

Oracle Database 19c: Administration

Course Summary

Description

This course will help you to learn about Oracle Database which enables you to store, organize, and retrieve data for your applications. The application is the front end and provides a user-friendly interface where users can update data in the database and retrieve data to create reports.

Objectives

At the end of this course, students will be able to:

- Describe Oracle Database architecture
- Explain Oracle Database Cloud Service (DBCS) architecture and features
- Create and manage DBCS database deployments
- Configure the database to support your applications
- Manage database security and implement auditing
- Implement basic backup and recovery procedures
- Move data between databases and files
- Employ basic monitoring procedures and manage performance

Topics

- Introduction
- Oracle Database Architecture
- Introduction to Oracle Database Cloud Service
- Creating DBCS Database Deployments
- Accessing an Oracle Database
- Managing DBCS Database Deployments
- Managing Database Instances
- Oracle Net Services
- Administering User Security
- Creating PDBs
- Creating Master Encryption Keys for PDBs
- Creating and Managing Tablespaces
- Managing Storage Space
- Managing Undo Data
- Moving Data
- Backup and Recovery Concepts
- Backup and Recovery Configuration
- Creating Database Backups
- Performing Database Recovery
- Monitoring and Tuning Database Performance
- Tuning SQL

Audience

This course is intended for anyone responsible for installing Oracle Database 19c. The purpose of Oracle Database is to store, organize, and retrieve data for your applications.

Prerequisites

Students should have familiar with a local installation of Oracle Database, and an appropriate file system format is being used.

Duration

Five days

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Course Outline

I. Introduction

- A. Objectives
- B. Course Objectives
- C. Introducing Oracle Database
- D. Oracle Database 19c
- E. Oracle Database 19c On-Premises Editions
- F. Oracle Database Standard Edition 2
- G. Oracle Database Options
- H. Oracle Management Packs
- I. What Is Oracle Cloud?
- J. Oracle Database Cloud Service: Overview
- K. Oracle Database Cloud Service Editions
- L. Oracle SQL and PL/SQL
- M. HR Schema
- N. Suggested Course Schedule
- O. Summary

II. Oracle Database Architecture

- A. Objectives
- B. Oracle Database Server Architecture: Overview
- C. Oracle Database Instance Configurations
- D. Connecting to the Database Instance
- E. Oracle Database Memory Structures
- F. Shared Pool
- G. Database Buffer Cache
- H. Redo Log Buffer
- I. Large Pool
- J. Java Pool
- K. Streams Pool
- L. Program Global Area (PGA)
- M. In-Memory Column Store: Introduction
- N. In-Memory Column Store: Overview
- O. Full Database In-Memory Caching
- P. Process Structures
- Q. Database Writer Process (DBWn)
- R. Log Writer Process (LGWR)
- S. Checkpoint Process (CKPT)
- T. System Monitor Process (SMON)
- U. Process Monitor Process (PMON)
- V. Recoverer Process (RECO)
- W. Listener Registration Process (LREG)
- X. Archiver Processes (ARCn)
- Y. Database Storage Architecture

- Z. Logical and Physical Database Structures
- AA. Segments, Extents, and Blocks
- BB. Tablespaces and Data Files
- CC. Default Tablespaces
- DD. SYSTEM and SYSAUX Tablespaces
- EE. Implementing Oracle Managed Files (OMF)
- FF. Oracle Container Database: Introduction
- GG. Multitenant Database
- HH. Multitenant Architecture
- II. Default Tablespaces in the Multitenant Architecture
- JJ. Application Containers
- KK. Automatic Storage Management
- LL. ASM Storage Components
- MM. Interacting with an Oracle Database: Memory, Processes, and Storage
- NN. Summary

III. Introduction to Oracle Database Cloud Service

- A. Objectives
- B. Oracle Cloud: Overview
- C. Database Cloud Service Offerings
- D. Infrastructure for Oracle Database Cloud Service
- E. Database Cloud Service Architecture (OCI Classic)
- F. Features and Tooling
- G. Automated Database Provisioning
- H. Additional Database Configuration Options
- I. Summary

IV. Creating DBCS Database Deployments

- A. Objectives
- B. Automated Database Provisioning
- C. Creating a Database Deployment
- D. How SSH Key Pairs Are Used
- E. Creating an SSH Key Pair
- F. Storage Used for Database Files
- G. Summary

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Course Outline (cont'd)

V. Accessing an Oracle Database

- A. Objectives
- B. Connecting to an Oracle Database Instance
- C. Oracle Database Tools
- D. Database Tool Choices
- E. SQL*Plus
- F. Oracle SQL Developer
- G. Oracle SQL Developer: DBA Actions
- H. SQL Developer Command Line (SQLcl)
- I. Database Configuration Assistant (DBCA)
- J. Oracle Enterprise Manager Database Express
- K. Using the Database Home Page
- L. Enterprise Manager Cloud Control 13c Features
- M. Single Pane of Glass for Enterprise Management
- N. Oracle Database Cloud Service Tools
- O. Cloud Tooling
- P. Accessing Tools and Features from the DBCS Console
- Q. Using Enterprise Manager Cloud Control
- R. Summary

VI. Managing DBCS Database Deployments

- A. Objectives
- B. Managing the Compute Node
- C. Managing Network Access to DBCS (OCI Classic)
- D. Enabling Access to a Compute Node Port (OCI Classic)
- E. Scaling a Database Deployment
- F. Patching DBCS
- G. Using the DBCS Console to Manage Patches
- H. Using the dbaas cli Utility to Manage Patches
- I. Summary

VII. Managing Database Instances

- A. Objectives
- B. Working with Initialization Parameters
- C. Initialization Parameters
- D. Modifying Initialization Parameters
- E. Viewing Initialization Parameters
- F. Starting the Oracle Database Instance

- G. Shutting Down an Oracle Database Instance
- H. Comparing SHUTDOWN Modes
- I. Opening and Closing PDBs
- J. Working with the Automatic Diagnostic Repository
- K. Automatic Diagnostic Repository
- L. Viewing the Alert Log
- M. Using Trace Files
- N. Administering the DDL Log File
- O. Querying Dynamic Performance Views
- P. Considerations for Dynamic Performance Views
- Q. Data Dictionary: Overview
- R. Querying the Oracle Data Dictionary
- S. Summary

VIII. Oracle Net Services

- A. Objectives
- B. Oracle Net Services: Overview
- C. Oracle Net Listener: Overview
- D. The Default Listener
- E. Establishing Oracle Network Connections
- F. Connecting to an Oracle Database
- G. Name Resolution
- H. Establishing a Connection
- I. Configuring Dynamic Service Registration
- J. Configuring Static Service Registration
- K. Naming Methods
- L. Easy Connect
- M. Local Naming
- N. Directory Naming
- O. Tools for Configuring and Managing Oracle Net Services
- P. Defining Oracle Net Services Components
- Q. Advanced Connection Options
- R. Testing Oracle Net Connectivity with tnsping
- S. Configuring Communication Between Database Instances
- T. Comparing Dedicated and Shared Server Configurations
- U. Summary

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Course Outline (cont'd)

IX. Administering User Security

- A. Objectives
- B. Oracle Cloud User Roles and Privileges
- C. Administering Oracle Cloud Users, Roles, and Privileges
- D. Managing Oracle Cloud Compute Node Users
- E. Database User Accounts
- F. Oracle-Supplied Administrator Accounts
- G. Creating Oracle Database Users in a Multitenant Environment
- H. Schema-Only Account
- I. Authenticating Users
- J. Password Authentication
- K. Password File Authentication
- L. OS Authentication
- M. OS Authentication for Privileged Users
- N. Privileges
- O. System Privileges
- P. System Privileges for Administrators
- Q. Object Privileges
- R. Granting Privileges in a Multitenant Environment
- S. Granting and Revoking System Privileges
- T. Granting and Revoking Object Privileges
- U. Using Roles to Manage Privileges
- V. Assigning Privileges to Roles and Assigning Roles to Users
- W. Oracle-Supplied Roles
- X. Creating and Granting Roles
- Y. Assigning Roles
- Z. Making Roles More Secure
- AA. Revoking Roles and Privileges
- BB. Profiles and Users
- CC. Creating Profiles in a Multitenant Architecture
- DD. Profile Parameters: Resources
- EE. Profile Parameters: Locking and Passwords
- FF. Oracle-Supplied Password Verification Functions
- GG. Assigning Profiles
- HH. Assigning Quotas
- II. Applying the Principle of Least Privilege
- JJ. Privilege Analysis
- KK. Privilege Analysis Flow
- LL. Summary

X. Creating PDBs

- A. Objectives
- B. Methods and Tools to Create PDBs
- C. Creating PDBs from Seed
- D. Creating a New PDB from PDB\$SEED
- E. Examples: Creating a PDB from Seed
- F. Cloning PDBs
- G. Cloning Regular PDBs
- H. Unplugging and Plugging in PDBs
- I. Plugging an Unplugged Regular PDB into a CDB
- J. Plugging Using an Archive File
- K. Dropping PDBs
- L. Summary

XI. Creating Master Encryption Keys for PDBs

- A. Objectives
- B. Encryption in Database Cloud Service
- C. Transparent Data Encryption (TDE): Overview
- D. Components of TDE
- E. Using TDE
- F. Defining the Keystore Location
- G. CDB and PDB Master Encryption Keys
- H. Do You Need to Create and Activate a Master Encryption Key?
- I. Creating and Activating a Master Encryption Key
- J. Summary

XII. Creating and Managing Tablespaces

- A. Objectives
- B. How Table Data Is Stored
- C. Database Block Content
- D. Creating Tablespaces
- E. Creating Permanent Tablespaces in a CDB
- F. Altering and Dropping Tablespaces
- G. Viewing Tablespace Information
- H. Review: Implementing Oracle Managed Files (OMF)
- I. Moving or Renaming Online Data Files
- J. Examples: Moving and Renaming Online Data Files
- K. Tablespace Encryption by Default in DBCS
- L. Controlling Tablespace Encryption by Default

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Course Outline (cont'd)

- M. Managing the Software Keystore and Master Encryption Key
- N. Creating an Encrypted Tablespace by Using a Non Default Algorithm
- O. Summary

XIII. Managing Storage Space

- A. Objectives
- B. Space Management Features
- C. Block Space Management
- D. Row Chaining and Migration
- E. Free Space Management Within Segments
- F. Types of Segments
- G. Allocating Extents
- H. Understanding Deferred Segment Creation
- I. Controlling Deferred Segment Creation
- J. Restrictions and Exceptions
- K. Space-Saving Features
- L. Private Temporary Tables
- M. Table Compression: Overview
- N. Compression for Direct-Path Insert Operations
- O. Advanced Row Compression for DML Operations
- P. Specifying Table Compression
- Q. Using Compression Advisor
- R. Resolving Space Usage Issues
- S. Monitoring Tablespace Space Usage
- T. Reclaiming Space by Shrinking Segments
- U. Shrinking Segments
- V. Results of a Shrink Operation
- W. Managing Resumable Space Allocation
- X. Using Resumable Space Allocation
- Y. Resuming Suspended Statements
- Z. What Operations Are Resumable?
- AA. Summary

XIV. Managing Undo Data

- A. Objectives
- B. Undo Data: Overview
- C. Transactions and Undo Data
- D. Storing Undo Information
- E. Comparing Undo Data and Redo Data
- F. Managing Undo
- G. Comparing SHARED Undo Mode and LOCAL Undo Mode

- H. Configuring Undo Retention
- I. Categories of Undo
- J. Guaranteeing Undo Retention
- K. Changing an Undo Tablespace to a Fixed Size
- L. Temporary Undo: Overview
- M. Temporary Undo Benefits
- N. Enabling Temporary Undo
- O. Monitoring Temporary Undo
- P. Viewing Undo Information
- Q. Viewing Undo Activity
- R. Summary

XV. Moving Data

- A. Objectives
- B. Moving Data: General Architecture
- C. Oracle Data Pump: Overview
- D. Oracle Data Pump: Benefits
- E. Data Pump Export and Import Clients
- F. Data Pump Interfaces and Modes
- G. Data Pump Import Transformations
- H. SQL Loader: Overview
- I. Comparing Loading Methods
- J. Data Save Feature
- K. Express Mode
- L. External Tables
- M. External Table Benefits
- N. Migrating to Oracle Database Cloud Service: Considerations
- O. Migrating to Oracle Database Cloud Service: Information Gathering
- P. Applicable Migration Methods
- Q. Summary

XVI. Backup and Recovery Concepts

- A. Objectives
- B. DBA Responsibilities
- C. Categories of Failure
- D. Statement Failure
- E. User Process Failure
- F. Network Failure
- G. User Error
- H. Instance Failure
- I. Media Failure
- J. Understanding Instance Recovery
- K. The Checkpoint (CKPT) Process
- L. Redo Log Files and the Log Writer (LGWR) Process

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Course Outline (cont'd)

- M. Automatic Instance Recovery or Crash Recovery
- N. Phases of Instance Recovery
- O. Tuning Instance Recovery
- P. Using the MTTR Advisor
- Q. Comparing Complete and Incomplete Recovery
- R. The Complete Recovery Process
- S. The Point-in-Time Recovery Process
- T. Oracle Data Protection Solutions
- U. Flashback Technology
- V. Summary

XVII. Backup and Recovery Configuration

- A. Objectives
- B. Configuring for Recoverability
- C. Configuring the Fast Recovery Area
- D. Monitoring the Fast Recovery Area
- E. Multiplexing Control Files
- F. Redo Log Files
- G. Multiplexing the Redo Log
- H. Creating Archived Redo Log Files
- I. Archiver (ARCn) Process
- J. Archived Redo Log Files: Naming and Destinations
- K. Configuring ARCHIVELOG Mode
- L. Summary

XVIII. Creating Database Backups

- A. Objectives
- B. Understanding Types of Backups
- C. Backup Terminology
- D. Understanding Types of Backups
- E. RMAN Backup Types
- F. Using Recovery Manager (RMAN)
- G. Backing Up the Control File to a Trace File
- H. Using RMAN Commands to Create Backups
- I. Backing Up Databases on DBCS
- J. Backup Destination Choices
- K. Backup Configuration
- L. Creating an On-Demand Backup
- M. Customizing the Backup Configuration
- N. Summary

XIX. Performing Database Recovery

- A. Objectives

- B. Opening a Database
- C. Keeping a Database Open
- D. Data Recovery Advisor
- E. Loss of a Control File
- F. Loss of a Redo Log File
- G. Loss of a Data File in NOARCHIVELOG Mode
- H. Loss of a Noncritical Data File in ARCHIVELOG Mode
- I. Loss of a System-Critical Data File in ARCHIVELOG Mode
- J. DBCS: Performing Recovery by Using the Console
- K. DBCS: Performing Recovery by Using the dbascli Utility
- L. Summary

XX. Monitoring and Tuning Database Performance

- A. Objectives
- B. Performance Management Activities
- C. Performance Planning Considerations
- D. Database Maintenance
- E. Automatic Workload Repository (AWR)
- F. Automatic Database Diagnostic Monitor (ADDM)
- G. Advisory Framework
- H. Automated Maintenance Tasks
- I. Server-Generated Alerts
- J. Setting Metric Thresholds
- K. Reacting to Alerts
- L. Alert Types and Clearing Alerts
- M. Database Server Statistics and Metrics
- N. Performance Monitoring
- O. Viewing Statistics Information
- P. Monitoring Wait Events
- Q. Monitoring Sessions
- R. Monitoring Services
- S. Performance Tuning Methodology
- T. Managing Memory Components
- U. Automatic Memory Management
- V. Automatic Shared Memory Management
- W. Managing the SGA for PDBs
- X. Managing the Program Global Area (PGA)
- Y. Managing the PGA for PDBs
- Z. Summary

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Course Outline (cont'd)

XXI. Tuning SQL

- A. Objectives
- B. SQL Tuning Process
- C. Oracle Optimizer
- D. Optimizer Statistics
- E. Optimizer Statistics Collection
- F. Setting Optimizer Statistics Preferences
- G. Optimizer Statistics Advisor
- H. Optimizer Statistics Advisor Report
- I. Executing Optimizer Statistics Advisor Tasks
- J. SQL Plan Directives
- K. Adaptive Execution Plans
- L. SQL Tuning Advisor: Overview
- M. SQL Access Advisor: Overview
- N. SQL Performance Analyzer: Overview
- O. Summary