Cloud Database Migrations the Easy Way

An Introduction to OCI Database Migration
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Resources to learn more

Video demonstration  Click here
Do a LiveLab online migration  Click here
Step-by-step guide and tutorial  Click here
Documentation  Click here

More information on Oracle.com  Click here
Oracle Cloud is built for Oracle Databases

What’s the best way to get there?
OCI Database Migration

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
## Different migration types

<table>
<thead>
<tr>
<th>Offline Migration</th>
<th>Online Migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>• One-time copy of the database</td>
<td>• Initial copy of database followed by change data capture during migration</td>
</tr>
<tr>
<td>• Requires applications to be offline during migration</td>
<td>• Applications can stay online during migration</td>
</tr>
</tbody>
</table>

### Physical Migration (Not available in OCI DM)
- • Blockwise copy of database files
- • Requires database vendors and versions to be same on source and target
- • No filtering or transformation
- • Tools: RMAN, DataGuard

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

<table>
<thead>
<tr>
<th>Direct Connection</th>
<th>Indirect Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Source database can be accessed directly from target network</td>
<td>• Source database cannot be accessed directly, behind firewall</td>
</tr>
<tr>
<td>• Requires VPN/FastConnect for on-premises</td>
<td>• Requires migration tool with agent</td>
</tr>
</tbody>
</table>
Oracle Database migration process and tools

### 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

*Requires Oracle for access

Visit [Database Migration to OCI](DatabaseMigrationToOCI) for links to all planning tools
OCI Database Migration – Native OCI Cloud Service

Supported sources, database versions, and targets

**O/S sources**
- SOLARIS
- IBM AIX
- x86-64 server
- Google Cloud

**Oracle sources**
- On Premises

**Oracle Cloud targets**
- Autonomous Database
- Base Database Cloud Service
- Exadata Cloud Service

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

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Latest sources and targets
OCI Database Migration – Native OCI Cloud Service
MySQL in OCI Database Migration - soon

Oracle sources
-On Premises

MySQL source
Version 5.7 – 8.0

Migration

Oracle Cloud target
OCI MySQL HeatWave
Database service

OCI Database Migration
Database Tools: MySQL Shell, GoldenGate, etc

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Latest sources and targets
Migration steps

1. Prerequisites:
   • Setup VPN or FastConnect
   • Provision Target DB, Object Store, and Vault
   • Configure source and target
   Optional for online:
   • OGG Marketplace

2. Setup

3. Validate
   • Use CPAT interactively to discover and respond to issues

4. Start
   • Fully automated
   Optional controls
   • Initial load
   • Online replication
   • Restarts

5. Complete
   • Switch operations to new database
How it works

Source Databases
- On-premises Oracle databases
- Other Cloud Provider Oracle Databases
- OCI Source Databases
  - Oracle Base Database Service
  - Exadata Cloud Service
  - Exadata Cloud@Customer

OCI Database Migration
- Cloud Premigration Advisor Tool
- Database Migration
- GoldenGate
- Online
- Offline
- Data Pump extract
- Data Pump Import
- DB Link
- Intermediate Storage OSS/FSS

Target Databases
- Autonomous Database
- Exadata Cloud Service
- Oracle Base Database Service
Pricing: **FREE** for all common use cases

**Included:**
- OCI Database Migration service operations and supporting infrastructure
- On-premises software agent for specific use cases
- OCI GoldenGate usage for online migrations
- *Oracle GoldenGate Marketplace for Database Migrations* license

**Not included:**
- Customer managed OCI resources used for database migration operations
  - e.g. Compute for GoldenGate Marketplace image, OCI Object Storage, File Storage Service, OCI Streaming
- 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
A walkthrough
Step 1: Select Database Migration menu on the OCI Console
Step 2: Create Connections for source and target

Provide reusable connection information and credentials for databases.
Step 3: Create Migration
Select migration method and other settings to move a database to the cloud

Create migration
Select databases

Source database
Database connection in jorge

Target database
Database connection in jorge

Create migration
Migration options

Transfer medium for initial load
- Data Pump via database link
- Data Pump via object storage
- Data Pump via file storage

Source database
Export directory
- Object storage bucket in jorge
- Use online replication
- Show advanced options

Online
Step 4a: Validate Migration

Confirm all prerequisites and permissions. CPAT identifies incompatible objects.

Embedded CPAT rules evaluate source database for issues. Validation fails when issues need user attention.
The advisor displays the **Issue**, **Impact**, and available **Actions**. In this case, the problematic object is excluded from the migration.
Step 4c: Validate Migration

Validation success!

After repairs, the validation runs again. When validation succeeds, the migration continues to the next phase.
Step 5: Start Migration

Initiate the migration job to migrate the database to the cloud.
Start Migration – Export Initial Load

Current DB state is exported to files using Oracle Data Pump

Export data using Data Pump

Source Application

Target Application

File Storage

Object Store

GoldenGate

Autonomous Database

Source Database

FastConnect

VPN

On-Premises Environment

Oracle Cloud Infrastructure

Phases

<table>
<thead>
<tr>
<th>Name</th>
<th>Status</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Validate</td>
<td>Completed</td>
<td>1 m 11 s</td>
</tr>
<tr>
<td>Prepare</td>
<td>Completed</td>
<td>2 m 43 s</td>
</tr>
<tr>
<td>Export Initial Load</td>
<td>Started</td>
<td>3 m 43 s</td>
</tr>
<tr>
<td>Upload Data</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Import Initial Load</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Post Initial Load</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Prepare Replication Target</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Monitor Replication Lag</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Switchover</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Cleanup</td>
<td>Pending</td>
<td>—</td>
</tr>
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Start Migration – Upload Data

Data Pump export is uploaded to the intermediate storage

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</tr>
<tr>
<td>Prepare</td>
<td>Completed</td>
<td>2 m 43 s</td>
</tr>
<tr>
<td>Export Initial Load</td>
<td>Completed</td>
<td>9 m 30 s</td>
</tr>
<tr>
<td>Upload Data</td>
<td>Started</td>
<td>26 s</td>
</tr>
<tr>
<td>Import Initial Load</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Post Initial Load</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Prepare Replication Target</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Monitor Replication Lag</td>
<td>Pending</td>
<td>—</td>
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<tr>
<td>Switchover</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Cleanup</td>
<td>Pending</td>
<td>—</td>
</tr>
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</table>
Start Migration – Import Initial Load

Exported dump files are imported to ADB

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<tr>
<td>Validate</td>
<td>Completed</td>
<td>1 m 11 s</td>
</tr>
<tr>
<td>Prepare</td>
<td>Completed</td>
<td>2 m 43 s</td>
</tr>
<tr>
<td>Export Initial Load</td>
<td>Completed</td>
<td>9 m 30 s</td>
</tr>
<tr>
<td>Upload Data</td>
<td>Completed</td>
<td>1 m 13 s</td>
</tr>
<tr>
<td>Import Initial Load</td>
<td>Started 50%</td>
<td>3 m 30 s</td>
</tr>
<tr>
<td>Post Initial Load</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Prepare Replication Target</td>
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<td>—</td>
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<tr>
<td>Monitor Replication Lag</td>
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<td>—</td>
</tr>
<tr>
<td>Switchover</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Cleanup</td>
<td>Pending</td>
<td>—</td>
</tr>
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Start Migration – Replication

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

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<tbody>
<tr>
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<tr>
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<td>Completed</td>
<td>2 m 43 s</td>
</tr>
<tr>
<td>Export Initial Load</td>
<td>Completed</td>
<td>9 m 30 s</td>
</tr>
<tr>
<td>Upload Data</td>
<td>Completed</td>
<td>1 m 13 s</td>
</tr>
<tr>
<td>Import Initial Load</td>
<td>Completed</td>
<td>5 m 33 s</td>
</tr>
<tr>
<td>Post Initial Load</td>
<td>Completed</td>
<td>3 s</td>
</tr>
<tr>
<td>Prepare Replication Target</td>
<td>Completed</td>
<td>2 m 11 s</td>
</tr>
<tr>
<td>Monitor Replication Lag</td>
<td>Completed</td>
<td>2 s</td>
</tr>
<tr>
<td>Switchover</td>
<td>Pending</td>
<td>—</td>
</tr>
<tr>
<td>Cleanup</td>
<td>Pending</td>
<td>—</td>
</tr>
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</table>

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Start Migration – Switchover

Wait until last transaction is replicated to switch over applications

**Phases**

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<tr>
<td>Validate</td>
<td>‟Completed”</td>
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</tr>
<tr>
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<td>‟Completed”</td>
<td>2 m 43 s</td>
</tr>
<tr>
<td>Export Initial Load</td>
<td>‟Completed”</td>
<td>9 m 30 s</td>
</tr>
<tr>
<td>Upload Data</td>
<td>‟Completed”</td>
<td>1 m 13 s</td>
</tr>
<tr>
<td>Import Initial Load</td>
<td>‟Completed”</td>
<td>5 m 33 s</td>
</tr>
<tr>
<td>Post Initial Load</td>
<td>‟Completed”</td>
<td>3 s</td>
</tr>
<tr>
<td>Prepare Replication Target</td>
<td>‟Completed”</td>
<td>2 m 11 s</td>
</tr>
<tr>
<td>Monitor Replication Lag</td>
<td>‟Completed”</td>
<td>2 s</td>
</tr>
<tr>
<td>Switchover</td>
<td>‟Completed”</td>
<td>1 m 26 s</td>
</tr>
<tr>
<td>Cleanup</td>
<td>‟Pending”</td>
<td></td>
</tr>
</tbody>
</table>
Migration Succeeded!

### Job Information
- **Job ID:** job-20240103044437
- **Migration:** GREENBUTTON
- **Compartments:** upstage (node/DMSstage)
- **Created:** Wed, Jan 3, 2024, 9:44:37 UTG
- **Type:** Migration

### Phases
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<thead>
<tr>
<th>Name</th>
<th>Status</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Initialize replication infrastructure</td>
<td>Completed</td>
<td>14 m 12 s 327 ms</td>
</tr>
<tr>
<td>Validate</td>
<td>Completed</td>
<td>4 m</td>
</tr>
<tr>
<td>Prepare</td>
<td>Completed</td>
<td>6 m</td>
</tr>
<tr>
<td>Export initial lead</td>
<td>Completed</td>
<td>6 m</td>
</tr>
<tr>
<td>Upload data</td>
<td>Completed</td>
<td>55 m</td>
</tr>
<tr>
<td>Import initial lead</td>
<td>Completed</td>
<td>45 m</td>
</tr>
<tr>
<td>Post initial load</td>
<td>Completed</td>
<td>12 m</td>
</tr>
<tr>
<td>Prepare replication target</td>
<td>Completed</td>
<td>4 m</td>
</tr>
<tr>
<td>Monitor replication tag</td>
<td>Completed</td>
<td>48 m</td>
</tr>
<tr>
<td>Synchronize</td>
<td>Completed</td>
<td>6 m</td>
</tr>
<tr>
<td>Clean up</td>
<td>Completed</td>
<td>4 m</td>
</tr>
</tbody>
</table>
Thank You!