Oracle Database 19c: Multitenant Architecture

Oracle Database

DURATION	MODULES	COURSE CODE
4 Days	**13 Lectures**	**—**

Course Overview

In addition, you learn how to create common and local users and administer database security to meet your business requirements by using encryption, Database Vault and auditing and you will learn how to create a database deployment in the Cloud.

What You Will Learn

CDB Basics

- Oracle Database 19c Multitenant Architecture
- Objectives
- Challenges
- Non-CDB Architecture
- Multitenant Architecture: Benefits
- Other Benefits of Multitenant Architecture
- Oracle Multitenant Container Database
- Configurations
- Database Objects in a Non-CDB
- User-Added Objects to a Non-CDB
- SYSTEM Objects in the USER Container
- Provisioning a Pluggable Database
- Multitenant Container Database Architecture
- Containers
- Tools
- Data Dictionary and Dynamic Views
- Terminology
- Impacts
- Summary
- Practices Environment – 1
- Practices Environment – 2

- Practice 1: Overview
- Multitenant Architecture Poster

CDB and Regular PDBs

- Objectives
- Goals
- Creating a CDB
- Creating a CDB: Using SQL*Plus
- Clause: SEED FILE_NAME_CONVERT
- Clause: ENABLE PLUGGABLE DATABASE
- After CDB Creation: What’s New in CDB
- Data Dictionary Views: DBA_xxx
- Data Dictionary Views: CDB_xxx
- Data Dictionary Views: Examples
- Data Dictionary Views: V$xxx Views
- After CDB Creation: To do List
- Automatic Diagnostic Repository
- Automatic Diagnostic Repository: alert.log File
- Provisioning New Pluggable Databases
- Tools
- Create New PDB from PDB$SEED
- Steps: With FILE_NAME_CONVERT
- Steps: Without FILE_NAME_CONVERT
- Summary
- Practice 2: Overview

Application PDBs and Application Installation

- Objectives
- Regular PDBs
- PDBs and Applications
- Application Containers
- Application Containers: Other Features
- Types of Containers
- Creating Application PDBs
- Application Name and Version
- Installing Applications
- Patching and Upgrading Applications
- Application Common Objects
- Use Cases for Application Containers
- Use Case: Pure PDB-Based Versus Hybrid Model
- Container Map
- Container Map: Example
- Query Routed Appropriately
- Dynamic Container Map
- Container Map and Containers Default

- Query Across CDBs Using Application Root Replica
- Durable Location Transparency
- Data Dictionary Views
- Terminology in Application Container Context
- Commonality in Application Containers
- Impacts
- Summary
- Practice 3: Overview

PDB Creation

- Objectives
- Cloning Regular PDBs
- Cloning Application Containers
- Plugging a Non-CDB into CDB
- Plugging a Non-CDB into CDB as PDB Using DBMS_PDB
- Replicating Non-CDB into CDB
- Cloning a Non-CDB or Remote PDB
- Plugging an Unplugged Regular PDB into CDB
- Flow
- Plugging Using Archive File
- Unplugging and Plugging Application PDBs
- Converting Regular PDBs to Application PDBs
- Unplugging and Plugging a PDB with Encrypted Data
- Local UNDO Mode Versus Shared UNDO Mode
- Cloning Remote PDBs in Hot Mode
- Near-Zero Down Time PDB Relocation
- Proxy PDB: Query Across CDBs Proxying Root Replica
- Creating a Proxy PDB
- Using DBCA to Clone a Remote PDB
- Using DBCA to Relocate a Remote PDB
- Using DBCA to Duplicate a CDB
- Dropping PDBs
- Summary
- Practice 4: Overview

CDB and PDB Management

- Objectives
- Connection
- Switching Connection
- Creating Services
- Renaming Services
- Starting Up a CDB Instance
- Mounting a CDB
- Opening a CDB
- Opening a PDB

- Automatic PDB Opening
- Closing a PDB
- Shutting Down a CDB Instance
- Changing PDB Mode
- Modifying PDB Settings
- Instance Parameter Change Impact
- Instance Parameter Change Impact: Example
- Using ALTER SYSTEM Statement on PDB
- Configuring Host Name and Port Number per PDB
- Summary
- Practice 5: Overview

Storage

- Objectives
- Objects in Tablespaces
- Tablespaces Created During PDB Creation
- Defining Default Permanent Tablespaces
- Temporary Tablespaces
- UNDO Tablespaces
- Summary
- Practice 6: Overview

Security

- Objectives
- Creating Common Users in the CDB and PDBs
- Creating Common Roles in the CDB and PDBs
- Granting Privileges Commonly in the CDB and PDBs
- Creating Common Profiles in the CDB and PDBs
- Common Objects in Application Containers
- Operations on Data-Linked Objects
- Enabling Common Users to Access Data in PDBs
- Finding Information About CONTAINER_DATA Attributes
- Restricting Operations with PDB Lockdown Profiles
- Restricting Operations in a PDB Lockdown Profile
- PDB Lockdown Profiles Inheritance
- Static and Dynamic PDB Lockdown Profiles
- Auditing Actions in the CDB and PDBs
- Managing Other Types of Security Policies in Application Containers
- Securing Data with Oracle Database Vault
- Oracle Database Vault-Enabled Strict Mode
- Managing Keystore in the CDB and PDBs
- Creating and Opening a Keystore
- Setting TDE Master Encryption Keys
- Managing Keystore in the CDB and PDBs
- Keystore Management Changes for PDBs

- Defining the Keystore Type
- Isolating a PDB Keystore
- Converting a PDB to Run in Isolated Mode
- Converting a PDB to Run in United Mode
- Migrating a PDB Between Keystore Types
- Unplugging and Plugging a PDB with Encrypted Data
- Per-PDB Wallet for PDB Certificates
- Summary
- Practice 7: Overview

Backup and Duplicate

- Objectives
- Goals
- Syntax and Clauses in RMAN
- CDB Backup: Whole CDB Backup
- CDB Backup: Partial CDB Backup
- PDB Backup: Partial PDB Backup
- Using RMAN Backup to Plug an Unplugged PDB
- Duplicating Pluggable Databases
- Cloning Active PDB into an Existing CDB
- Example: 1
- Example: 2
- Duplicating On-Premises CDB as Cloud Encrypted CDB
- Duplicating On-Premises Encrypted CDB as Cloud Encrypted CDB
- Migrating Cloud Encrypted CDB as On-Premises CDB
- Checking for Block Corruption
- Summary
- Practice 8: Overview

Recovery and Flashback

- Objectives
- Goals
- Instance Failure and Instance Recovery
- NOARCHIVELOG Mode
- PDB Tempfile Recovery
- PDB SYSTEM or UNDO Tablespace Recovery
- PDB Non-SYSTEM Tablespace Recovery
- PITR
- Migrating a Non-CDB to a CDB
- Migrating a Non-CDB and Transporting Non-CDB Backups to a CDB
- Relocating/Plugging a PDB into Another CDB
- Plugging a PDB and Transporting PDB Backups to a CDB – 1
- Plugging a PDB and Transporting PDB Backups to a CDB – 2
- Using PrePlug-in Backups
- To Be Aware Of

- Example
- CDB and PDB Flashback
- PDB Flashback and Clean Restore Point
- Creating a PDB Snapshot from a PDB
- PDB Snapshot Carousel
- Creating PDB Snapshot
- Creating PDBs Using PDB Snapshots
- Dropping PDB Snapshots
- Flashbacking PDBs Using PDB Snapshots
- Switching Over a Refreshable Cloned PDB
- Unplanned Switchover
- Summary
- Practice 9: Overview

Performance

- Objectives
- Tuning a CDB
- Sizing the CDB
- Testing the Estimates
- Managing SGA for PDBs
- Managing PGA for PDBs
- Monitoring PDB Memory Usage
- AWR and ADDM Behavior
- PDB-Level Snapshot Views
- Configuring Automatic ADDM Analysis at the PDB Level
- AWR Report
- ADDM Tasks: At the CDB or PDB Levels
- Enabling ADDM in a Pluggable Database
- ADDM Data Visibility
- Basic Rules: Statistics for Common Objects
- Controlling the Degree of Parallelism of Queries
- Heat Map and ADO Support
- Managing Heat Map and ADO Policies in PDB
- CDB Fleet
- CDB Lead and CDB Members
- Use Cases
- DB Replay: The Big Picture
- Capturing and Replaying in a CDB and PDBs
- Reporting
- Consolidated Database Replay Use Cases
- Use Cases: Source Workloads
- The Big Picture
- Step 1
- Step 2
- Step 3

- Step 4
- Summary
- Practice 10: Overview

Resources Allocation

- Objectives
- Allocating Resources in the CDB
- Resource Manager and Pluggable Databases
- Managing Resources Between PDBs
- CDB Resource Plan Basics: Limits
- PDB IO Rate Limit
- CDB Resource Plan: Full Example
- Maintaining a CDB Resource Plan
- Managing Resources Within a PDB
- Putting It Together
- Considerations
- PDB-Level Parallel Statement Queuing
- PDB-Level Parallel Statement Queuing: CPU_COUNT
- Session PGA Limit
- Performance Profiles
- Summary
- Practice 11: Overview

Data Movement

- Objectives
- Using Oracle Data Pump with PDBs
- Exporting from Non-CDB and Importing into PDB
- Exporting and Importing Between PDBs
- Exporting from PDB and Importing into Non-CDB
- Full Transportable Export/Import: Overview
- Full Transportable Export/Import: Usage
- Full Transportable Export/Import: Example
- Transporting a Database Over the Network: Example
- Additional features of Oracle Data Pump
- Using SQL*Loader with PDBs
- Summary
- Practice 12: Overview

Upgrade Methods

- Objectives
- Upgrading CDB and PDBs to 19c: Methods
- Upgrading a CDB Including PDBs from 18c to 19c
- Upgrading CDB Including PDBs from 18c to 19c
- Upgrading a Single Regular PDB from 18c to 19c
- Converting and Upgrading Regular PDBs to Application PDBs