



Oracle Database Migration

from

On-Premises to OCI Cloud

An Industry-Grade Oracle Migration
Learning

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Program Overview

This training program provides a comprehensive understanding of Oracle Database Migration strategies, techniques, and best practices for migrating databases from on-premises environments to Oracle Cloud Infrastructure (OCI) and between on-premises environments. The course spans 10 weeks with structured learning modules designed for database administrators, architects, and IT professionals responsible for Oracle database migrations.

Module 1: Introduction to Oracle Database Migration

Learning Objectives

- Understand core concepts of database migration.
- Differentiate between migration and in-place upgrades.
- Learn the migration lifecycle and planning approach.

Module 1: Database Migration Fundamentals

- What constitutes database migration?
- Key objectives of migration:
 - Performance improvement
 - Platform upgrades
 - Cost optimization
 - Enhanced capabilities

Module 2: Migration Benefits and Use Cases

- **Benefits of migration:**
 - Enhanced scalability and performance
 - Improved security and compliance
 - Reduced operational overhead.
 - Cloud technology advantages
- **Migration vs. In-place Upgrades:**
 - Key differences and decision criteria
 - Business and technical considerations

Module 3: The Migration Lifecycle

- **Planning Phase:**
 - Business requirements gathering
 - Technical assessment
 - Risk evaluation



- **Assessment Phase:**
 - Database size and complexity analysis
 - Application dependencies mapping
 - Performance baseline establishment
- **Execution Phase:**
 - Migration method selection
 - Implementation steps
 - Testing protocols
- **Post-Migration Phase:**
 - Validation and verification
 - Performance tuning
 - Operational handover

Module 4: Migration Strategy Development

- **Database and Infrastructure Dependency Assessment:**
 - Identifying critical dependencies
 - Compatibility assessment
 - Pre-migration checklist
- **Migration Timeline Planning:**
 - Evaluating business impact
 - Calculating downtime requirements
 - Creating realistic schedules with contingencies

Hands-on Exercise

- Conduct a sample migration assessment for a fictional database.
- Create a migration plan document with timeline and dependencies.

Module 2: Migration Approaches and Methods

Learning Objectives

- Understand different migration methods.
- Learn how to select appropriate migration approaches.
- Compare logical vs. physical migration techniques.

Module 1: Migration Method Classification

- **Logical vs. Physical Migration:**
 - Definitions and key differences
 - Pros and cons of each approach
 - Implementation considerations

Module 2: Logical Migration Methods

- **Logical Online Migration using GoldenGate:**
 - Architecture and components
 - Configuration requirements
 - Use cases and limitations.
- **Logical Offline Migration using Data Pump:**
 - Process overview
 - Performance optimization
 - Advantages and challenges

Module 3: Physical Migration Methods

- **Physical Online Migration using DataGuard:**
 - Inflight upgrade capabilities
 - Configuration requirements
 - Benefits and considerations
- **Physical Offline Migration using RMAN:**
 - Backup and restore procedures.
 - Cross-platform considerations
 - Limitations and best practices

Module 4: Zero Downtime Migration (ZDM)

- **ZDM Architecture and Components:**
 - Role in physical migrations
 - Setup requirements
 - Operational flow
- **ZDM Migration Methods:**
 - Support for various migration paths
 - Integration with other Oracle tools



Module 5: Migration Method Selection Framework

- **Decision Criteria for Migration Method:**
 - Database size implications (100GB, 10TB, 100TB)
 - Downtime tolerance
 - Network bandwidth considerations
 - Complexity factors

Hands-on Exercise

- Use a decision matrix to select appropriate migration methods for different scenarios.
- Create a migration method selection document with justifications.



Module 3: Oracle Database Migration from On-prem to Cloud

Learning Objectives

- Understand the core migration methodologies and their applications.
- Master environment configuration for successful migration
- Learn infrastructure preparation techniques essential for Oracle migration.

Key Migration Methods in ZDM 21.5

- **Logical Online Migration using GoldenGate**
- **Logical Offline Migration using Data Pump**
- **Physical Online Migration using Data Guard**
- **Physical Offline Migration using RMAN**
- **Physical Offline Migration using XTTS**

Module 1: Target Environment Configuration

- **Huge Pages Configuration for ExaCC Database:**
 - Impact on database performance and memory management
 - Step-by-step configuration process
 - Testing and validation techniques
- **Database Parameter Migration Strategies:**
 - Identifying and prioritizing critical parameters
 - Methods for parameter transfer and adjustment
 - Troubleshooting parameter-related migration issues

Module 2: Performance Benchmarking

- **Comparative Analysis: On-premises vs ExaCC:**
 - Effective benchmarking approaches
 - Critical performance metrics and indicators Data collection and analysis methodologies
- **ExaCC Performance Optimization:**
 - ExaCC-specific tuning techniques
 - Resource allocation best practices
 - Performance monitoring and analysis tools

Module 3: Secure Access Configuration

- **Implementing Bastion Host Architecture:**
 - Security design principles for cloud access
 - Bastion host deployment procedures
 - Operational best practices
- **Secure Connectivity Setup:**
 - ZDM connection requirements
 - SSH configuration and port management



- Network security and troubleshooting techniques

Module 4: Backup and Data Protection

- **Strategic Backup Planning:**
 - Crafting backup strategies for varying database sizes
 - Balancing performance, time, and risk factors
 - Developing appropriate recovery time objectives
- **TDE Implementation and Migration:**
 - Transparent Data Encryption concepts
 - Secure wallet transfer methodologies
 - Encryption best practices during migration

Hands-on Lab

- Configure an ExaCC test environment with optimized parameters.
- Implement and verify TDE configuration.
- Design and deploy a comprehensive backup strategy for migration.



Module 4: Oracle 12.2 to 19c Migration (Physical Online)

ZDM physical online with inflight upgrade.

Learning Objectives

- Master the process of migrating from 12.2 to 19c
- Understand Data Guard with inflight upgrade approach.
- Learn version-specific migration considerations.

Module 1: Migration Planning for Version Upgrades

- **Pre-migration Assessment:**
 - Compatibility verification
 - Feature changes between versions
 - Deprecated functionality identification
- **Version-specific Considerations:**
 - 12.2 to 19c migration paths
 - Potential obstacles and solutions

Module 2: Physical Online Migration with Data Guard

- **Data Guard Architecture Overview:**
 - Components and configuration
 - Standby database setup
 - Switchover vs. failover options
- **Inflight Upgrade Process:**
 - Step-by-step configuration
 - Monitoring the upgrade
 - Troubleshooting common issues

Module 3: Migration Execution and Validation

- **Migration Implementation:**
 - Detailed execution steps
 - Progress monitoring
 - Issue resolution strategies
- **Post-migration Validation:**
 - Database integrity verification
 - Performance assessment
 - Application compatibility testing

Module 4: Advanced Troubleshooting

- **Common Migration Challenges:**
 - Data Dictionary incompatibilities
 - Performance degradation causes
 - Application connectivity issues



- **Resolution Strategies:**
 - Diagnostic approaches
 - Oracle Support utilization
 - Rollback procedures

Hands-on Exercise

- Set up a test environment for 12.2 to 19c migration.
- Implement a physical online migration with Data Guard
- Validate the migration success.

Module 5: Cross-Platform Migration with XTTS

Learning Objectives

- Understand Cross-Platform Transportable Tablespaces (XTTS)
- Learn migration techniques from UNIX to Linux
- Master endian format conversion procedures

Module 1: XTTS Fundamentals

- **Cross-Platform Migration Concepts:**
 - Platform compatibility matrix
 - Endianness considerations
 - Version compatibility
- **XTTS V4 Architecture:**
 - Components and process flow
 - Requirements and limitations
 - Use cases

Module 2: UNIX to Linux Migration

- **Solaris/AIX to Linux Migration Path:**
 - Platform-specific considerations
 - File system differences
 - OS-level prerequisites
- **Endian Format Conversion:**
 - Conversion methods
 - Performance implications
 - Validation techniques

Module 3: XTTS Implementation

- **Pre-migration Tasks:**
 - Source database preparation
 - Target platform setup
 - Network and storage configuration



- **Migration Execution:**
 - Step-by-step implementation
 - Progress monitoring
 - Issue resolution

Module 4: Post-migration Activities

- **Database Validation:**
 - Integrity checks
 - Performance assessment
 - Application connectivity testing
- **Platform-specific Optimizations:**
 - Linux-specific parameters
 - Resource allocation strategies
 - OS-level tuning

Hands-on Exercise

- Set up a test environment for cross-platform migration.
- Execute an XTTS migration from UNIX to Linux
- Perform post-migration validation and optimization.



Module 6: Data Pump for Logical Offline Migration

Learning Objectives

- Master Data Pump for large-scale migrations
- Learn performance optimization techniques.
- Understand metadata handling during migration.

Module 1: Data Pump Fundamentals

- **Architecture and Components:**
 - Master and worker processes
 - Direct path vs. external table mode
 - API vs. command-line interfaces
- **Data Pump vs. Traditional Export/Import:**
 - Key advantages
 - Limitations and challenges
 - Migration scenarios

Module 2: Data Pump Configuration and Optimization

- **Performance Tuning Parameters:**
 - Parallel processing
 - Network transfer rate
 - Buffer and memory allocation
- **Metadata Handling:**
 - Schema translation
 - Object filtering
 - Remapping options

Module 3: Large Database Migration Strategies

- **Partitioning Strategies:**
 - Schema-level migration
 - Tablespace groupings
 - Data subsetting
- **Storage Considerations:**
 - Tablespace management
 - ASM and file system implications
 - Temporary space requirements

Module 4: Advanced Data Pump Features

- **Network Mode Operations:**
 - Database link utilization
 - Direct server-to-server transfer
 - Security considerations
- **Encryption and Compression:**
 - Algorithms and impact



- When to use encryption
- Compression trade-offs

Hands-on Exercise

- Execute a Data Pump migration for a medium-sized database.
 - Implement various performance optimizations.
 - Compare performance metrics with different configurations.
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Module 7: Zero Downtime Migration (ZDM) with GoldenGate

Learning Objectives

- Understand ZDM architecture and components.
- Master GoldenGate configuration for online migration
- Learn end-to-end logical online migration process.

Module 1: ZDM and GoldenGate Integration

- **ZDM Architecture for Logical Online Migration:**
 - Components and interaction
 - Operational flow
 - Prerequisites and requirements
- **GoldenGate Fundamentals:**
 - Replication concepts
 - Architecture components
 - Data flow patterns

Module 2: GoldenGate Configuration

- **Source Database Preparation:**
 - Supplemental logging setup
 - User privileges and access
 - Schema selection strategies
- **Target Database Configuration:**
 - Schema creation Tablespace
 - mapping Initial load
 - considerations

Module 3: Migration Execution with ZDM and GoldenGate

- **Implementation Steps:**
 - ZDM command execution
 - Migration monitoring
 - Progress validation



- **Switchover Process:**
 - Applicationcutover planning
 - Final synchronization Post-switchover
 - validation

Module 4: Performance Tuning and Optimization

- **GoldenGate Performance:**
 - Parameter optimization
 - Resource allocation
 - Network considerations
- **Troubleshooting Techniques:**
 - Common issues
 - Log interpretation
 - Resolution strategies

Hands-on Exercise

- Configure ZDM with GoldenGate for a test migration.
- Execute a logical online migration.

Validate data consistency and application connectivity.



Module 8: M5 Migration for Linux Version Upgrades

Learning Objectives

- Understand M5 migration methodology.
- Master the process of migrating from Linux 19.18 to 19c OCI
- Learn platform-specific optimization techniques.

Module 1: M5 Migration Fundamentals

- **M5 Methodology Overview:**
 - Components and architecture Use
 - cases and scenarios. Advantages and limitations
- **Linux Version Compatibility:**
 - Oracle support matrix
 - OS version considerations
 - Kernel parameter requirements

Module 2: Pre-migration Assessment

- **Compatibility Analysis:**
 - Feature and functionality differences
 - Deprecated features identification
 - Application dependencies
- **Migration Planning:**
 - Timeline development
 - Resource allocation
 - Risk mitigation strategies

Module 3: M5 Migration Implementation

- **Step-by-step Migration Process:**
 - Source database preparation
 - Migration execution
 - Target database configuration
- **Monitoring and Troubleshooting:**
 - Progress tracking
 - Issue identification Resolution approaches

Module 4: Post-migration Optimization

- **Linux 19c-specific Tuning:**
 - Parameter optimization Resource allocation Performance benchmarking
- **Application Integration:**
 - Connectivity testing



- o Performance assessment
- o User acceptance validation

Hands-on Exercise

- Implement M5 migration for a test database.
- Migrate from Linux 18.16 to 19c
- Validate and optimize the migrated database.

Module 9: Autonomous Database Migration

Learning Objectives

- Learn migration techniques to Autonomous Transaction Processing (ATP)
- Understand Data Guard associations in Oracle Cloud
- Master cloud-specific migration considerations

Module 1: ATP Migration Fundamentals

- **Autonomous Database Architecture:**
 - o Components and features
 - o Self-management capabilities
 - o Service tiers and options
- **Migration Paths to ATP:**
 - o Direct vs. indirect approaches
 - o Tool selection criteria
 - o Migration method evaluation

Module 2: On-premises to ATP Migration

- **Pre-migration Assessment:**
 - o Compatibility verification
 - o Feature utilization analysis Application
 - o dependency mapping
- **MigrationExecution:**
 - o Step-by-step implementation
 - o Data loading strategies
 - o Schema migration techniques

Module 3: Data Guard Associations in Oracle Cloud

- **Cloud Console Configuration:**
 - o Setting up Data Guard
 - o Standby database creation
 - o Association management
- **Switchover and Failover Operations:**
 - o Planned vs. unplanned transitions.



- Testing procedures
- Validation techniques

Module 4: Cloud-specific Optimizations

- **ATP Performance Tuning:**
 - Service scaling Workload
 - management Resource allocation
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- **Monitoring and Management:**
 - Cloud console tools
 - Performance dashboards
 - Alert configuration

Hands-on Exercise

- Migrate a test database to ATP.
- Implement and test switchover procedures.



Module 10: Advanced Topics and Future Directions

OCI Advanced Training Add-On Modules

1. Database Management

- **Cluster Patching:** Automated patching via OCI Console/CLI, rolling patches for minimal downtime, always backup & test before patching.
 - **Bastion Connectivity:** Secure SSH access to DB servers without public IPs, session- based access, IAM integration for control.
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2. Storage Operations

- **Storage Uplift:** Online resizing of block volumes/DB storage, scale as workloads grow, monitor IOPS before scaling.
 - **Object Storage:** Backup & migration storage, Standard vs. Archive tiers, enable encryption & lifecycle policies.
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3. Compute Scaling

- **CPU Allocation/Resizing:** Scale up/down OCPUs based on workload, cost optimization, seasonal spikes.
 - **CPU Removal:** Reduce unused CPUs to save cost, use Autonomous DB auto-scaling.
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4. Monitoring & Performance

- Track CPU, memory, I/O, DB sessions via OCI Console.
- Use AWR/ASH/ADDM reports for tuning.
- Set proactive alarms & automate log analytics.

5. Explore Oracle Database 23ai Capabilities.

- Next-gen **Converged Database** with AI/ML features.
 - Enhanced **automation, performance, and security.**
 - New features for **multimodel, analytics, and DevOps integration**
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6. Future Trends in Database Migration

- **Cloud-native services:** Serverless, auto-scaling, API-driven management
- **Hybrid & multi-cloud migrations** becoming standard.
- **AI-assisted migrations** with automated assessments & predictive tuning.

Learning Resources

- Oracle documentation and white papers ZDM
- and migration tool guides
- Sample scripts and configuration files Case
- studies and reference architectures

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