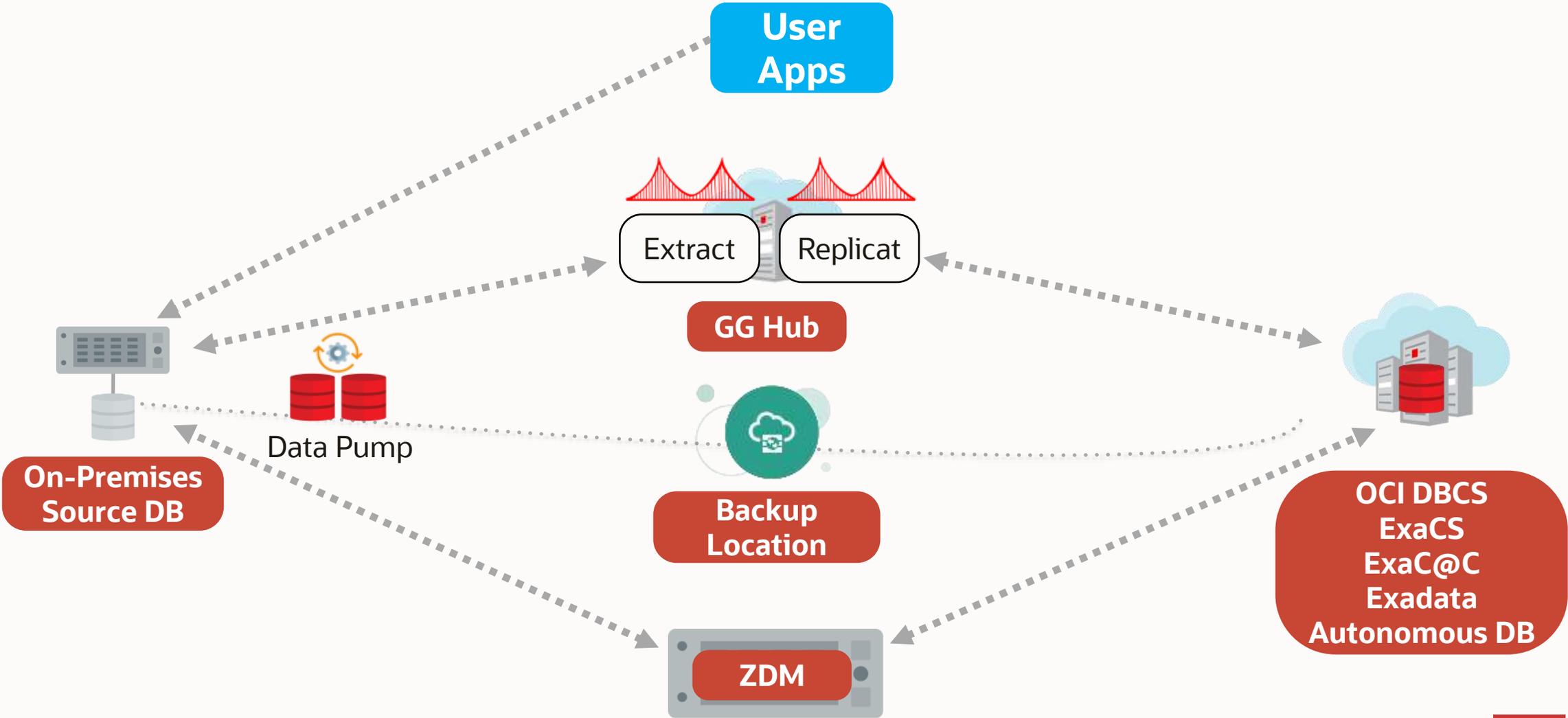**Scheduled operations**

Audit trail

Migrations in parallel

Jobs framework

How it works – Zero Downtime Migration
Architecture – Physical Migration

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How it works – Zero Downtime Migration
Architecture – Logical Migration

User Apps

Extract Replicat

GG Hub

Data Pump

Backup Location

On-Premises Source DB

ZDM

OCI DBCS ExaCS ExaC@C Exadata Autonomous DB

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Zero Downtime Migration
Features & Functionality

Source Databases	Source Platforms	Supported Targets

SE & EE On-Premises

ORACLE

11*g*, 12c, 18c, 19c, 21c

ORACLE
AWS RDS

AIX

ORACLE
Solaris

Physical &
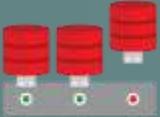Logical Migration

Logical
Migration Only

DBCS

ExaCS, ExaC@C
Exadata

ATP / ADW

Zero Downtime Migration
Features & Functionality

Non-CDB to CDB	Methodologies	In-Flight Upgrade	Technologies
✓	Physical ✓ Logical ✓	Logical Migration Only	RMAN Data Guard Data Pump GoldenGate

Zero Downtime Migration
History & Evolution

21.2

21c

19.7

19c

08/2021

03/2021

10/2020

11/2019

- *Migration from AWS RDS to ADB*

- *Solaris & AIX Sources*

- *Direct Data Transfer Support for Physical Migration*

- *Existing RMAN Backup usage as a Migration Source*

- Automatic Creation/Remap of Tablespaces

- CPAT Enhancements

- Customization Enhancements

- *Logical Migration*

- *Physical Migration to Exadata*

- *ADB as Target*

- Non-CDB to CDB Support

- Migration Advisor CPAT

- Lighter ZDM Home

- Command Line Enhancements

- Response File Enhancements

- Target DB Home Auto Discovery

- Backup Related Enhancements

- Phyisical Migration

- DBCS/ExaCS/ExaC@C Targets

- Linux Sources

Zero Downtime Migration
Today

Oracle Zero Downtime Migration 21.3
New Features and Functionality

Logical Migration Enhancements		Physical Migration Enhancements	Oracle AWS RDS Enhancements
New Target Exadata On-Premises	**Logical Online** Cross-Platform Support		
	• Job Suspension	• **Standby Database** Support	• Migration Advisor Support
	• GG Microservice Suspension and Configuration Update	• **Data Guard Broker** Support	• Logical Online Support
	• Parallel Schema Migration		• New OCI Targets

Agenda

1. Oracle Database Cloud Migration General Overview

2. **Zero Downtime Migration - Physical Migration**

3. **Summary**

4. **Resources**

Zero Downtime Migration - Physical Migration
Supported Sources and Targets

Source Versions

- ORACLE Database 11g
- ORACLE Database 12c
- ORACLE Database 18c
- 19c ORACLE Database

Non-CDB to PDB Ok

Target Versions

- ORACLE Database 11g
- ORACLE Database 12c
- ORACLE Database 18c
- 19c ORACLE Database

Target Platforms

DBCS BM / VM

ExaCS, ExaC@C
Exadata On-Premises
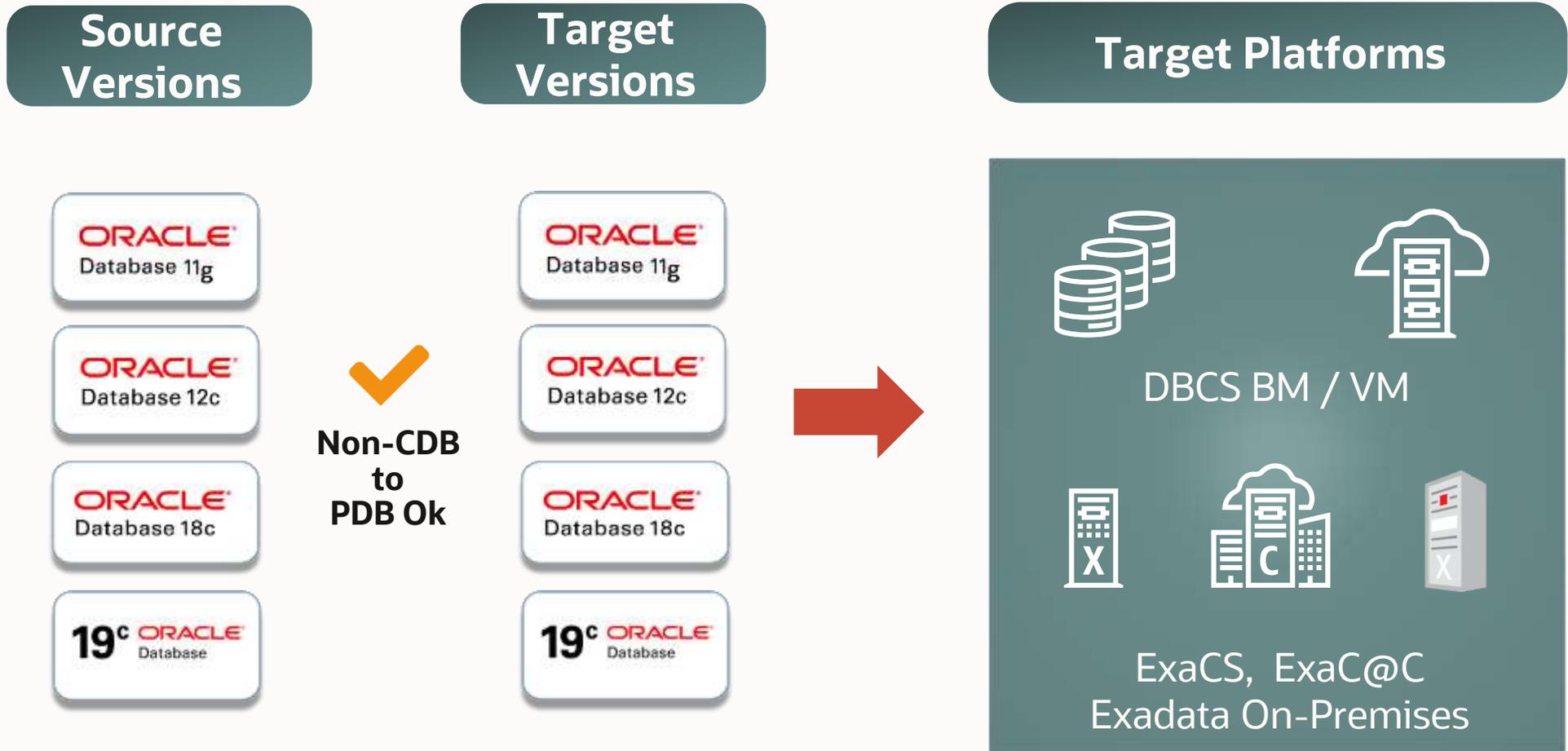
Zero Downtime Migration - Physical Migration
Workflows

Physical Offline Migration

RMAN Backup & Restore

Backup Location

Standard Edition Enterprise Edition

Physical Online Migration

Data Guard

Backup Location, Physical Direct Data Transfer or Standby Database Mode

Enterprise Edition

Zero Downtime Migration - Physical Migration
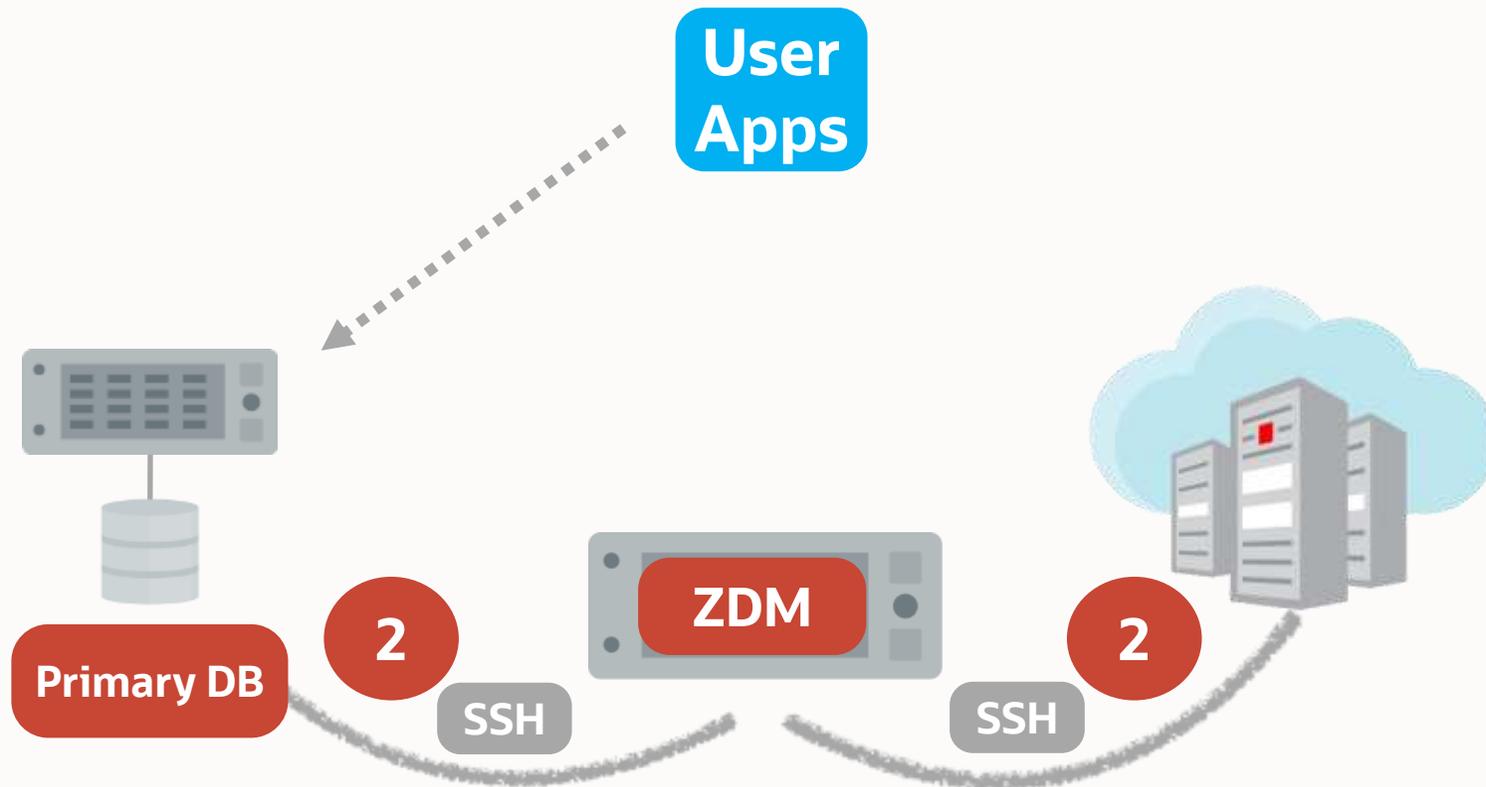Online Migration with Backup Location

Step by Step Migration Overview

Step 1 – Download & Configure ZDM
Physical Online Migration Workflow

User Apps

www.oracle.com/goto/zdm

ZDM

1

Primary DB
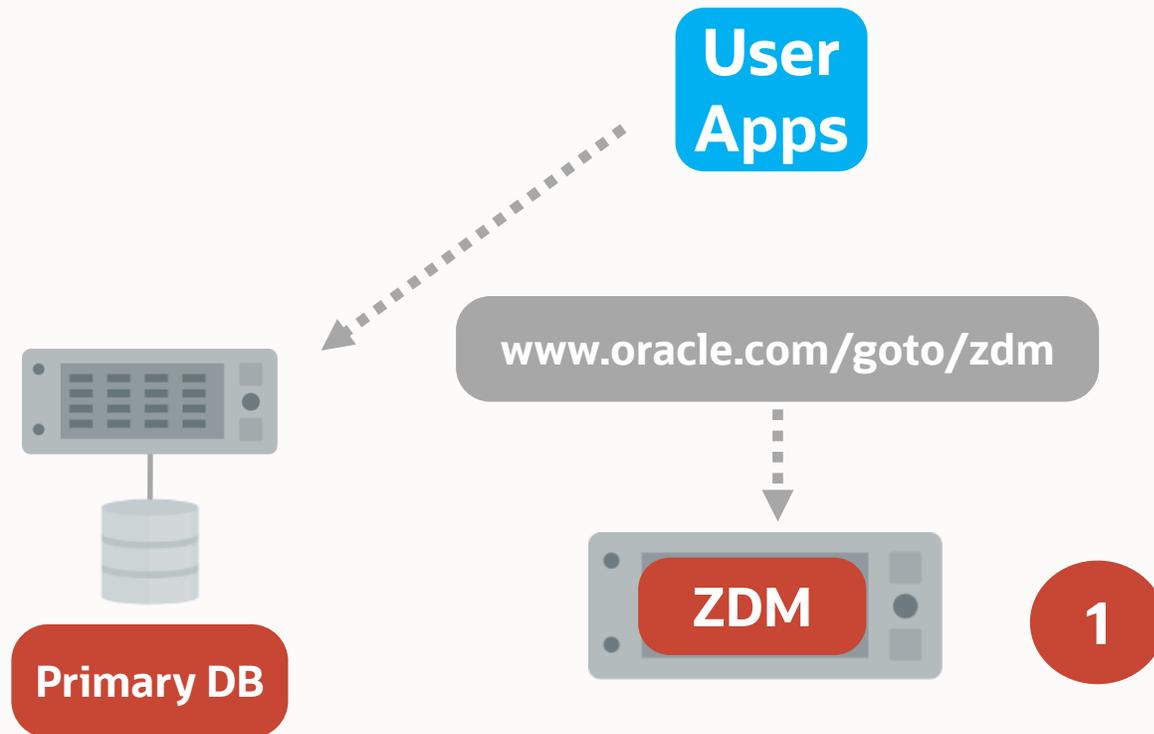
Step 2 – ZDM Starts Database Migration
Physical Online Migration Workflow

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Step 3 – ZDM Connects Source Database to Backup Location
Physical Online Migration Workflow

Step 4 – ZDM Orchestrates Transfer of DB Backup Files
Physical Online Migration Workflow
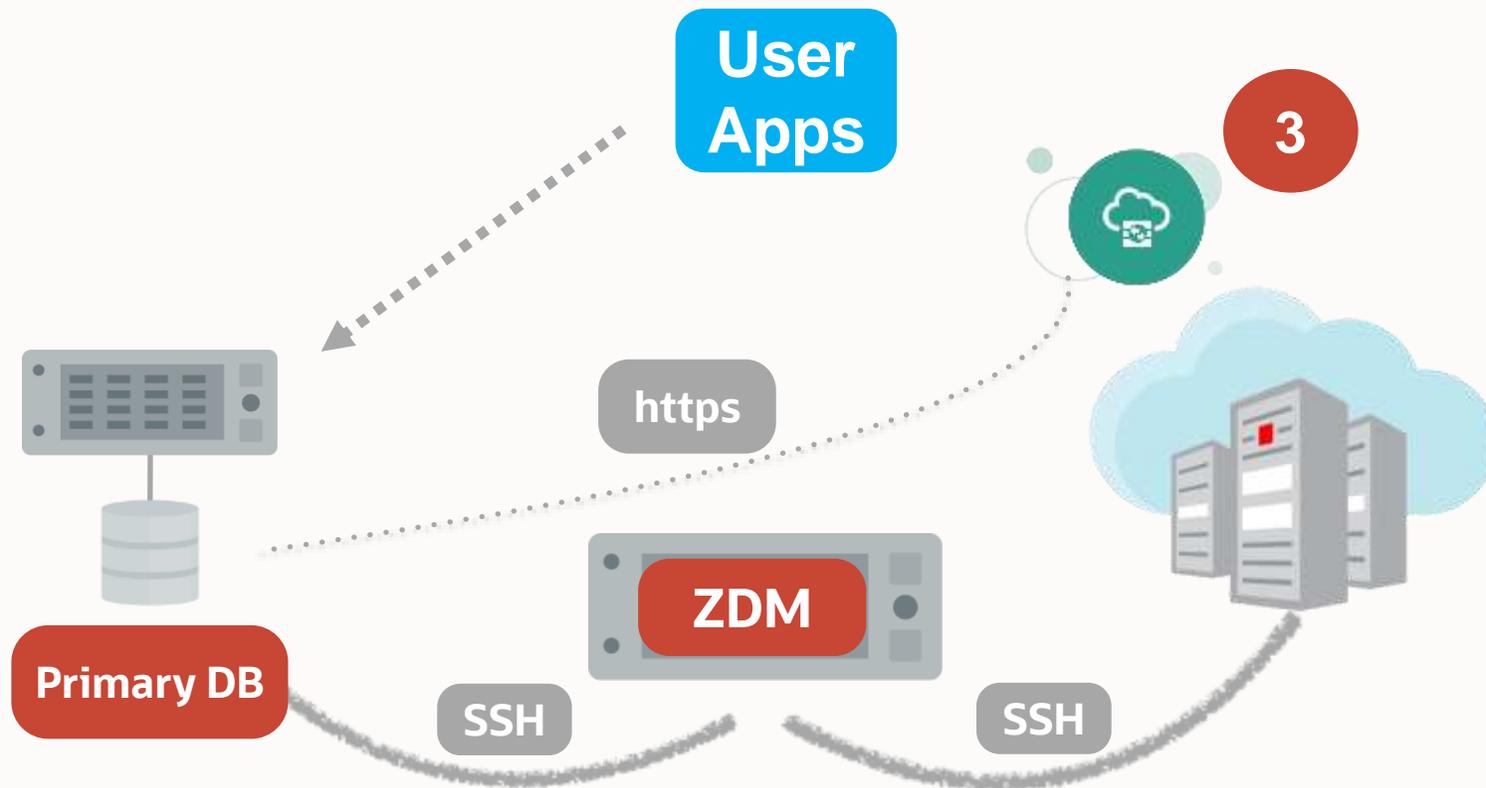
Step 5 – ZDM Instantiates a Standby Database
Physical Online Migration Workflow

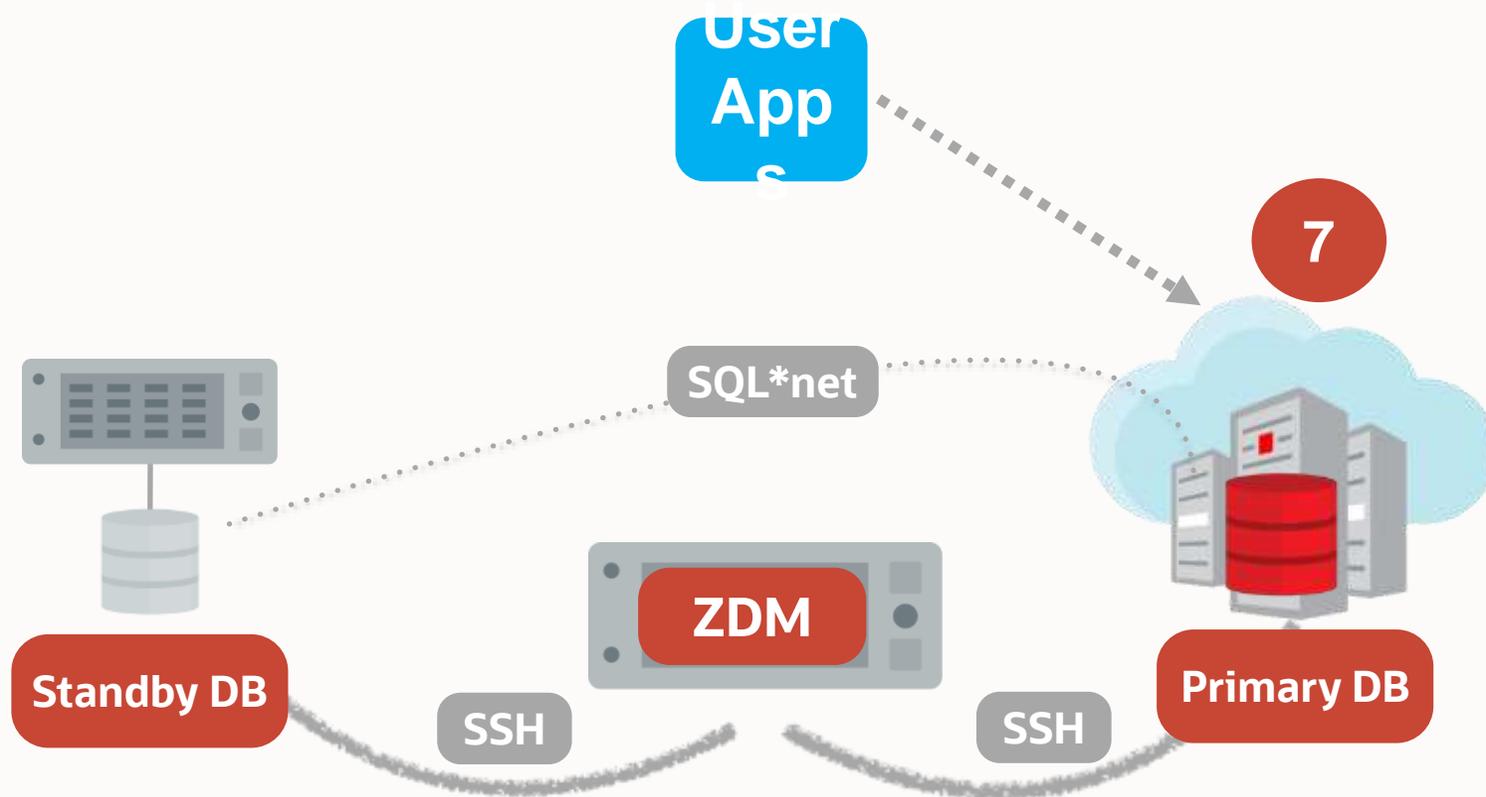Copyright © 2022, Oracle and/or its affiliates
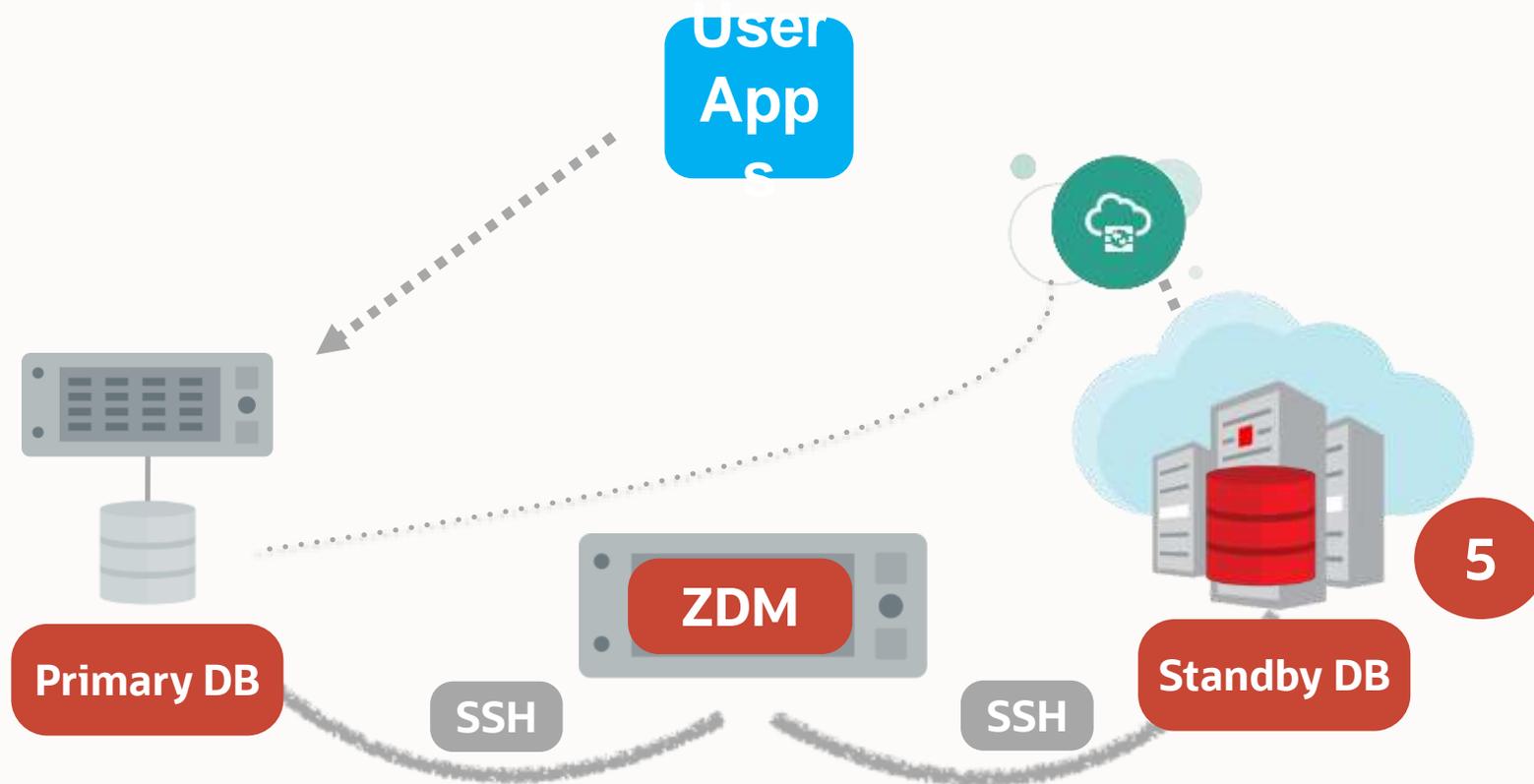
Step 6 – ZDM Synchronizes Primary & Standby
Physical Online Migration Workflow

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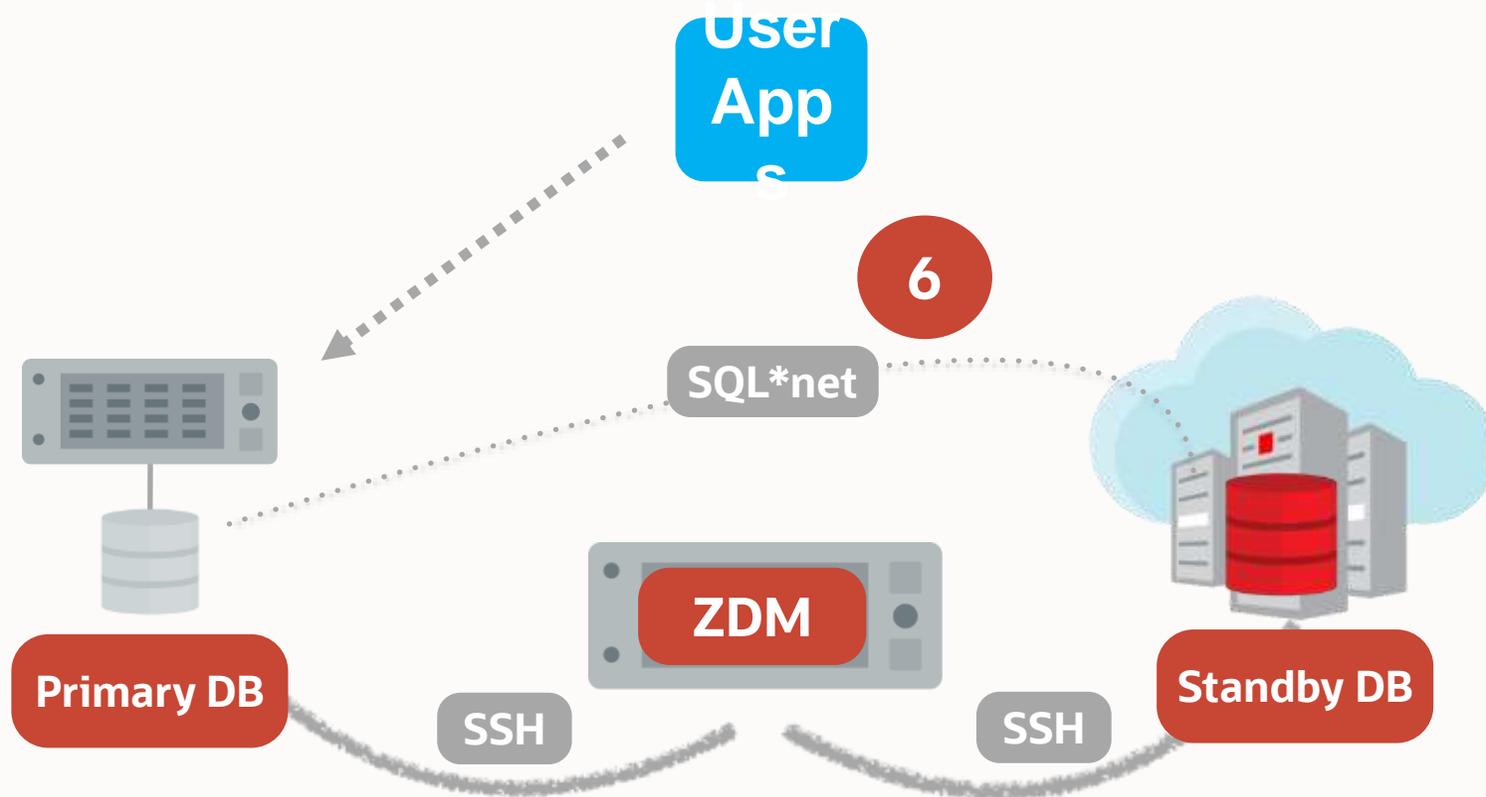
Step 7 – ZDM Switches Over & Swaps Roles

Physical Online Migration Workflow

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Step 8 – ZDM Finalizes the Migration Process
Physical Online Migration Workflow
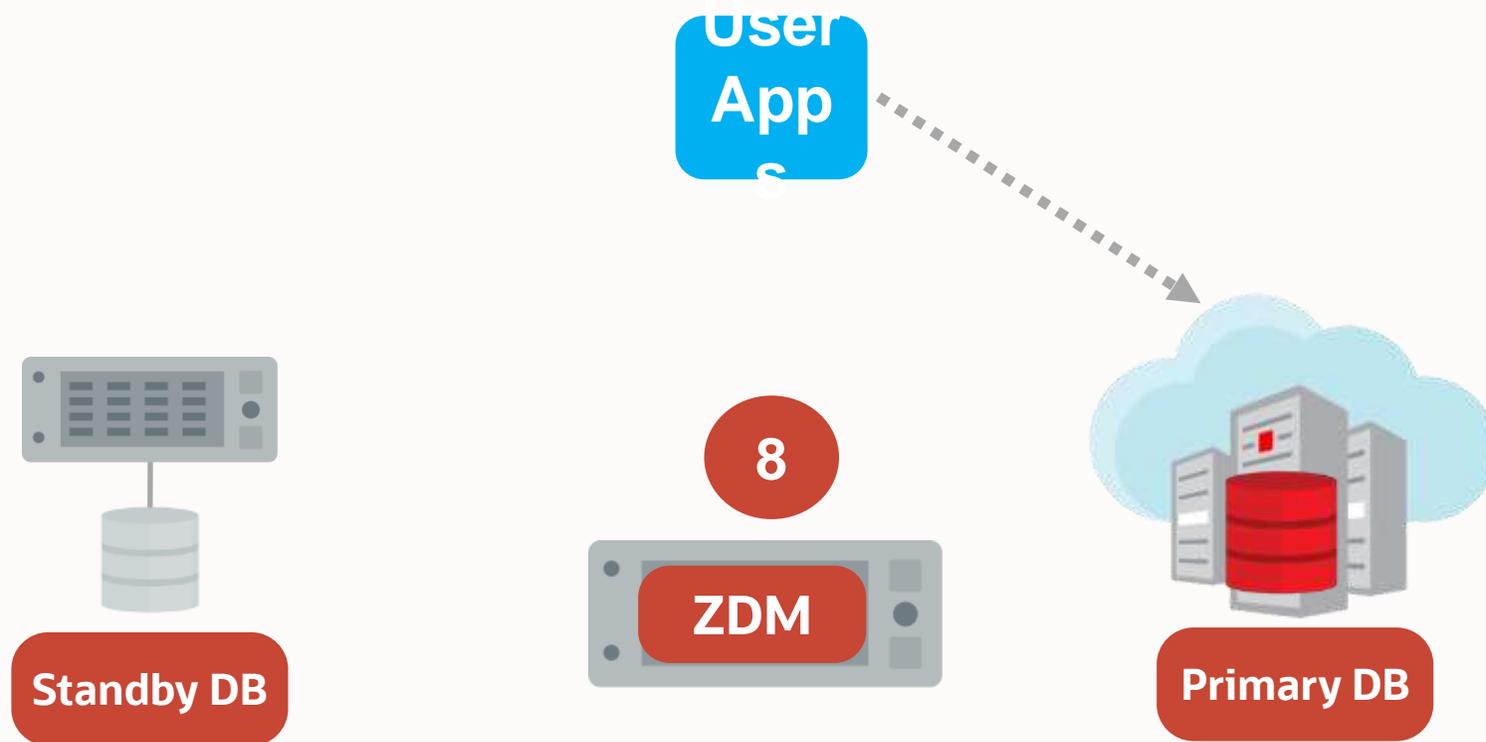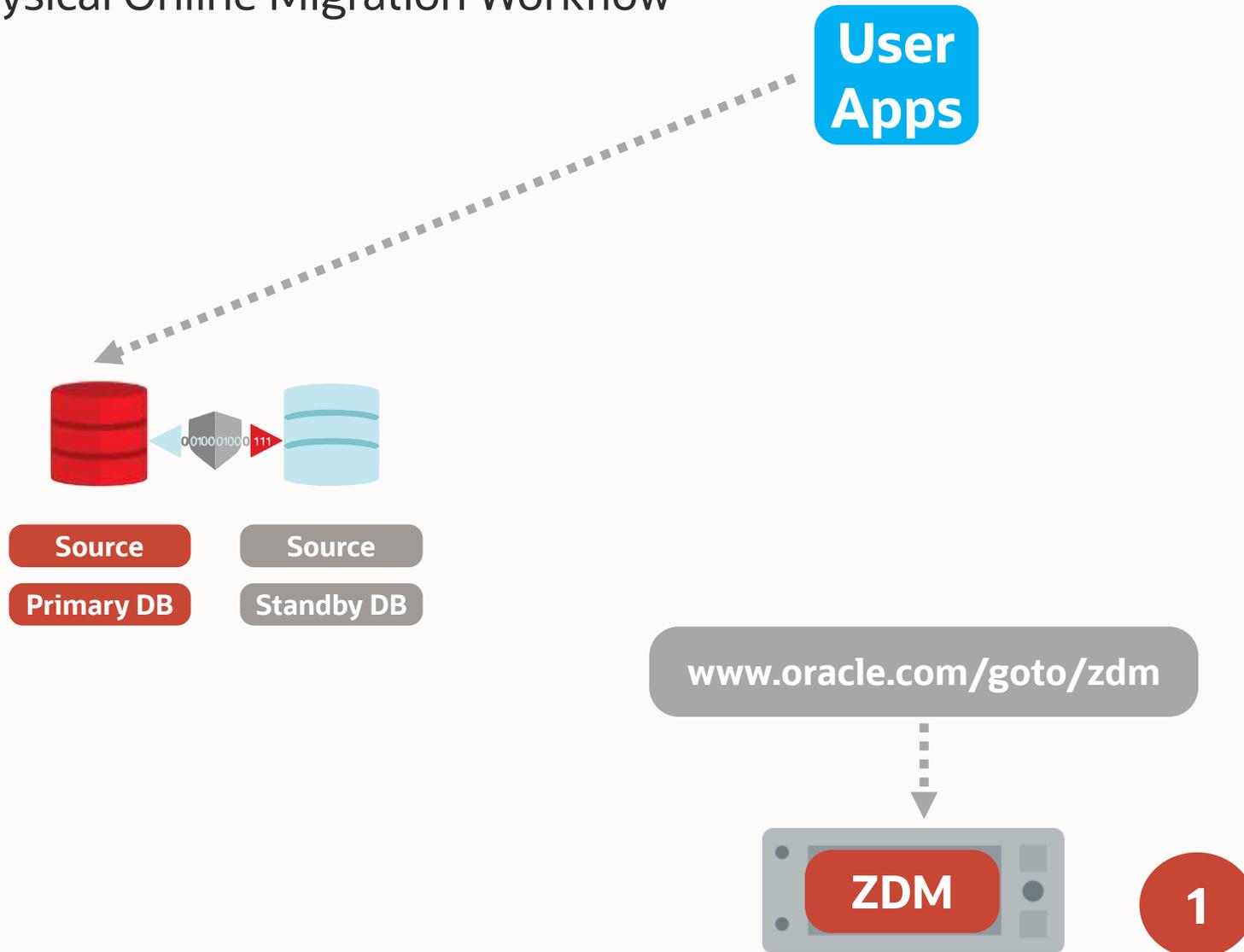
Zero Downtime Migration - Physical Migration
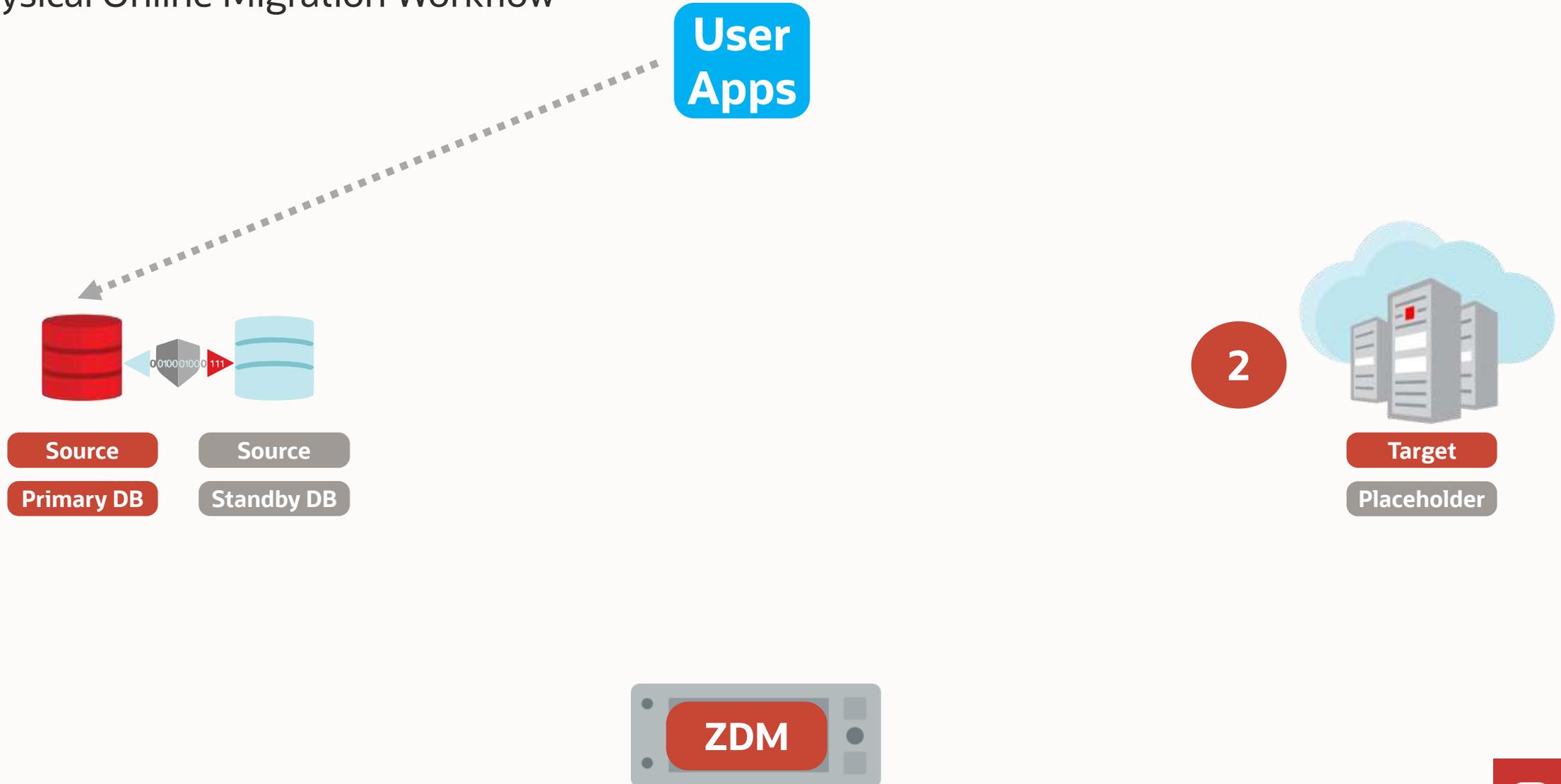Online Migration with Standby Database

Step by Step Migration Overview

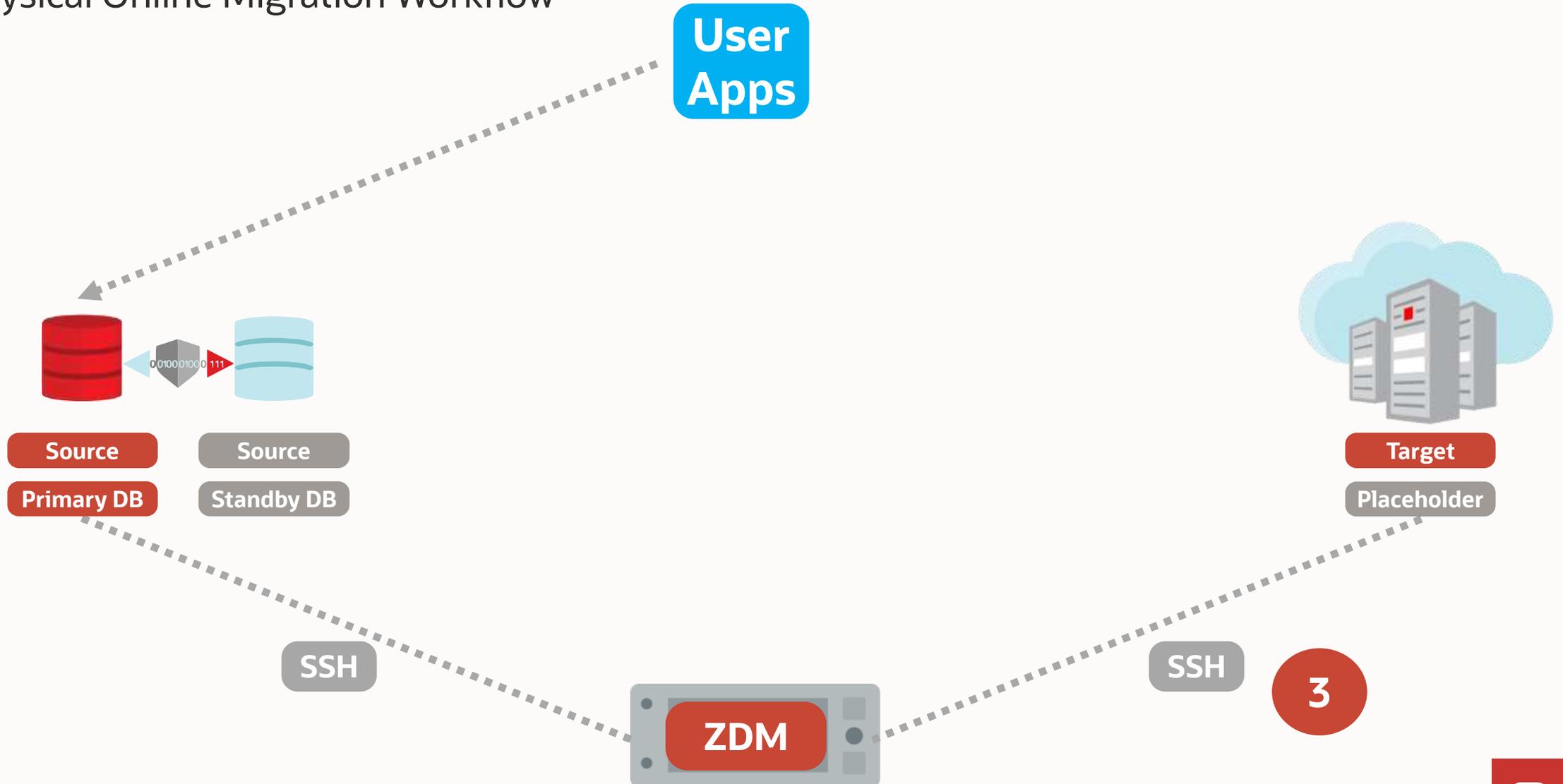# Step 1 – Download & Configure ZDM
Physical Online Migration Workflow

User Apps

0.0100.01000 111

Source

Source

Primary DB

Standby DB

www.oracle.com/goto/zdm

ZDM

1

Step 2 – User Setup Placeholder Target Database and Verify Connectivity
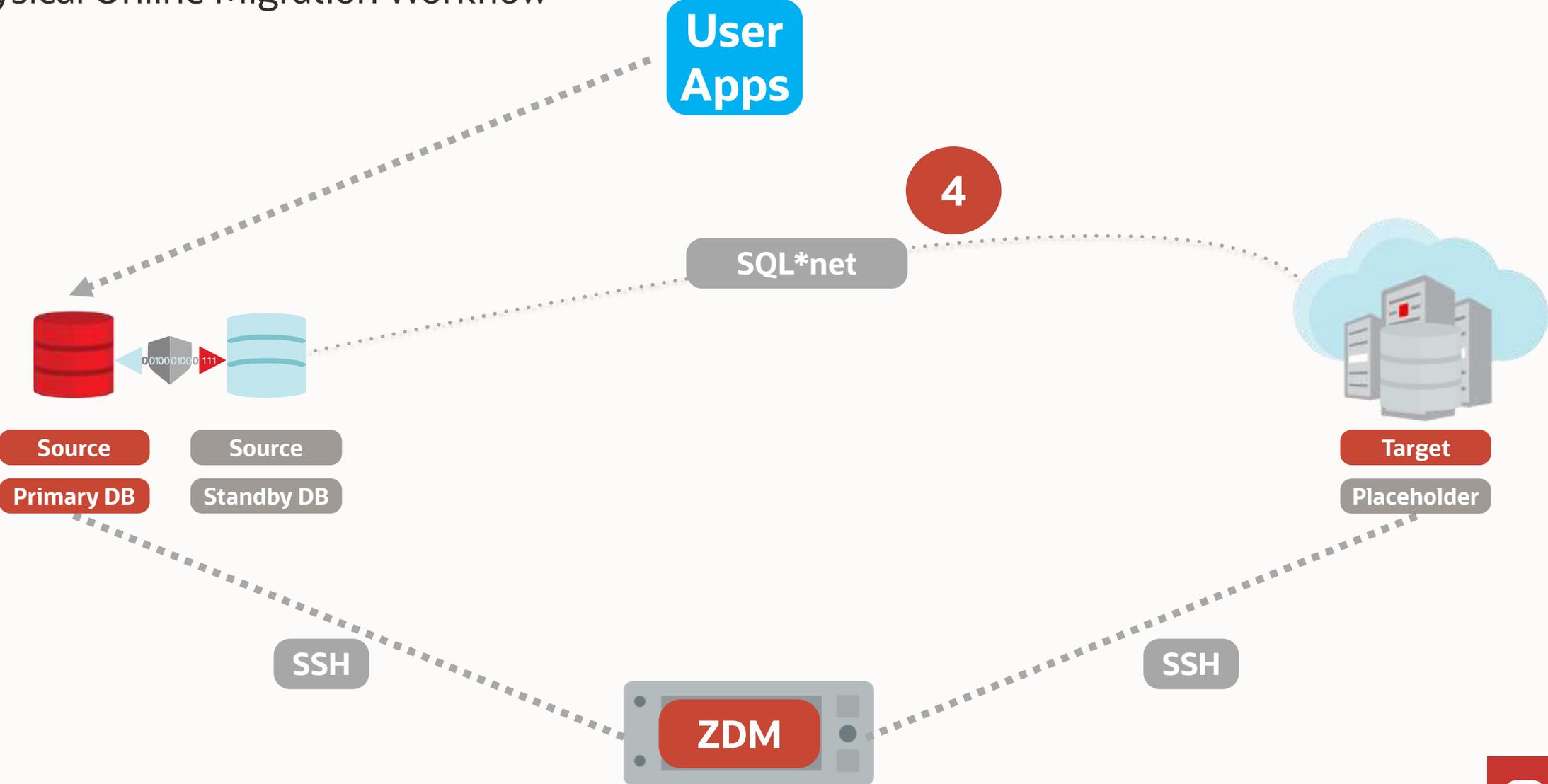## Physical Online Migration Workflow

User Apps

0100 0100 111

Source
Primary DB

Source
Standby DB

2

Target
Placeholder

ZDM

Step 3 – ZDM Starts Migration Process
Physical Online Migration Workflow

User Apps

Source

Source

Primary DB

Standby DB

Target

Placeholder

SSH

SSH

3

ZDM
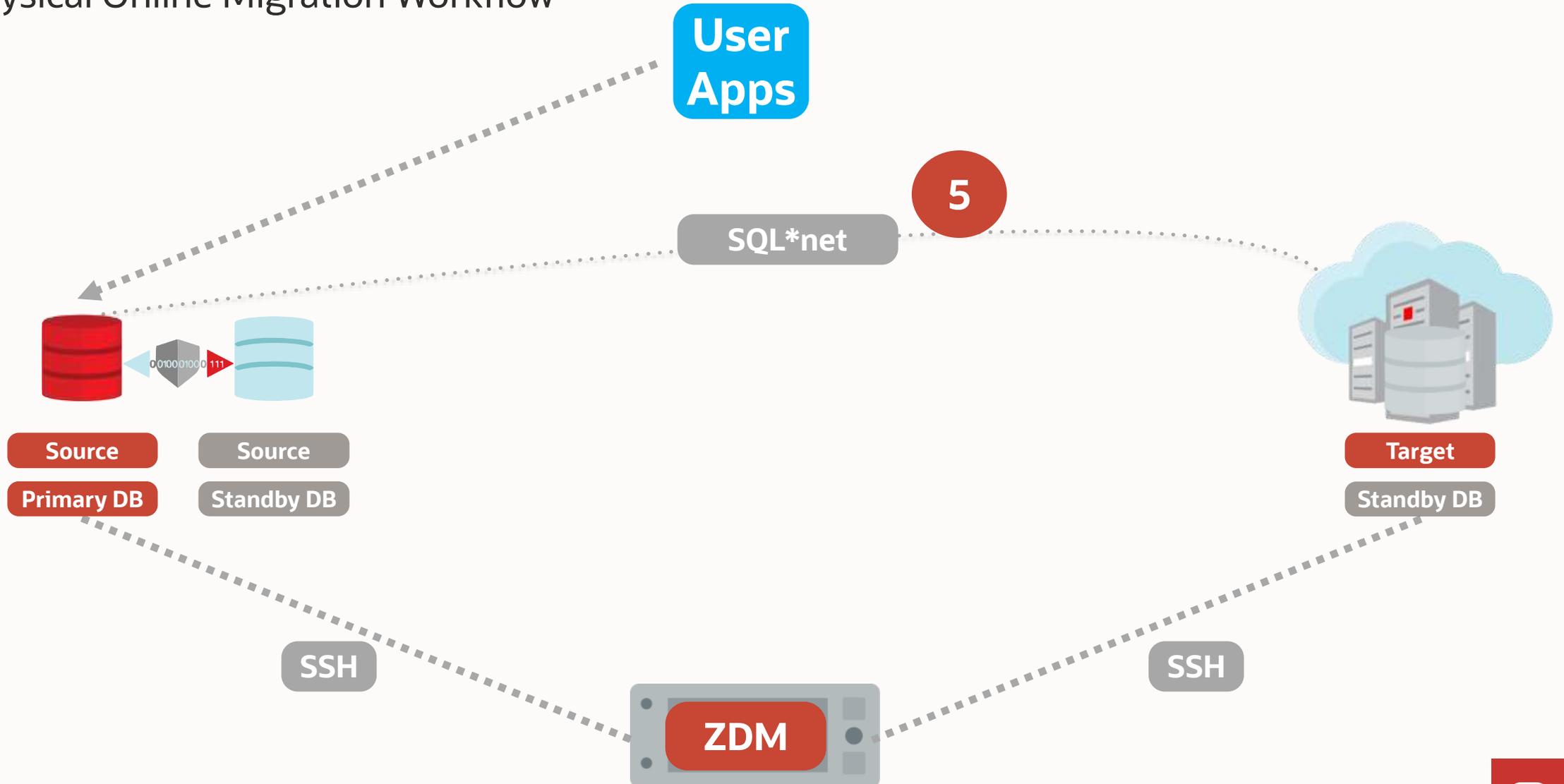
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Step 4 – ZDM Leverages Standby to Instantiate Target via Restore from Service

Physical Online Migration Workflow

User Apps

4

SQL*net

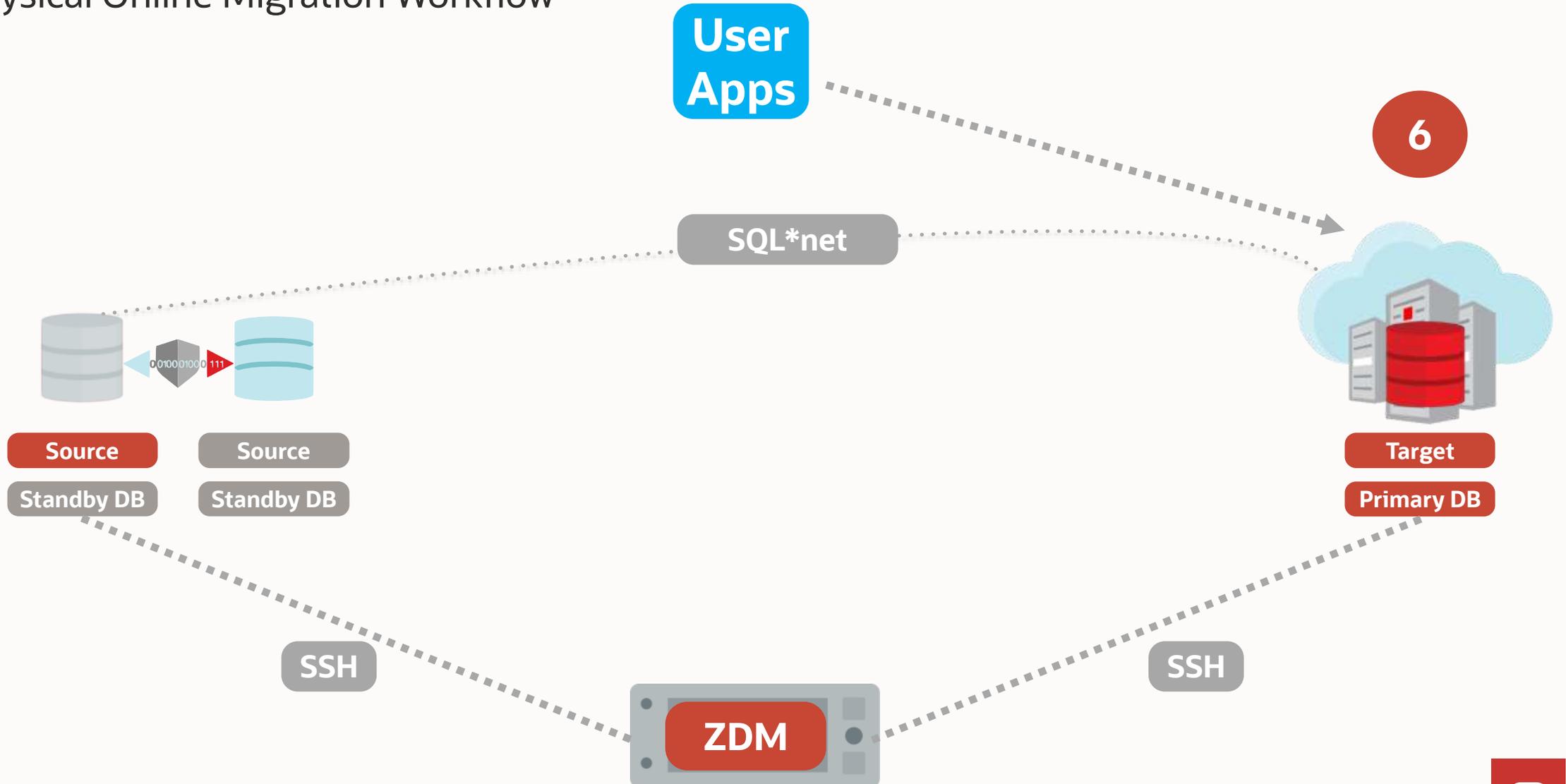Source
Primary DB

Source
Standby DB

Target
Placeholder

SSH

SSH

ZDM

Step 5 – ZDM Synchronizes Primary and Target Standby
Physical Online Migration Workflow

User Apps

5

SQL*net

Source
Primary DB

Source
Standby DB

Target
Standby DB

SSH

SSH

ZDM

Step 6 – ZDM Switches Over and Swaps Roles
Physical Online Migration Workflow

User Apps

6

SQL*net

Source

Standby DB

Source

Standby DB

Target

Primary DB

SSH

SSH

ZDM

Step 7 – ZDM Finalizes the Migration Process
Physical Online Migration Workflow

User Apps

Source
Standby DB

Source
Standby DB

Target
Primary DB

7

ZDM
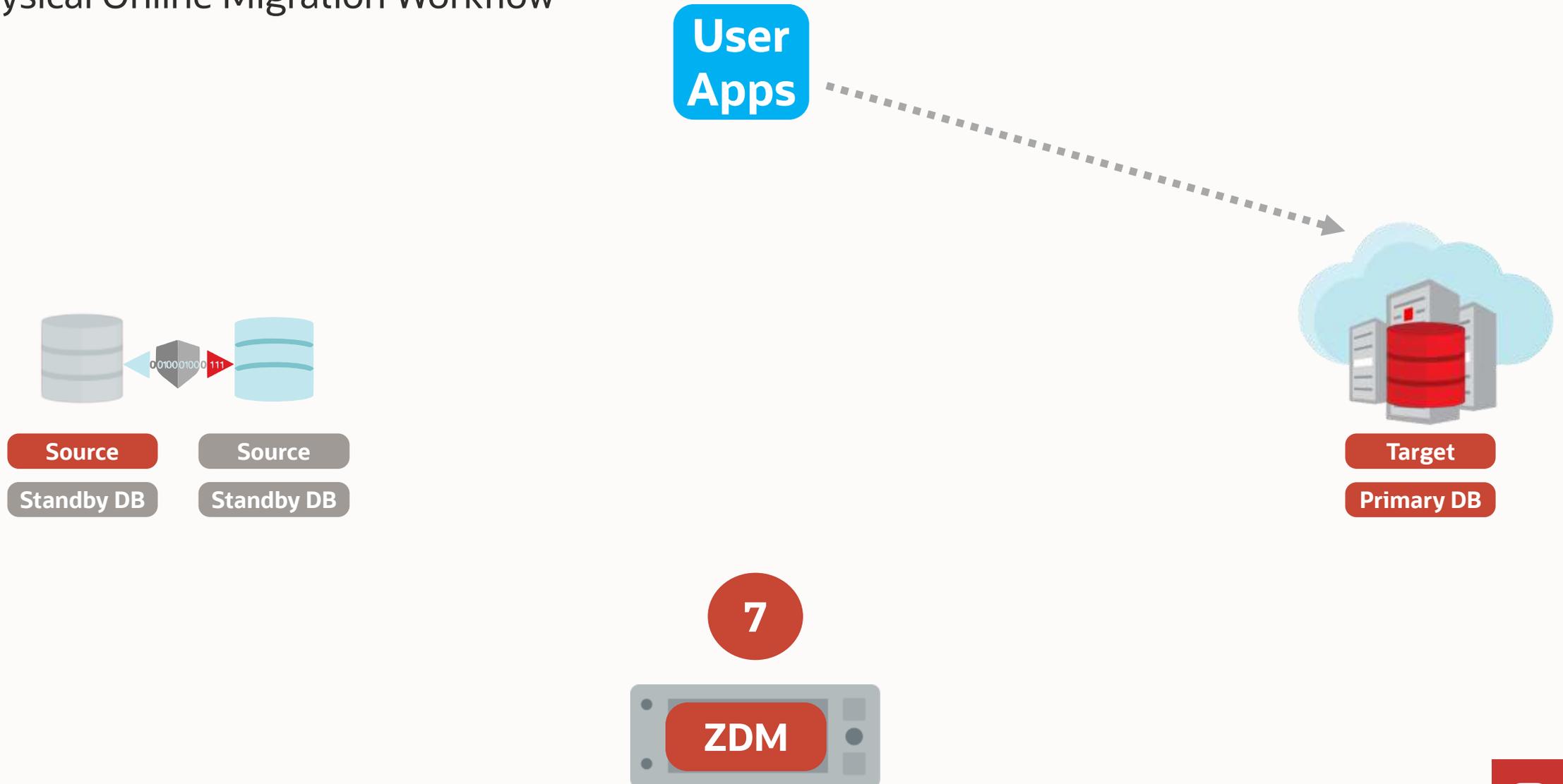
Agenda

1. Oracle Database Cloud Migration General Overview

2. **Migration Methodologies**
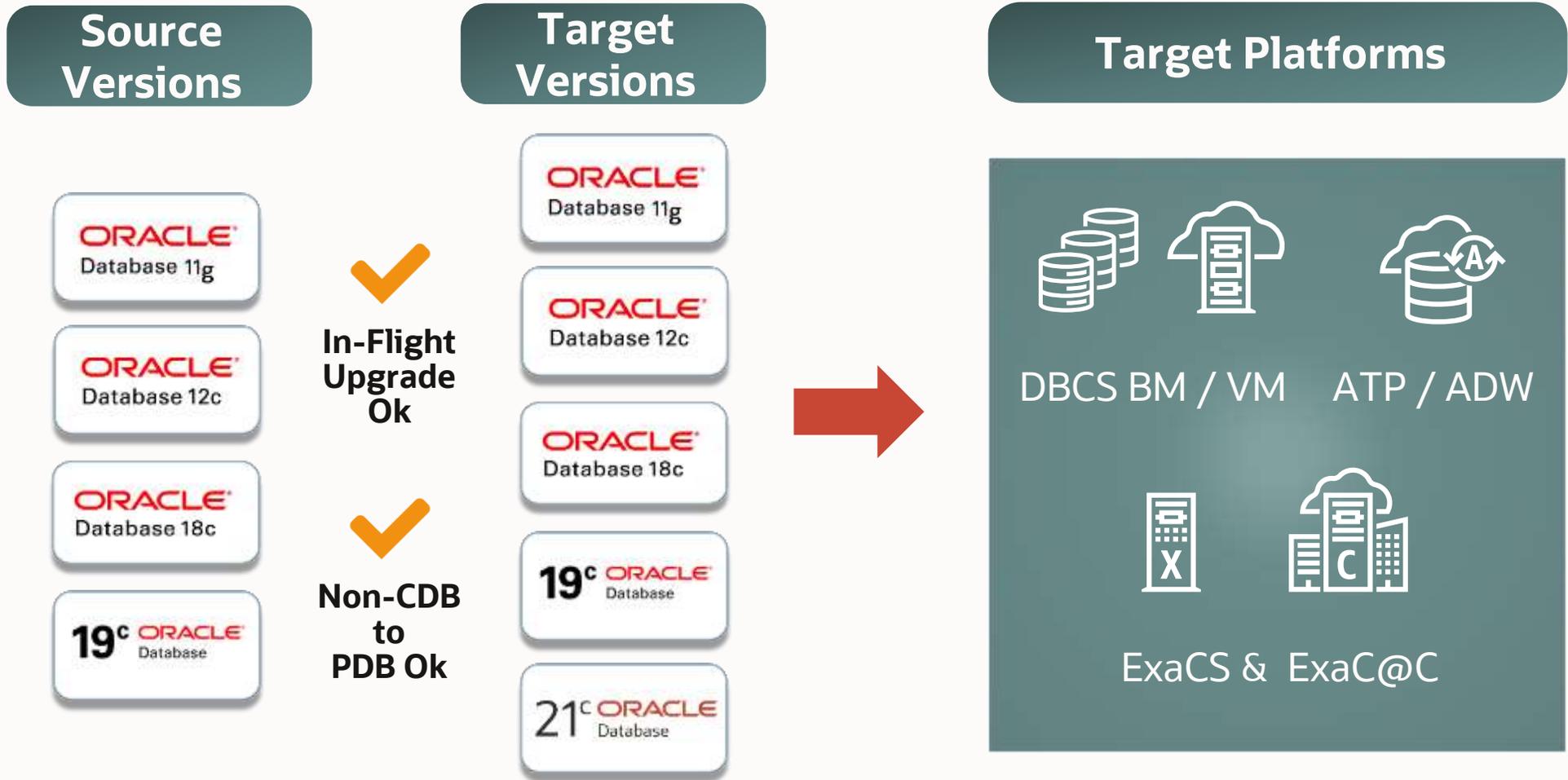
   1. Zero Downtime Migration - Physical Migration

   2. **Zero Downtime Migration - Logical Migration**

3. **Summary**

4. **Resources**

Zero Downtime Migration - Logical Migration
Supported Sources and Targets

Source Versions

ORACLE Database 11g

ORACLE Database 12c

ORACLE Database 18c

19c ORACLE Database

✓ **In-Flight Upgrade Ok**

✓ **Non-CDB to PDB Ok**

Target Versions

ORACLE Database 11g

ORACLE Database 12c

ORACLE Database 18c

19c ORACLE Database

21c ORACLE Database

Target Platforms

DBCS BM / VM   ATP / ADW

ExaCS & ExaC@C

Zero Downtime Migration - Logical Migration
Workflows

Logical Offline Migration

Data Pump

Backup Location or DB Links

Standard Edition Enterprise Edition

Logical Online Migration

Data Pump & GoldenGate

Backup Location or DB Links

Standard Edition Enterprise Edition
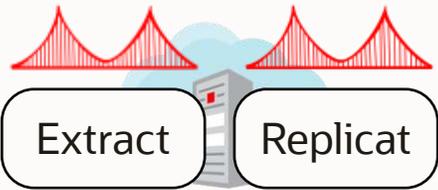
Zero Downtime Migration
GoldenGate Usage

Free *

ORACLE Cloud Marketplace

Oracle GoldenGate for Oracle Database Migrations

OCI Based Migrations

Extract | Replicat

OCI GG Hub

ExaC@C Migrations

docker **+** Extract | Replicat
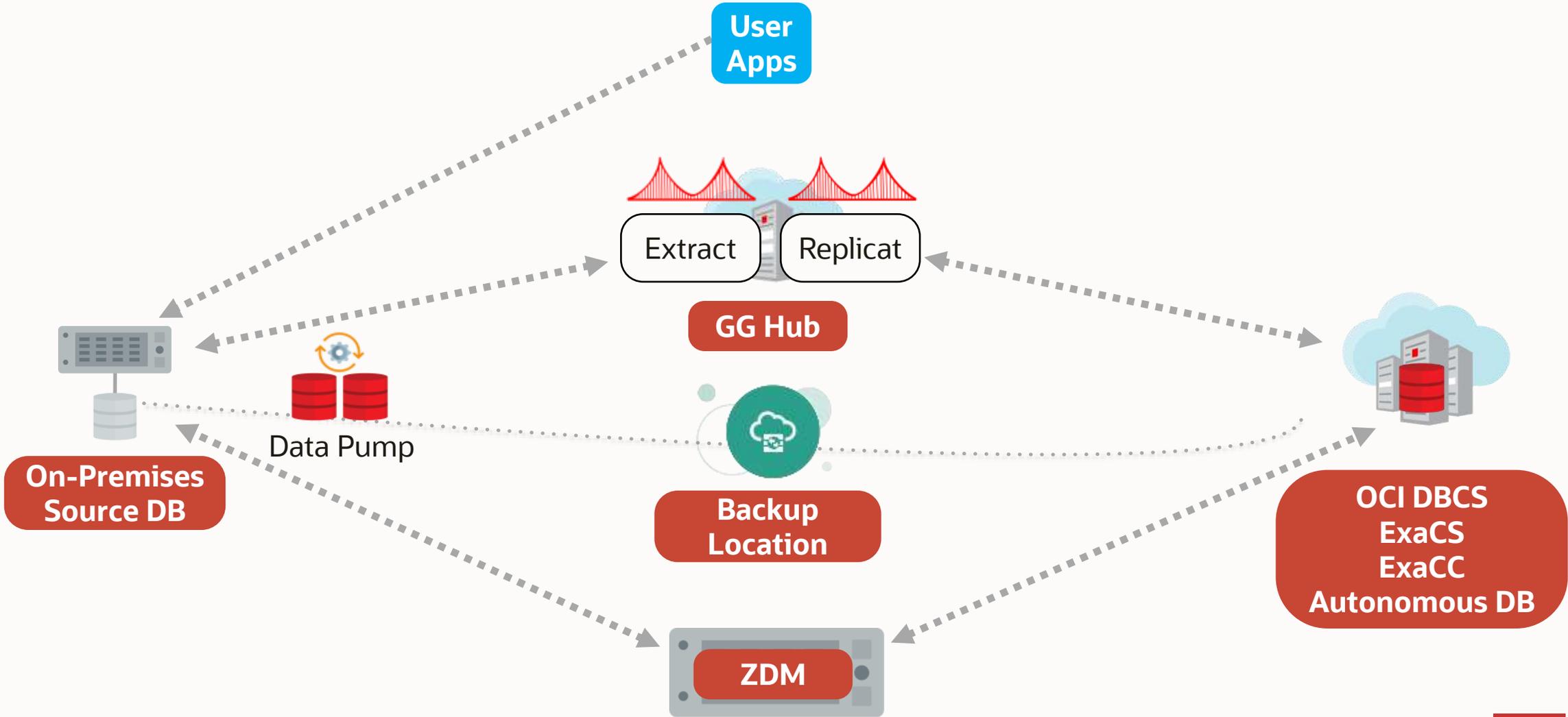
On-Prem GG Hub

Zero Downtime Migration - Logical Migration
Online Migration with Backup Location

Step by Step Migration Overview

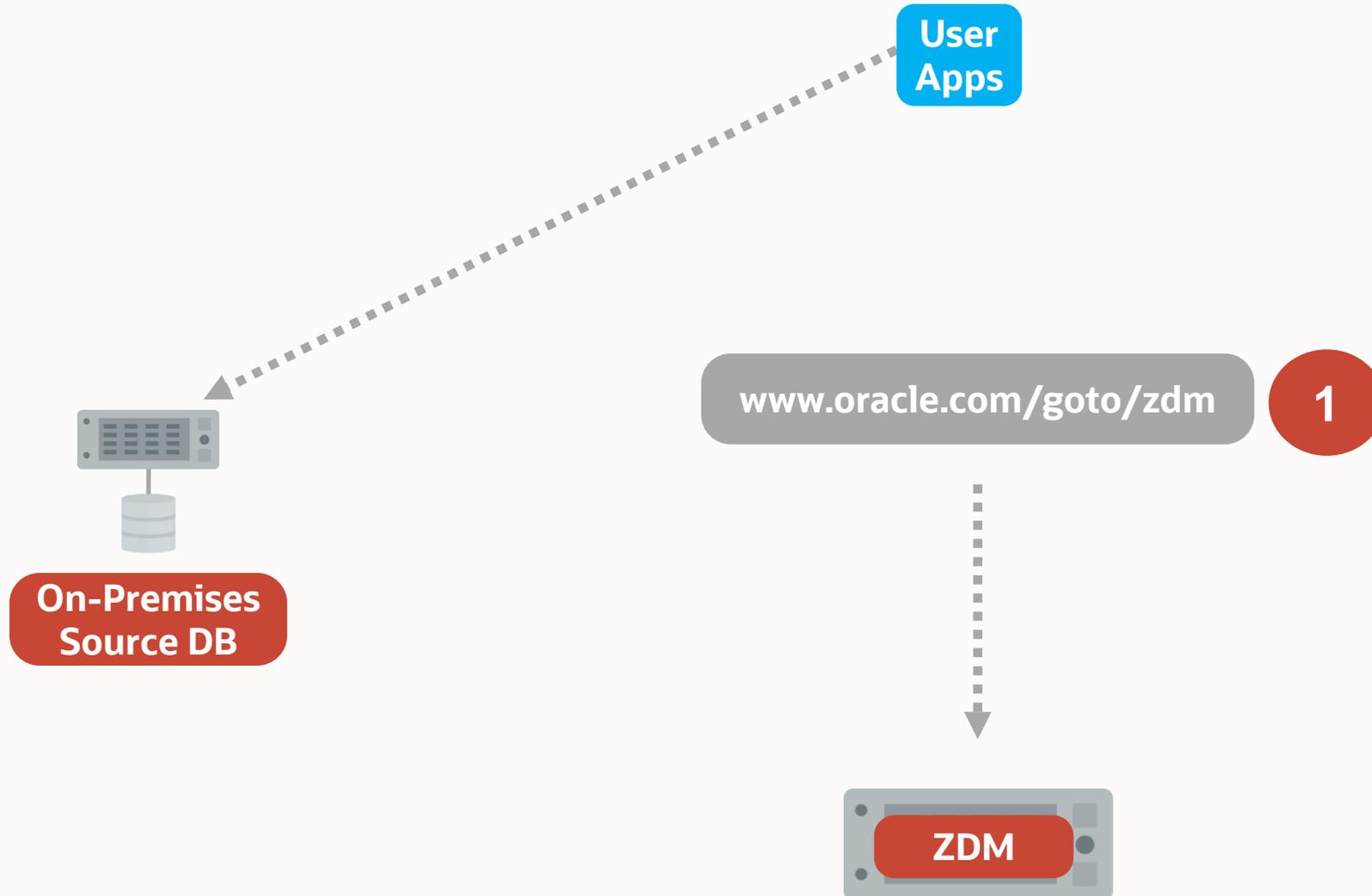# Zero Downtime Migration - Logical Migration
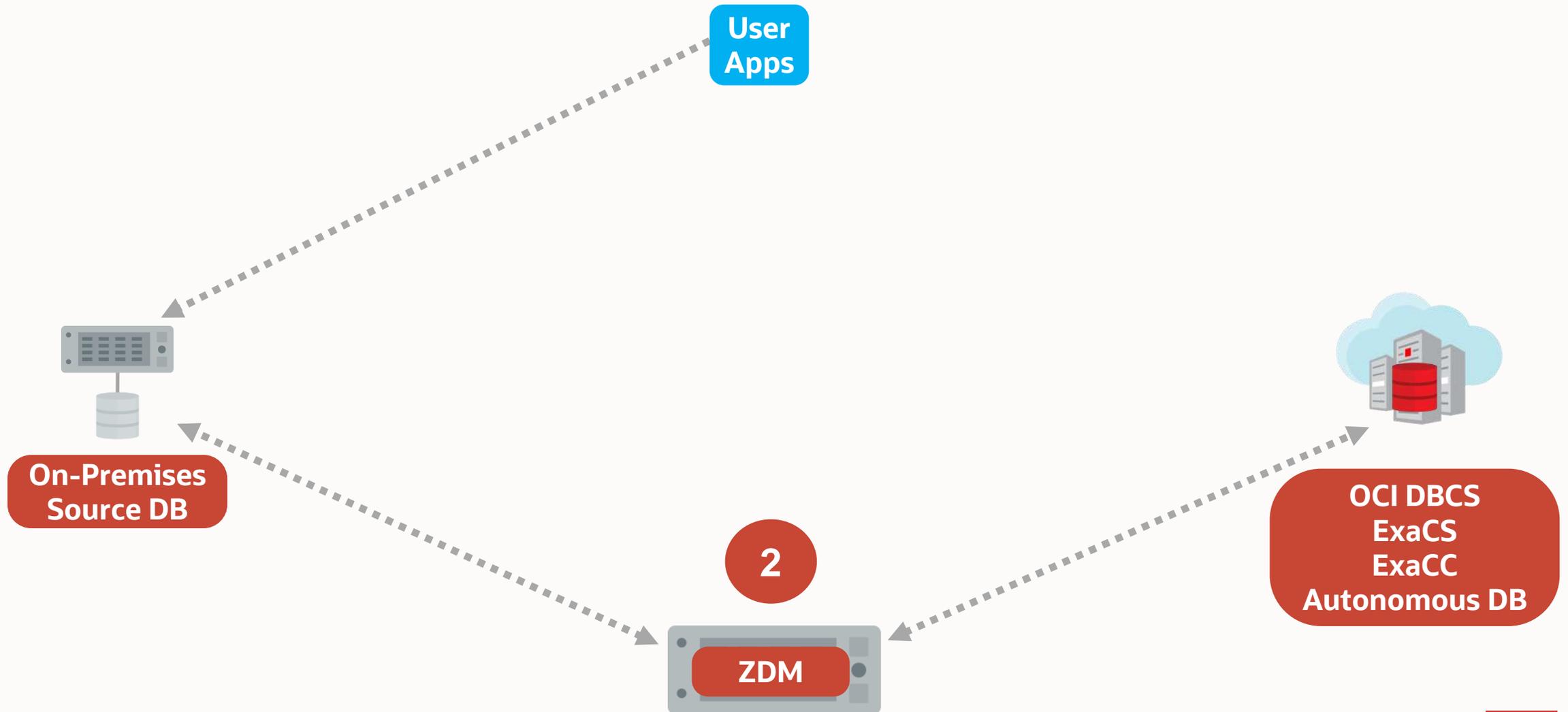## Online Migration with Backup Location

User Apps

Extract | Replicat

GG Hub

Data Pump

Backup Location

On-Premises Source DB

ZDM

OCI DBCS ExaCS ExaCC Autonomous DB

Step 1 – Download & Configure ZDM
Logical Online Migration Workflow

User Apps

www.oracle.com/goto/zdm **1**

On-Premises Source DB

ZDM

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Step 2 – ZDM Connects to Source and Target
Logical Online Migration Workflow

User Apps

On-Premises Source DB

2

ZDM

OCI DBCS ExaCS ExaCC Autonomous DB

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Step 3 – ZDM Connects to Backup Location
Logical Online Migration Workflow

User Apps

3

On-Premises Source DB

Backup Location

OCI DBCS ExaCS ExaCC Autonomous DB

ZDM
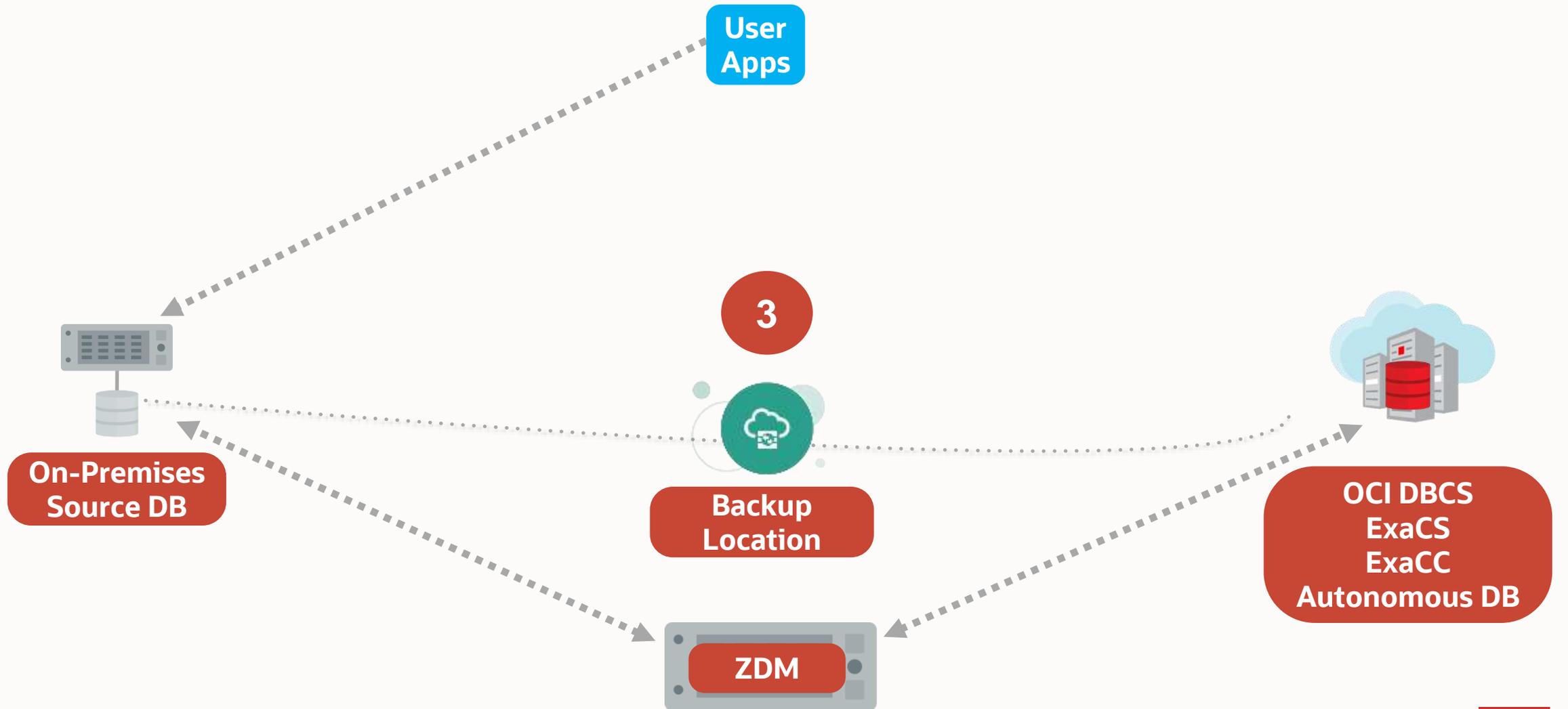
Step 4 – ZDM Configures an OGG Extract Microservice
Logical Online Migration Workflow

User Apps

4

Extract

GG Hub

On-Premises Source DB

Backup Location

OCI DBCS ExaCS ExaCC Autonomous DB

ZDM
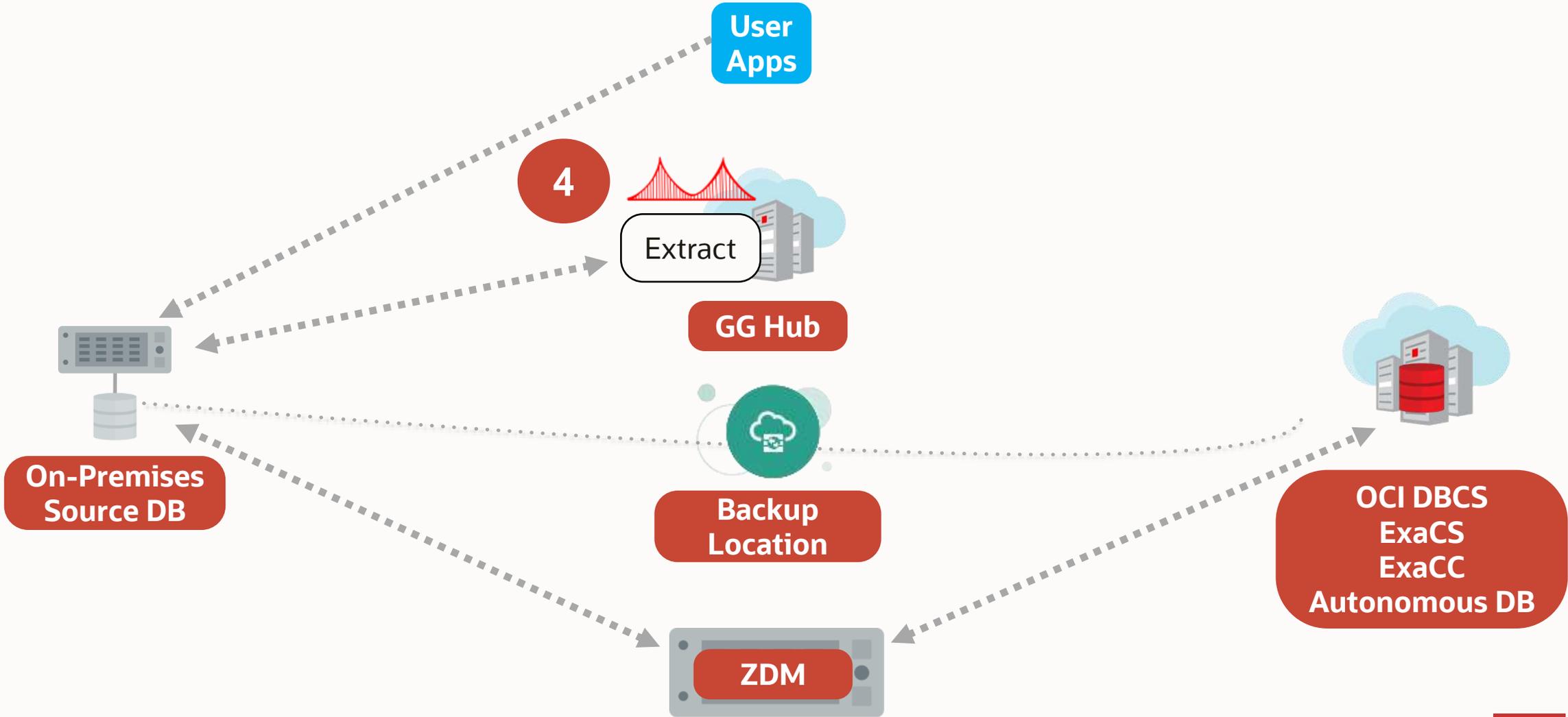
Step 5 – ZDM Starts a Data Pump Export Job
Logical Online Migration Workflow

User Apps

Extract

GG Hub

5

Data Pump

On-Premises Source DB

Backup Location

ZDM

OCI DBCS ExaCS ExaCC Autonomous DB
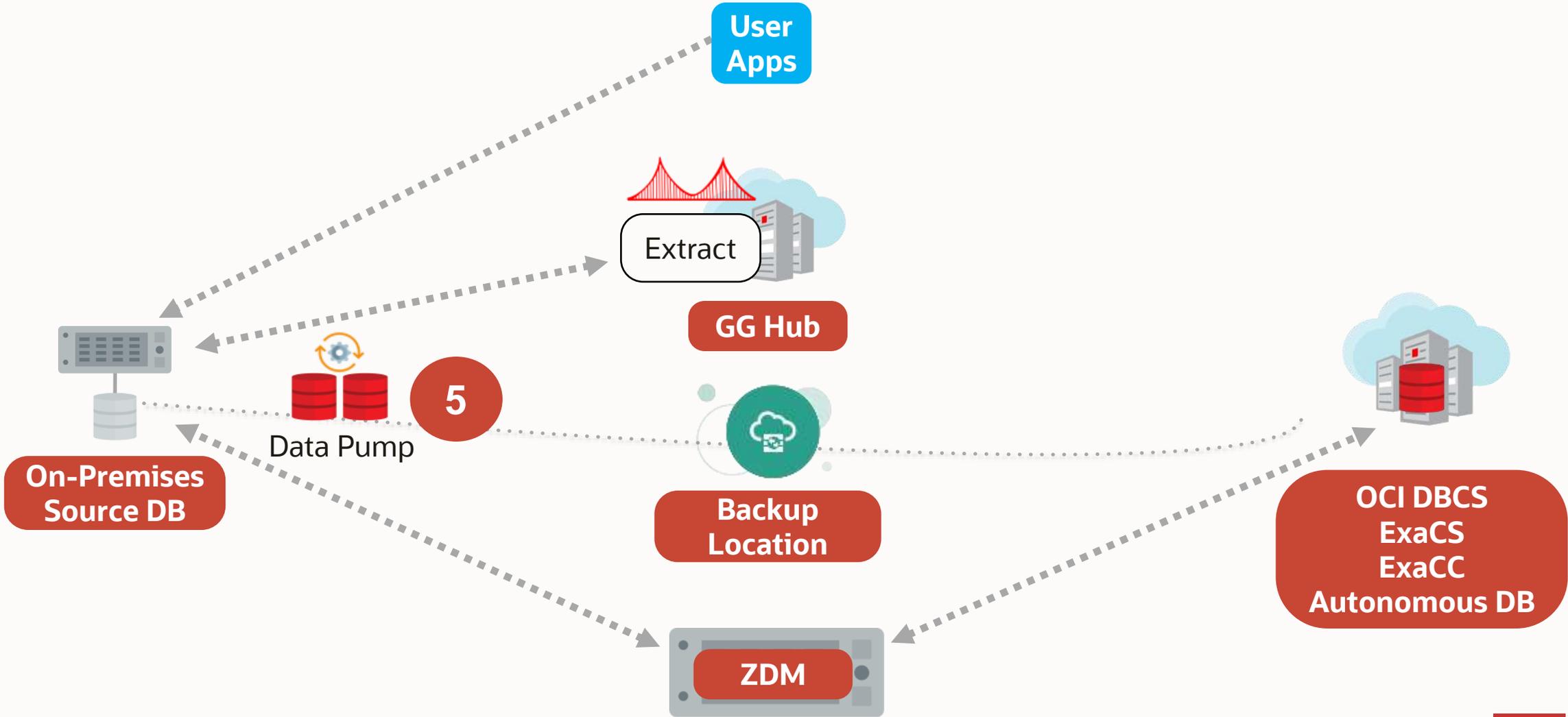
Step 6 – ZDM Starts a Data Pump Import Job
Logical Online Migration Workflow

User Apps

Extract

GG Hub

On-Premises Source DB

Backup Location

Data Pump

6

OCI DBCS ExaCS ExaCC Autonomous DB

ZDM
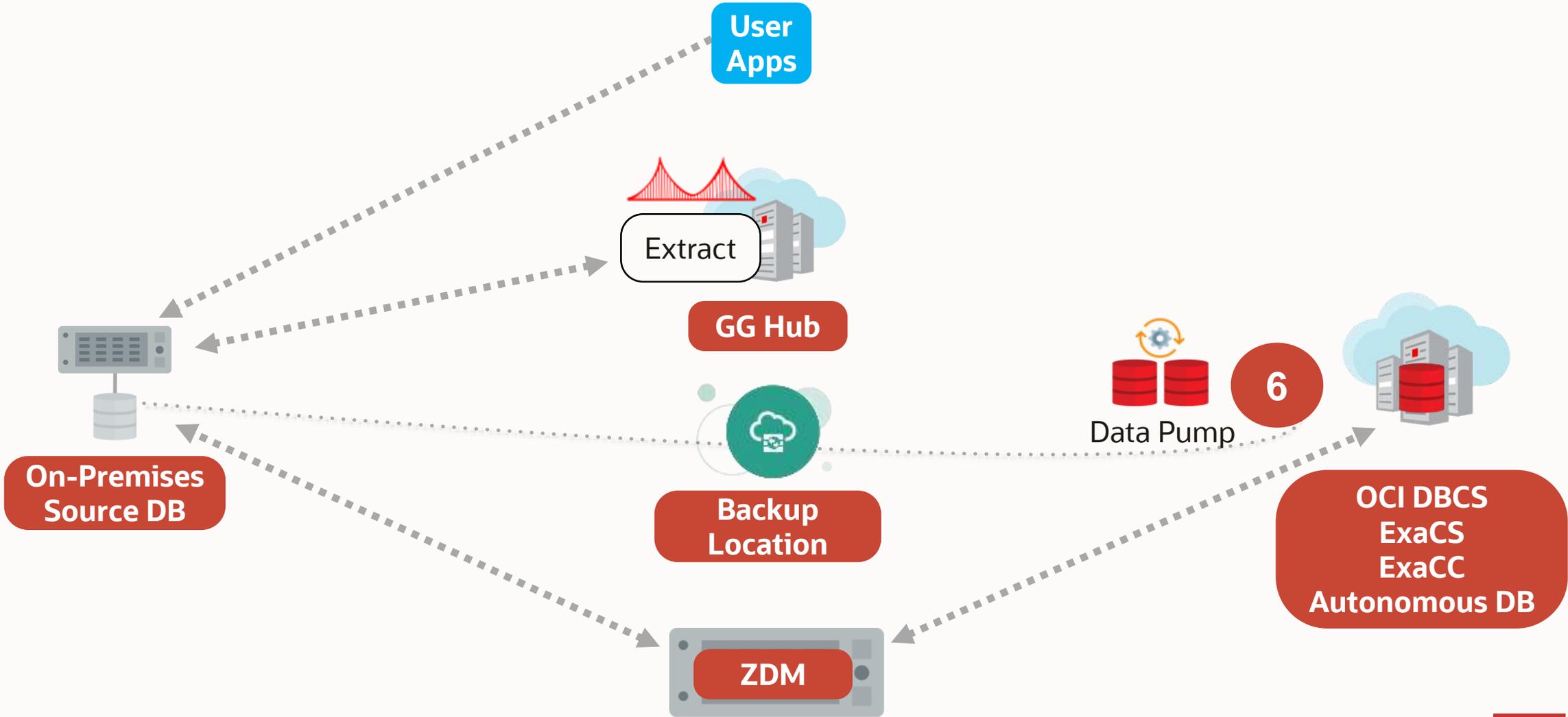
Step 7 – ZDM Configures an OGG Replicat Microservice
Logical Online Migration Workflow

User Apps

7

Extract | Replicat

GG Hub

On-Premises Source DB

Backup Location

OCI DBCS ExaCS ExaCC Autonomous DB

ZDM

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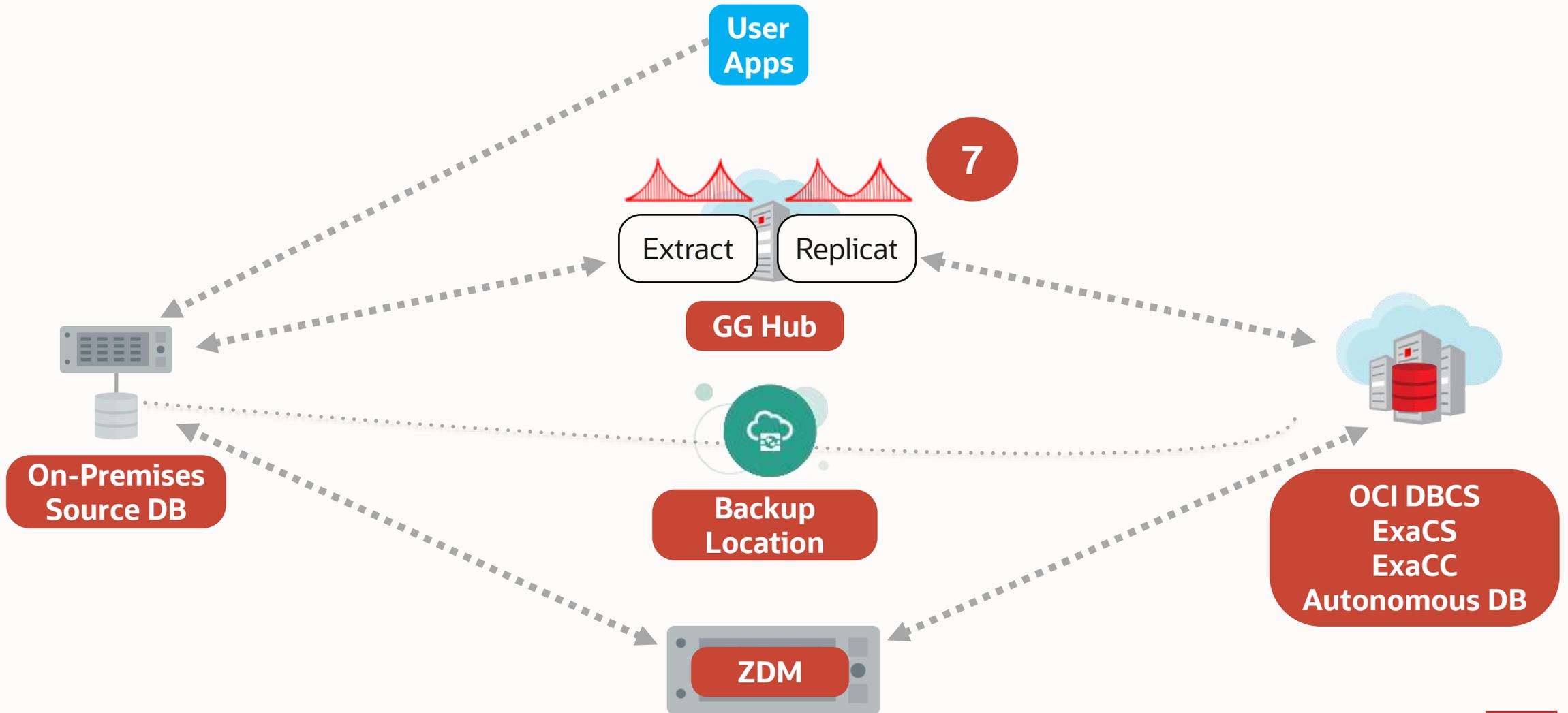
Step 8 – ZDM Switches Over and Finalizes Migration
Logical Online Migration Workflow
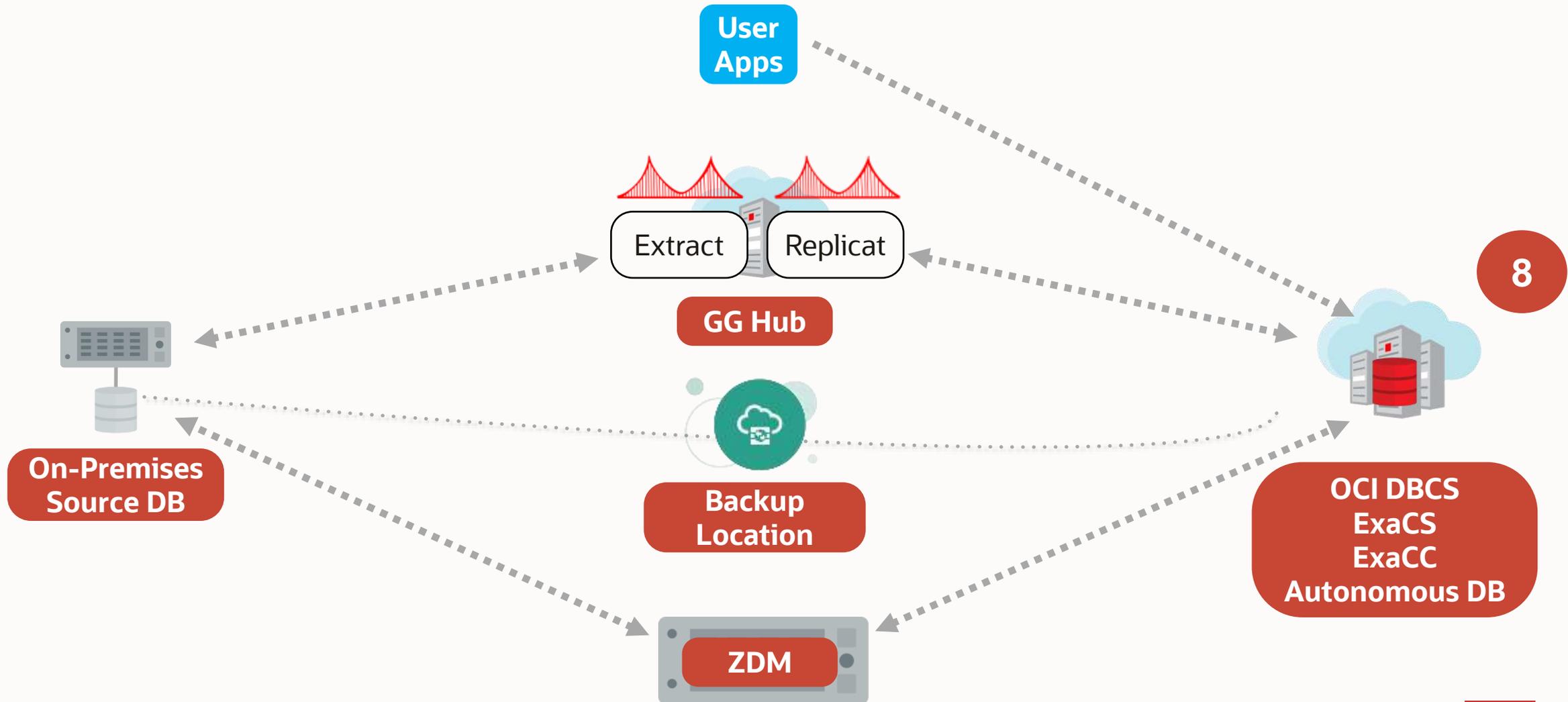
User Apps

Extract   Replicat

GG Hub

On-Premises Source DB

Backup Location

OCI DBCS ExaCS ExaCC Autonomous DB
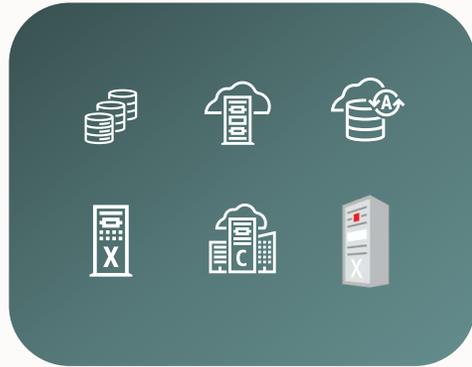
8

ZDM

Agenda

1. Oracle Database Cloud Migration General Overview

2. Zero Downtime Migration - Physical Migration

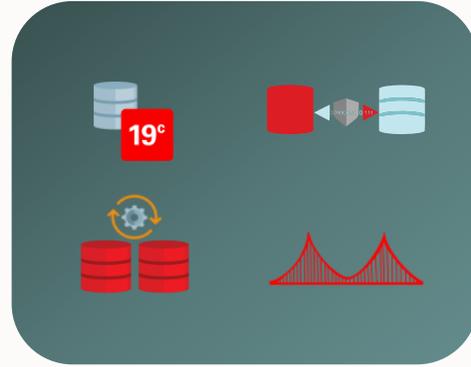3. **Summary**

4. **Resources**

Summary
ZDM is the Best-in-Class Solution for Moving your Databases to the Oracle Cloud
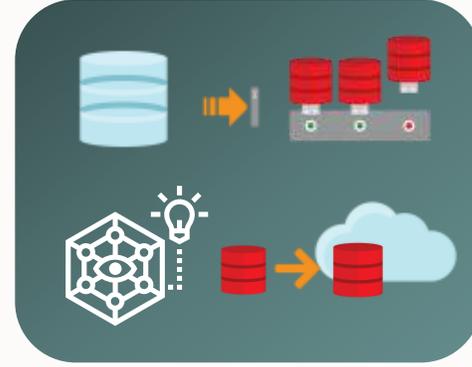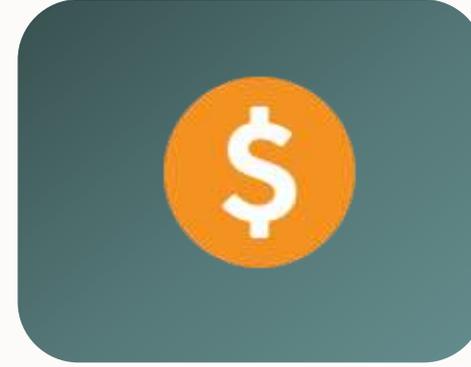

Varierty of Migration Sources

Variety of Migration Targets

Multiple Migration Workflows

Best-in-Class Features & Functionality

Free of Additional Charge

Agenda

1. Oracle Database Cloud Migration General Overview

2. Zero Downtime Migration - Physical Migration

3. Summary

4. **Resources**

Resources
Learn More

1 www.oracle.com/goto/zdm

2 https://www.oracle.com/a/tech/docs/oracle-zdm-step-by-step-guide.pdf

3 https://docs.oracle.com/en/database/oracle/zero-downtime-migration/index.html

4 https://www.oracle.com/a/tech/docs/oracle-zdm-logical-migration-step-by-step-guide.pdf

Thank You!