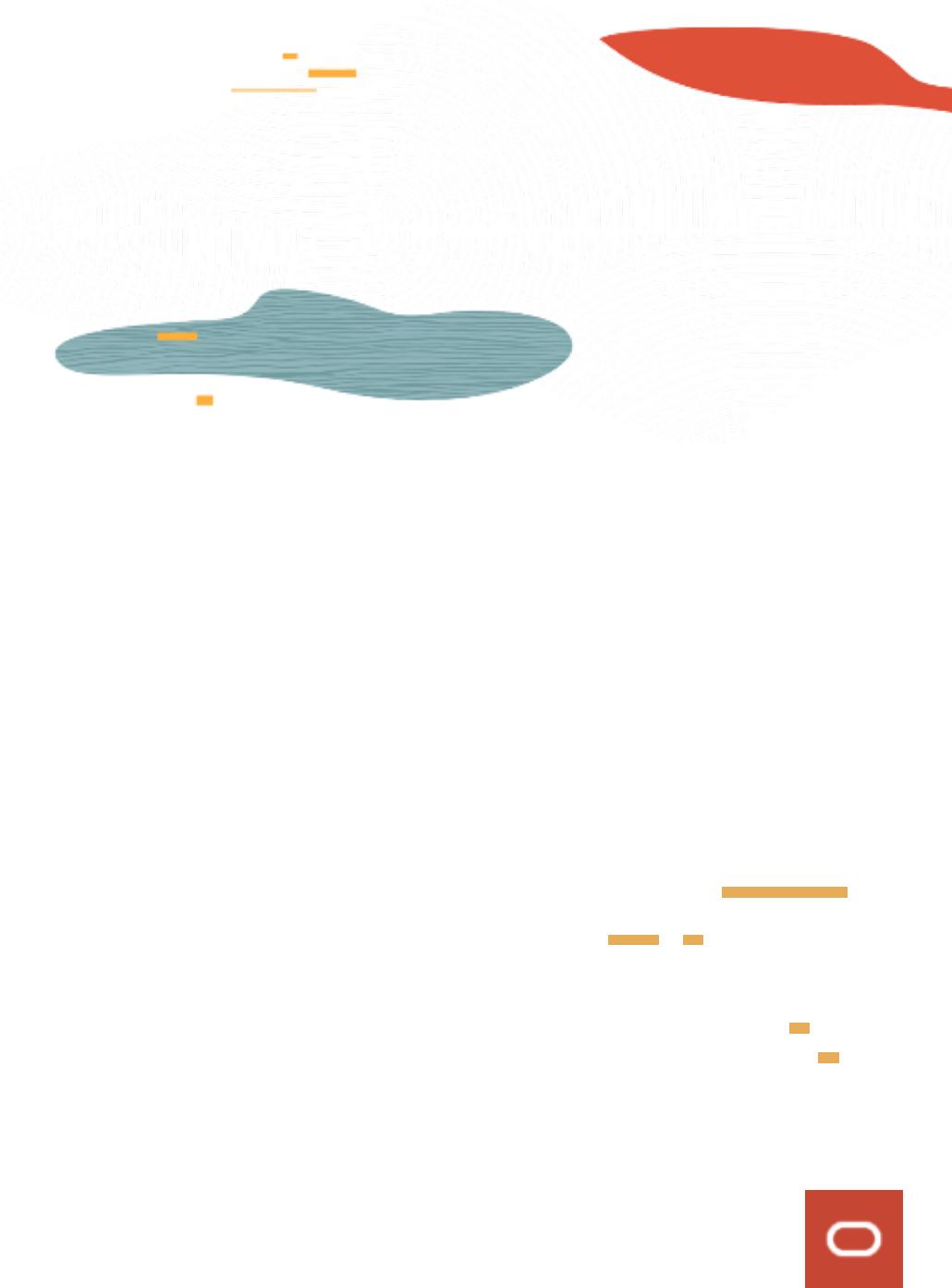




Moving Databases to OCI- Methods & Best Practices

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

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



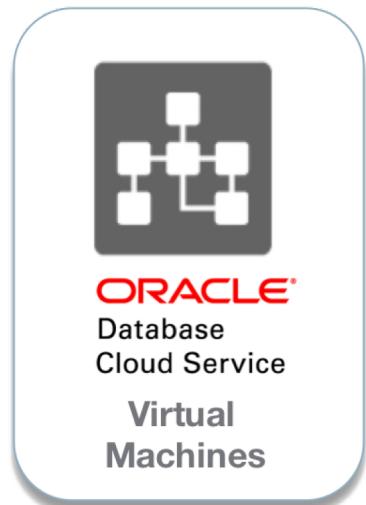
Cloud Migration Best Practice



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

ORACLE® Cloud

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



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



ORACLE® Cloud

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



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



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.



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



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.



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



Autonomous Database Cloud



ORACLE
Autonomous
Data Warehouse

PDB

Optimized for Analytics

Columnar

Large PGA

Statistics maintained during bulk loads



ORACLE
Autonomous
Transaction
Processing
Serverless



ORACLE
Autonomous
Transaction
Processing
Dedicated
Deployments

- 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 <u>Data Loading for Autonomous Data Ware House</u> <u>Data Loading for Autonomous Transaction Processing Serverless Deployments</u> <u>Data Loading for Autonomous Transaction Processing Dedicated Deployments</u> |
|--------------------------------|--|

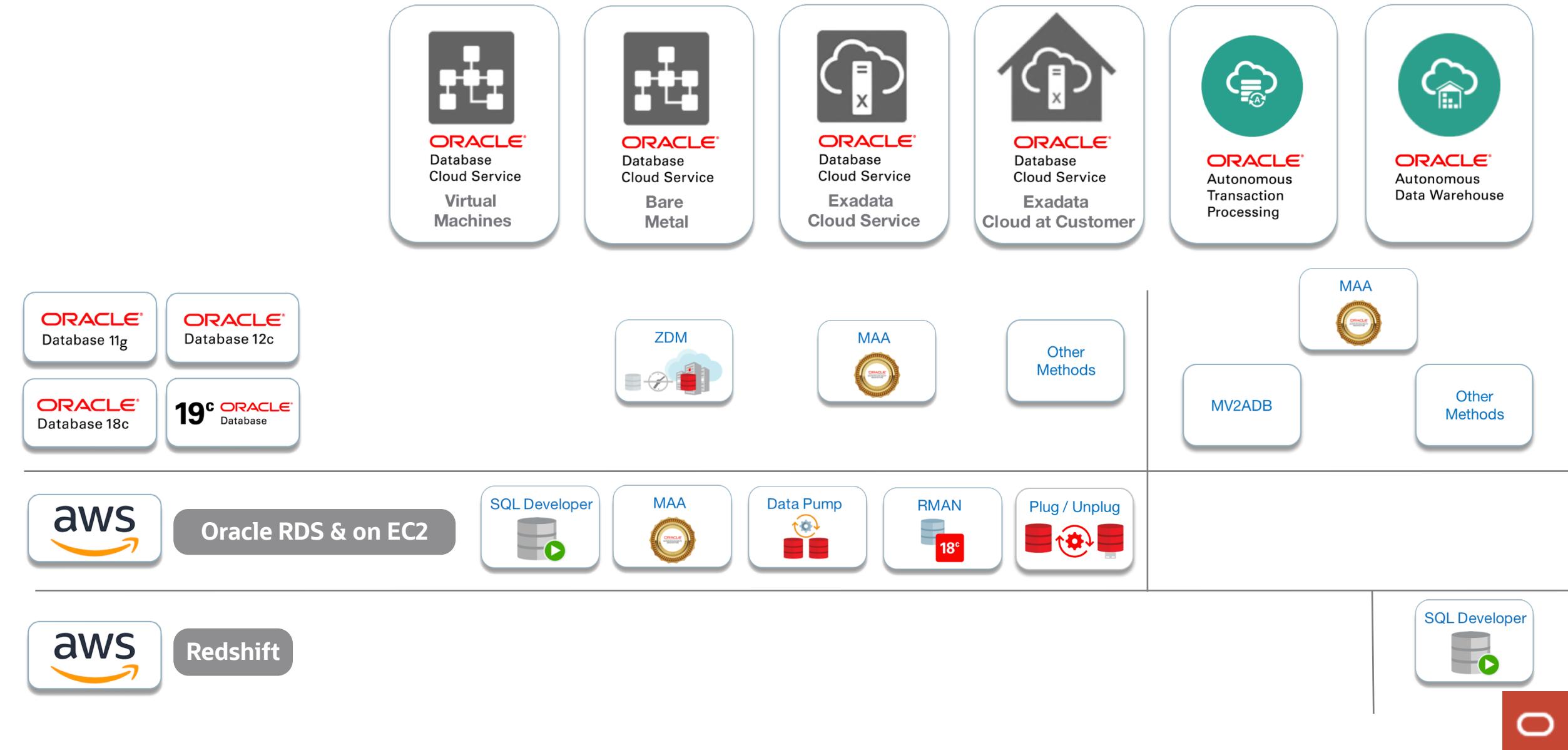


Cloud Migration Best Practice



Understand your Cloud Migration Landscape

Cloud Migration Scenarios

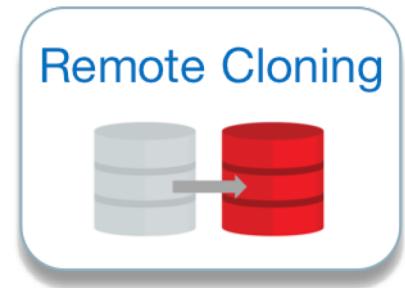
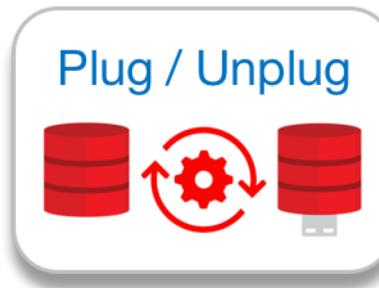
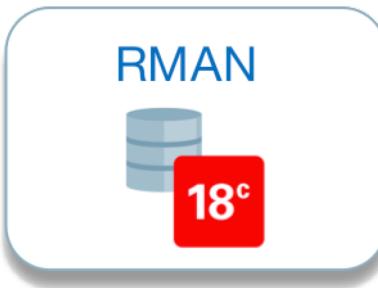
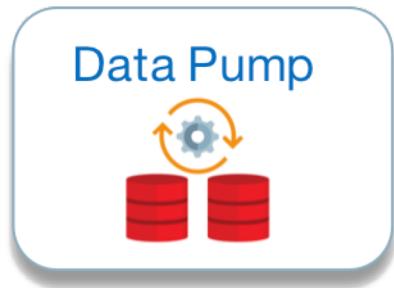


Cloud Migration Best Practice



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 |
|--|--------------------|------------------|-----------------|
|  SQL Developer | Logical | Online | Small to Medium |
|  RMAN | Physical | Online / Offline | Any |
|  Plug / Unplug | Physical | Online / Offline | Any |
|  Remote Cloning | 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

Part 2. Move to the Oracle Cloud- Migrating to Autonomous Databases using MV2ADB

Introducing MOVE to the Oracle Cloud

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.

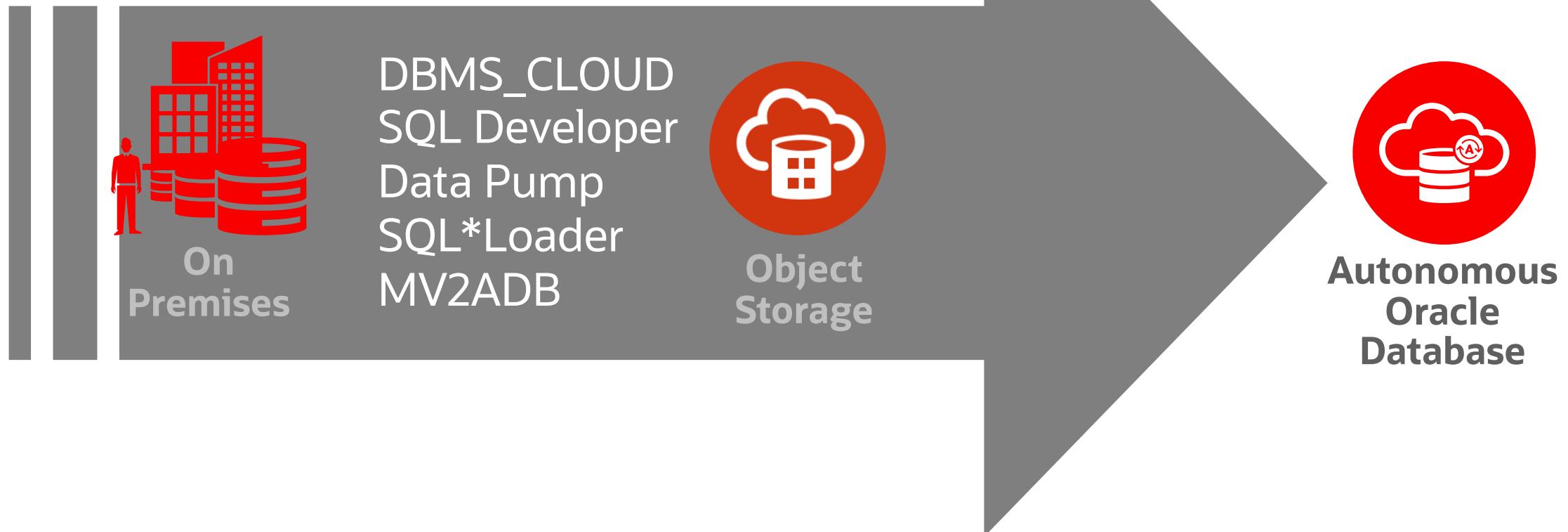


Cloud Migration Advisor

Autonomous Cloud | General Migration Path



Autonomous Cloud | General Migration Techniques

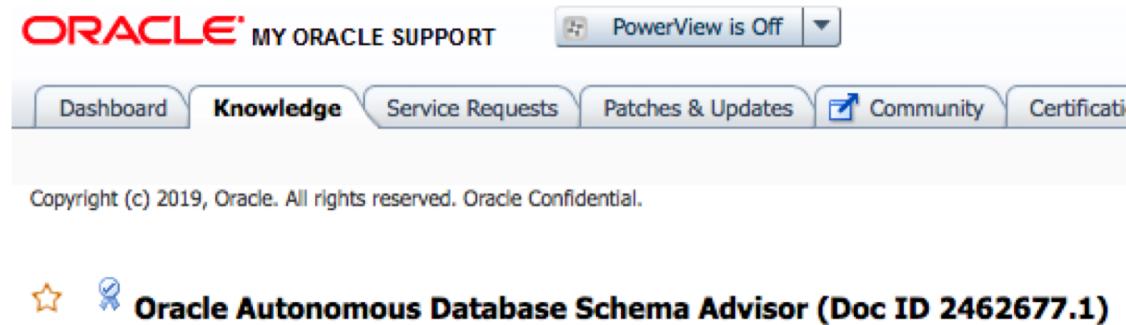


How To Load Data To ADW/ATP Using DBMS_CLOUD.COPY_DATA Method And Find/Validate The Inputs Required (Doc ID 2493502.1)



Cloud Migration Best Practice

Use the Schema Advisor when migrating to Oracle Autonomous Database



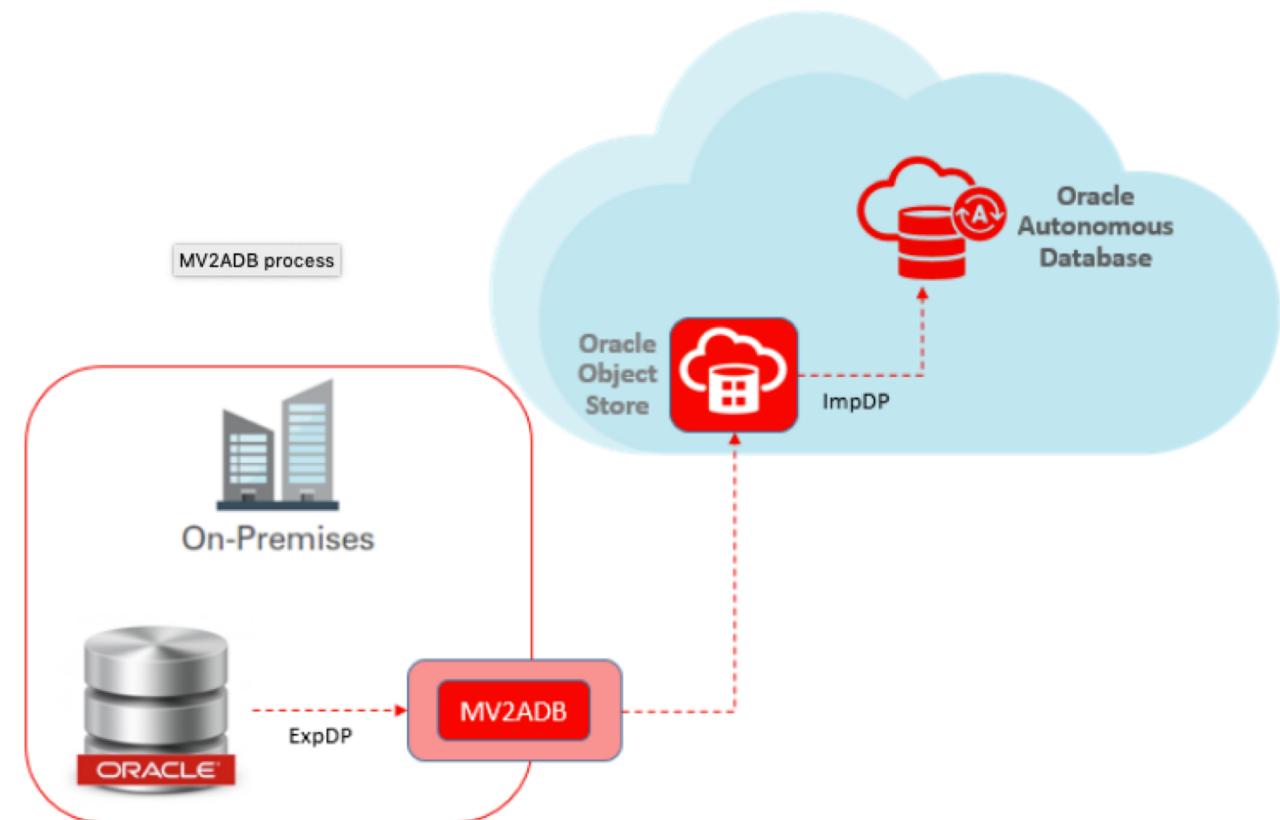
Cloud Migration Best Practice

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...>

The screenshot shows the GitHub repository page for the OCI CLI. At the top, there are tabs for 'bare-metal', 'cloud', 'infrastructure', and 'cli'. Below the tabs, there are statistics: 108 commits, 57 branches, 49 releases, 11 contributors, and a 'View license' link. In the center, there's a dropdown for 'Branch: master' and a 'New pull request' button. On the right, there are 'Find File' and 'Clone or download' buttons. A large red arrow points to the 'Clone with HTTPS' button, which has a tooltip: 'Use Git or checkout with SVN using the web URL.' Below it is a text input field containing the URL `https://github.com/oracle/oci-cli.git`. At the bottom, there are 'Open in Desktop' and 'Download ZIP' buttons.

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

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

OCI object storage bucket operations:

createbucket

delbucket

listbucket

OCI object storage object operations:

deldump

getdump

listdump

putdump

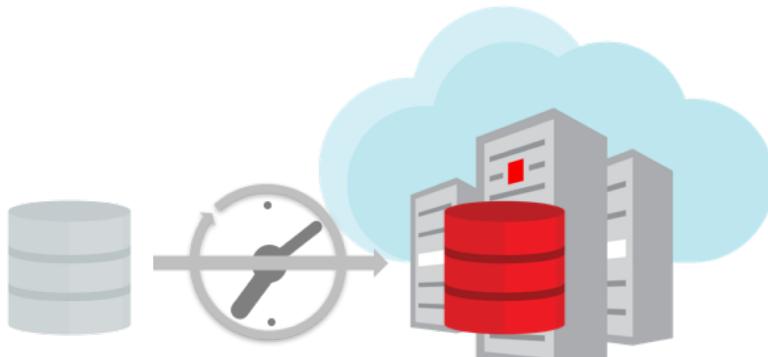
```
mv2adb auto {-conf <conf file path>} |  
  {-bmchost <REST endpoint>  
   -bmctenant <tenant name>  
   -bmclId <user ID>  
   -bmcbucket <bucket name>  
   [-proxyHost <host> -proxyPort <port> [-proxyID <user ID> -proxyPass <password>]]} |  
  {-oci  
   -bmctenant <tenant name>  
   -bmcbucket <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



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

Zero Downtime Migration

Sources



Targets



Same Version / Platform

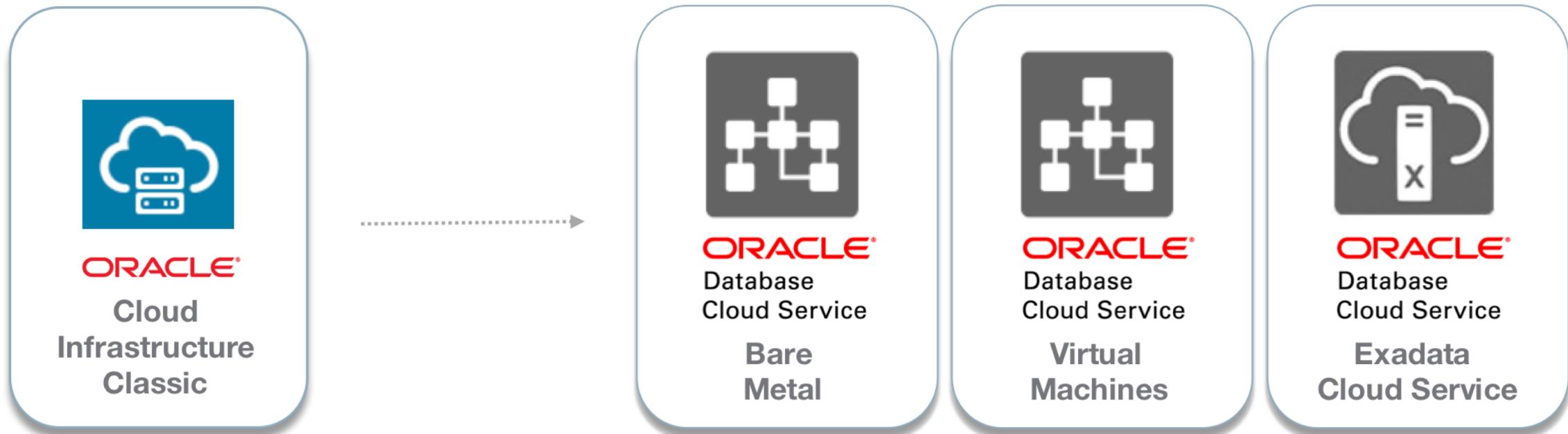
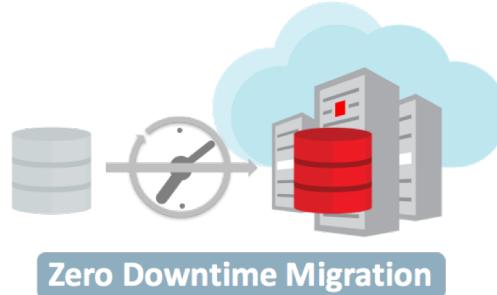


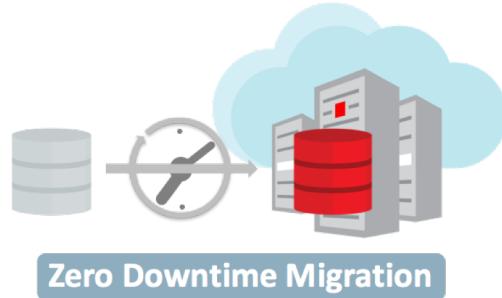
Zero Downtime Migration



ZDM

Migration from OCI-C to OCI





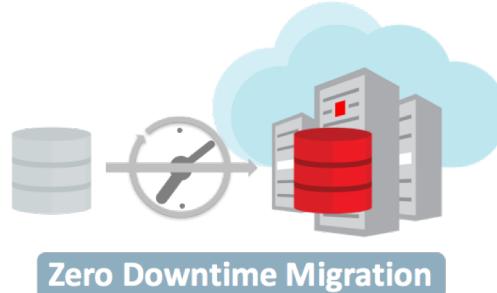
Oracle Zero Downtime Migration

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**

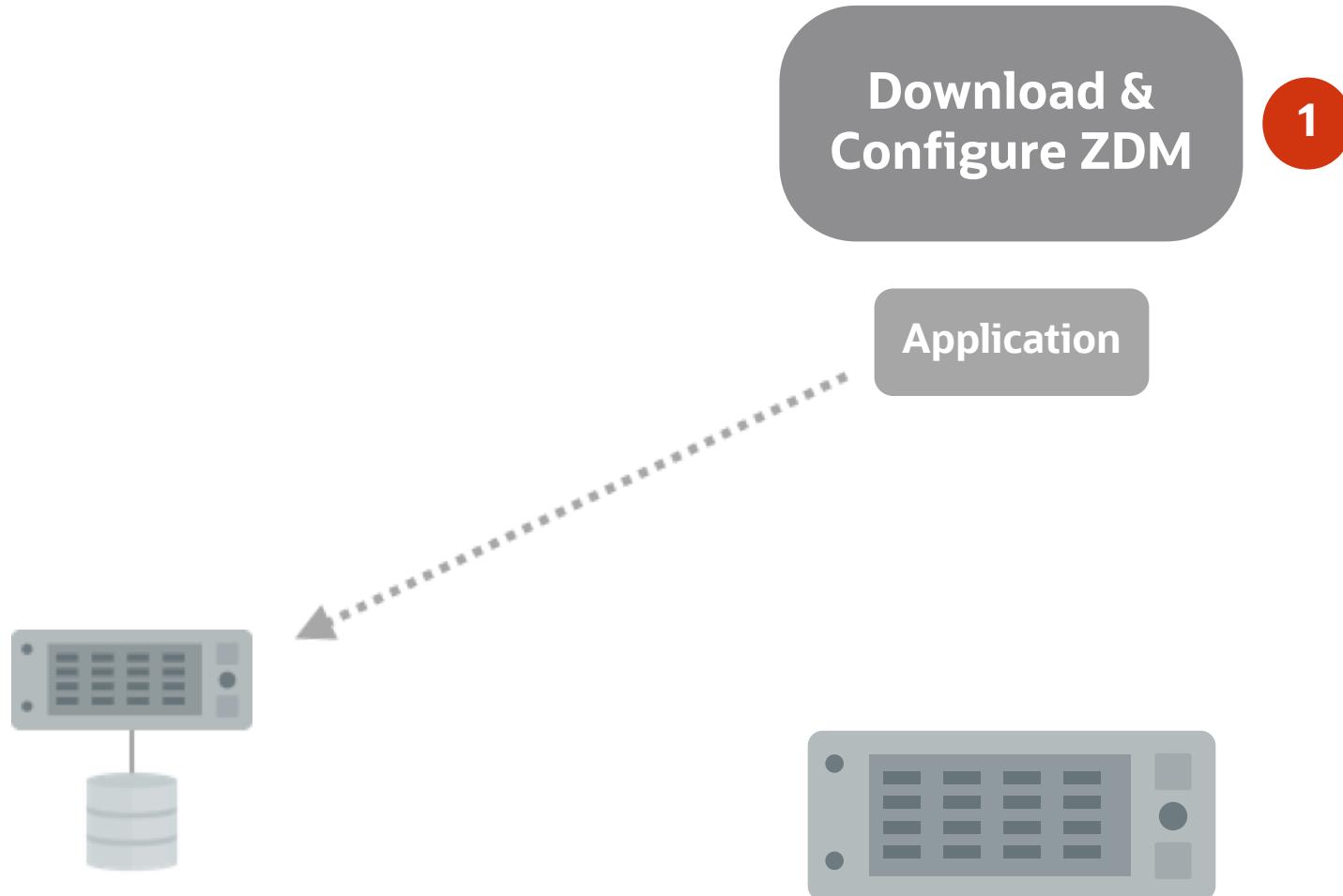
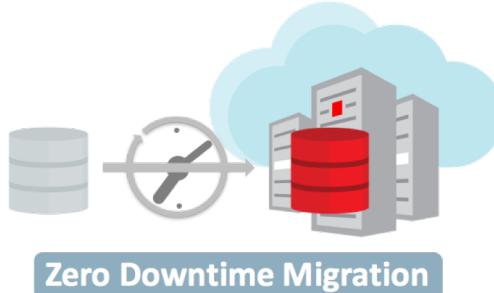
Migration

Switch

Finalize

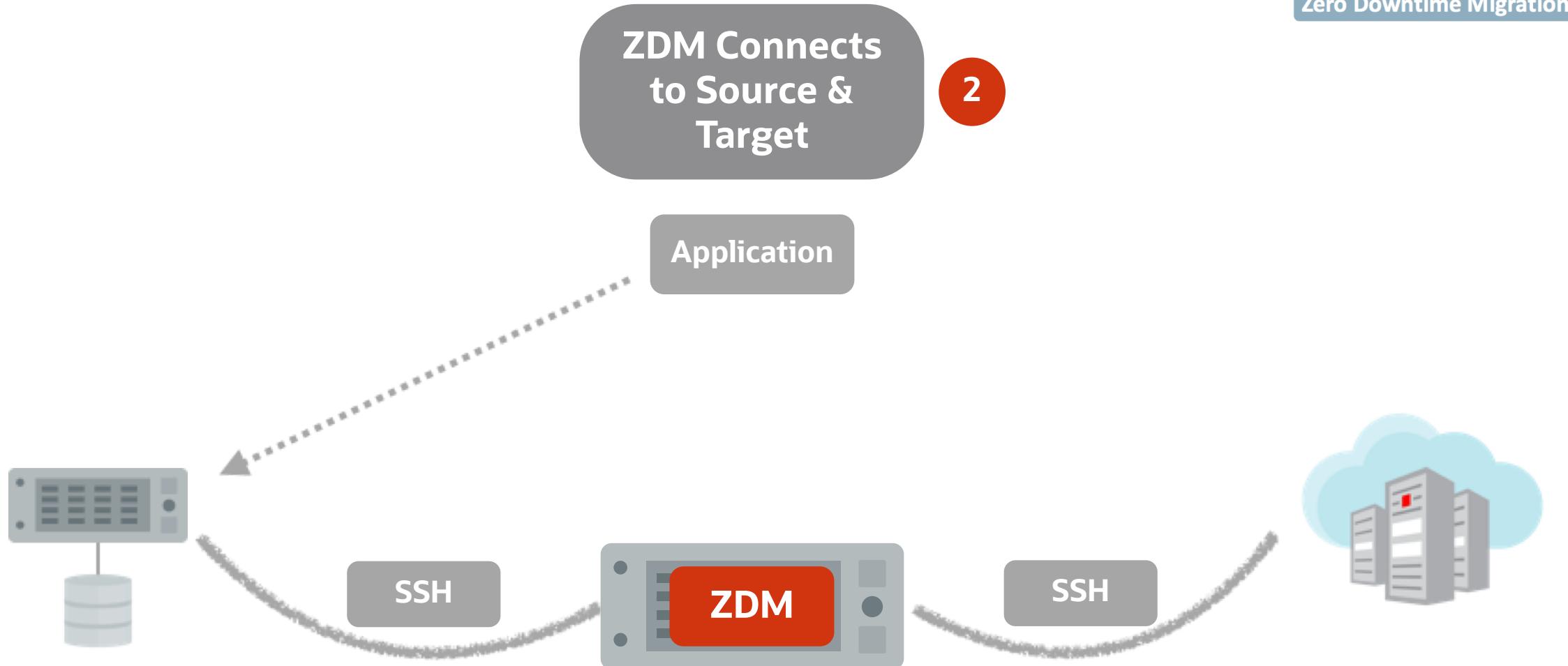
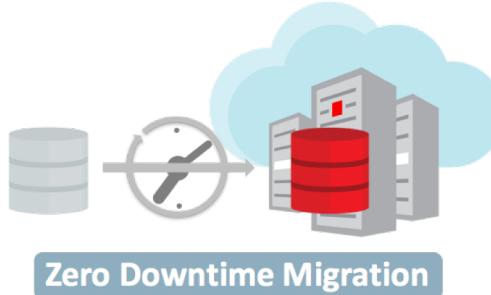
Zero Downtime Migration

Workflow



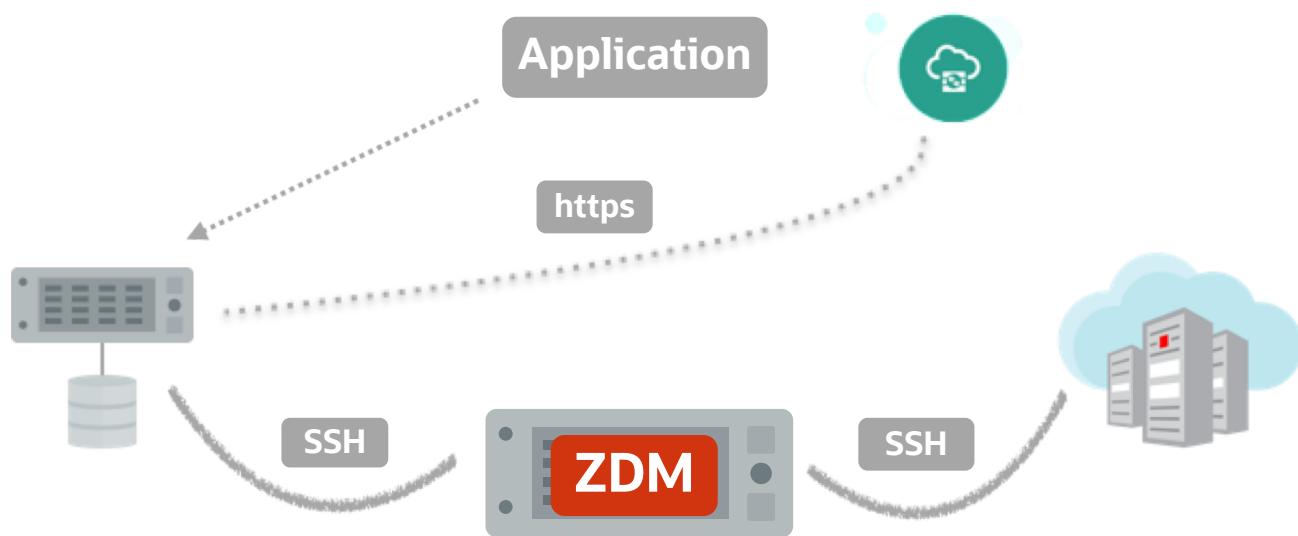
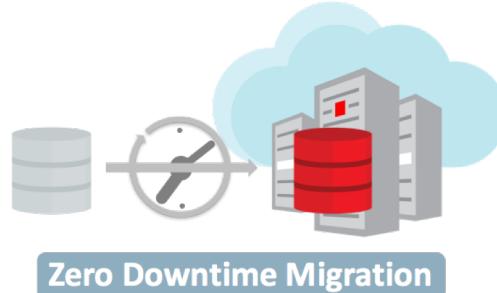
Zero Downtime Migration

Workflow



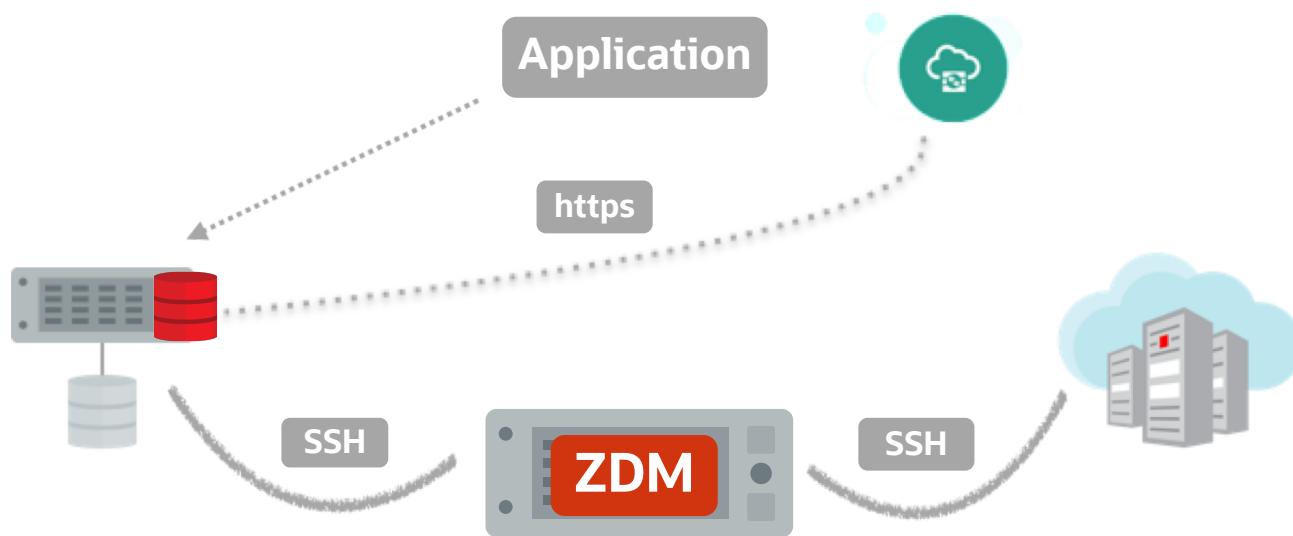
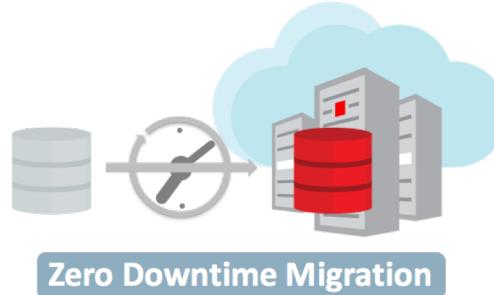
Zero Downtime Migration

Workflow



Zero Downtime Migration

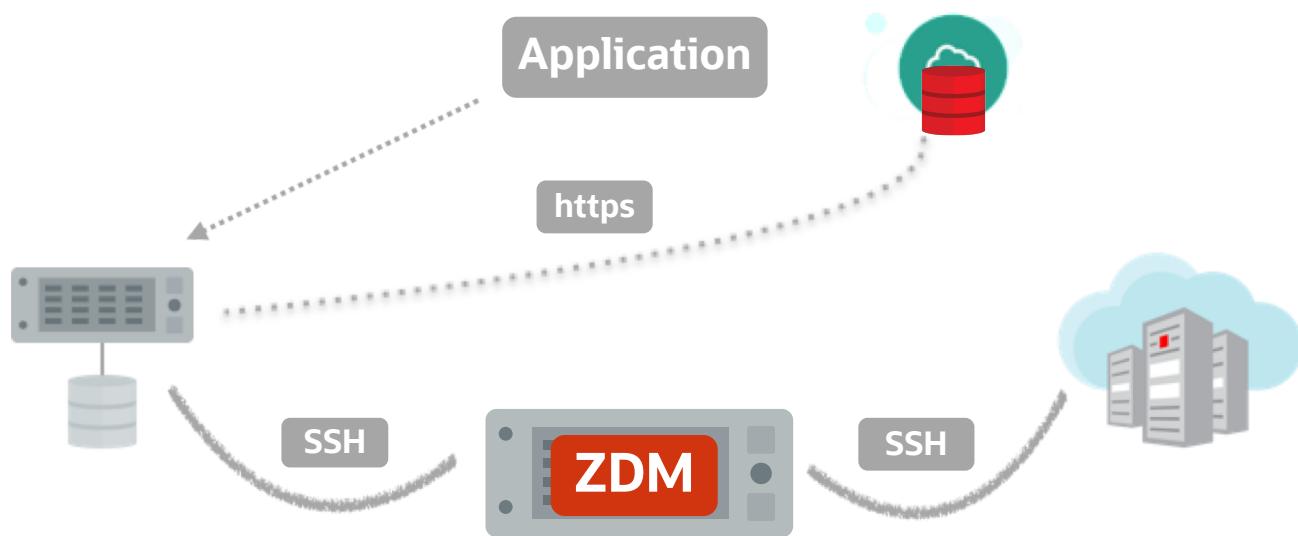
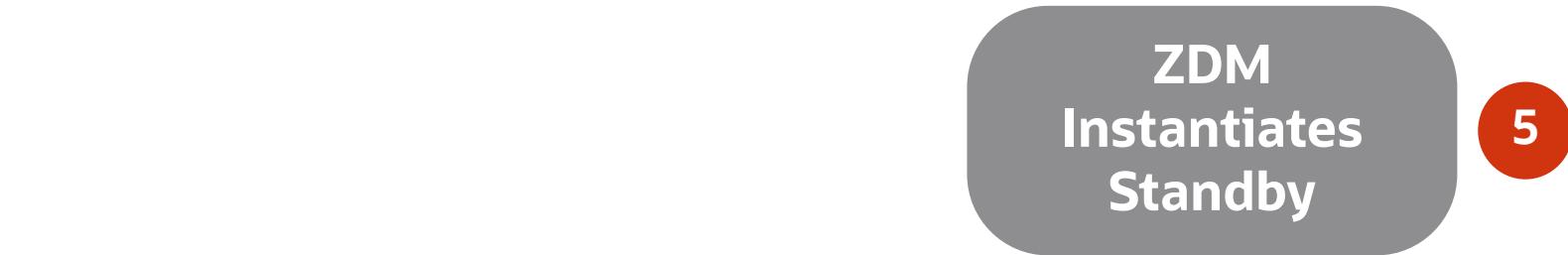
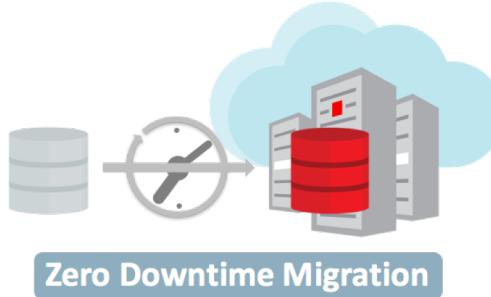
Workflow



- Database Files
- Full Backup
- Including Incremental Archives

Zero Downtime Migration

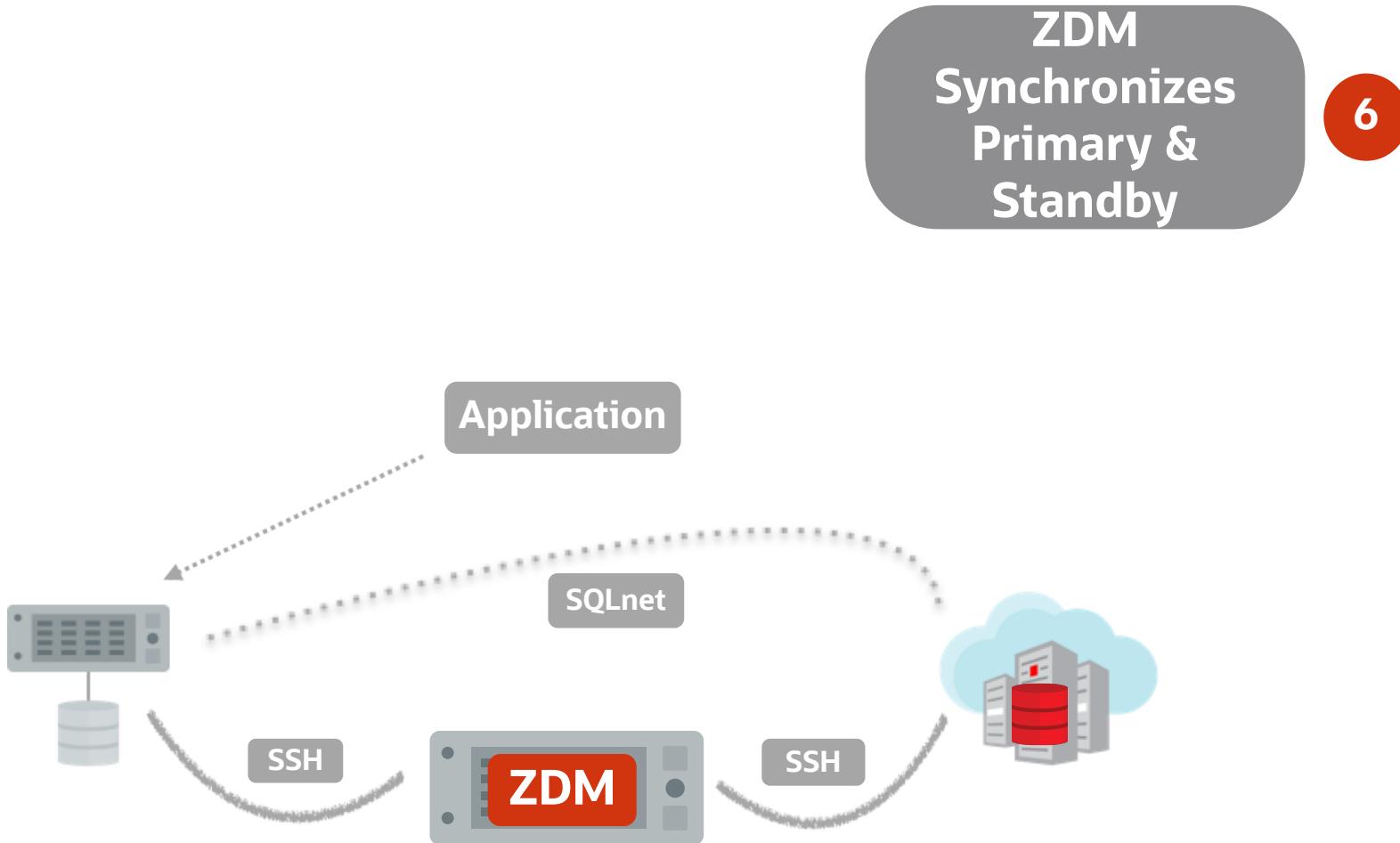
Workflow



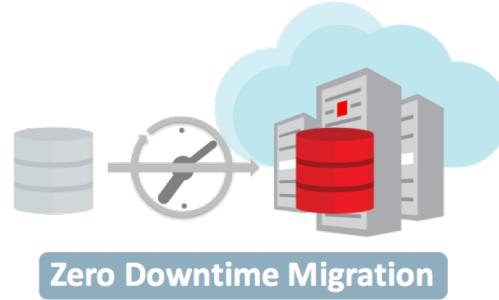
- Standby on target initiates with the backup files transferred to the Object Store

Zero Downtime Migration

Workflow

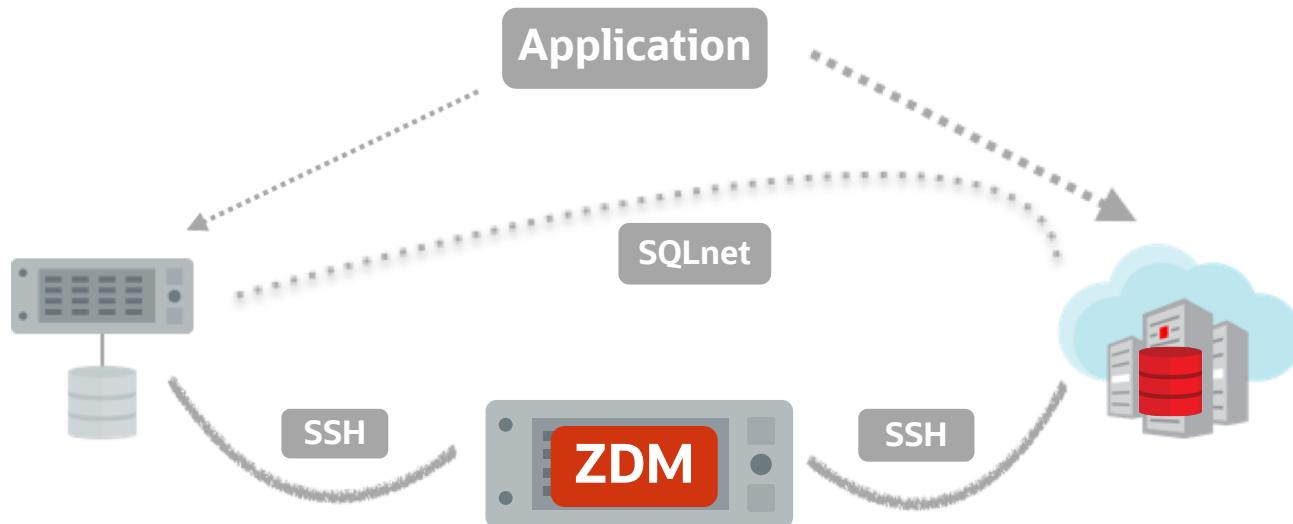
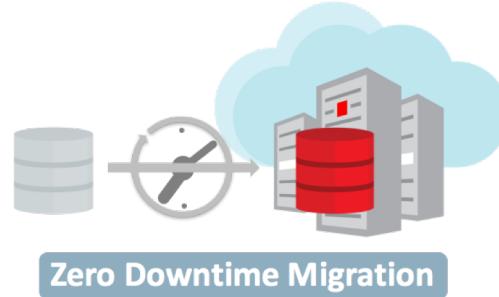


- SQLnet connectivity is established between source & target
- Synchronization between Primary and Standby starts



Zero Downtime Migration

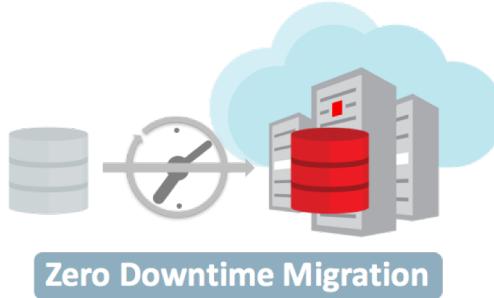
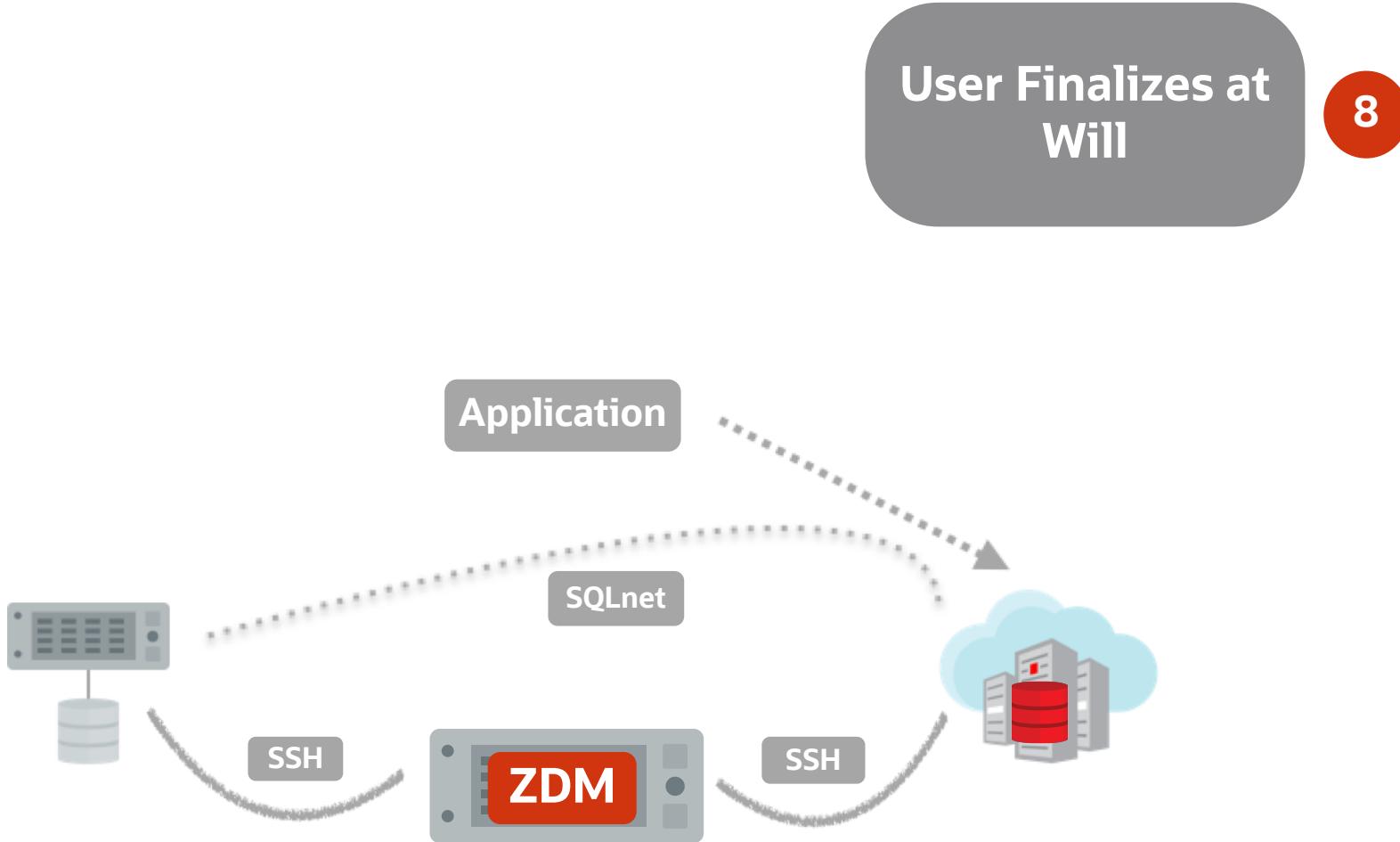
Workflow



- Switchover
- Role swap between Primary and Standby

Zero Downtime Migration

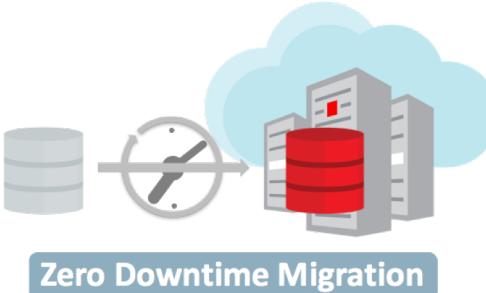
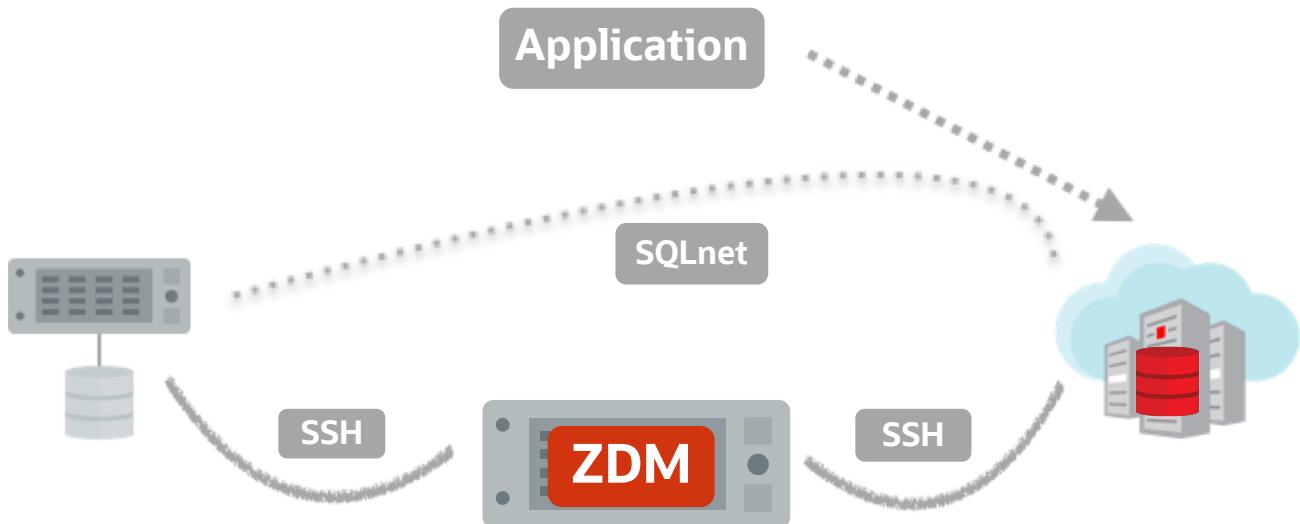
Workflow



- 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

The screenshot shows the Oracle Zero Downtime Migration landing page. At the top, there's a teal header with the title "Oracle Zero Downtime Migration" and a subtext "Simple, Automated, One button approach solution for moving your Oracle Databases into the Oracle Cloud". Below the header is a "Download" button and a small icon of a server and database. The main content area has a light gray background and features the heading "What's New In Oracle Zero Downtime Migration". It includes three sections: "Introduction and Technical Overview" (with icons of people and gears), "Documentation" (with icons of files and charts), and "Product Demo" (with an icon of a tablet displaying a 3D cube). Each section has a corresponding button below it.

Oracle Zero Downtime Migration

8 Simple Automated Steps



User Downloads and Configures ZDM



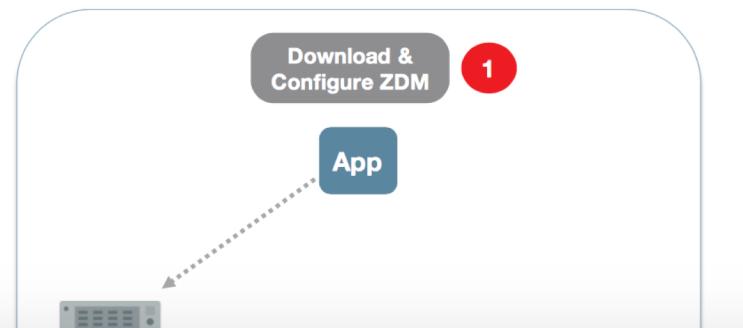
ZDM Starts Database Migration



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 Cloud always free tier:

oracle.com/cloud/free/

OCI training and certification:

oracle.com/cloud/iaas/training

oracle.com/cloud/iaas/training/certification

education.oracle.com/oracle-certification-path

OCI hands-on labs:

ocitraining.qloudable.com/provider/oracle

Oracle learning library videos on YouTube:

youtube.com/user/OracleLearning