

Oracle 19c Database Multitenant Architecture - TTOR20719

Explore Creating, Managing and Securing Various Types of Pluggable Databases (PDBs) in Multitenant Container Databases (CDBs)

Duration: 3 Days

Skill Level: Introductory

Available Format: Instructor-Led Online; Instructor-Led, Onsite In Person ; Blended; On Public Schedule

Oracle 19c Database Multitenant Architecture is a hands-on, three-day course designed for Database Administrators seeking to master Oracle's cutting-edge Multitenant Architecture. Throughout the course you'll deep dive into the essentials of Container Databases (CDBs) and Pluggable Databases (PDBs), covering topics such as CDB and PDB management, security, backup, recovery, and performance tuning. By learning these core concepts, you'll will enhance their ability to streamline database operations, boost data security, and optimize performance, directly benefiting your daily tasks and your organization's efficiency.

What You'll Learn

Overview

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The interactive course combines 50% hands-on lab work with engaging discussions and group activities. Guided by an industry expert, you'll engage in real-world scenarios through labs that simulate real-world scenarios, allowing you to practice tasks like configuring Multitenant environments, managing security within CDBs and PDBs, and executing backup and recovery procedures. These labs are designed to reflect the challenges you'll face in your role, preparing you for a range of projects, from routine database management to complex migrations and upgrades. Upon completion, you'll emerge with a comprehensive grasp of Oracle's Multitenant Architecture, equipped with advanced skills in CDB and PDB management. You'll have the skills needed to boost database performance, ramp up security, and smoothly navigate complex data challenges.

NOTE: This training is NOT Official Oracle University training. This is independent, adjustable content that aligns with current topics, skills and tools that participants need to excel in these areas.

Objectives

Working in a hands-on learning environment led by our expert facilitator, you'll explore:

- **CDB Management Skills:** Gain expertise in managing Container Databases (CDBs), including setup, configuration, and maintenance.
- **PDB Operations Proficiency:** Develop the ability to efficiently handle Pluggable Database (PDB) operations like creation, cloning, and management.
- **Database Security Measures:** Learn to implement and manage security protocols in both CDBs and PDBs, ensuring data integrity and compliance.
- **Backup and Recovery Techniques:** Master the techniques for performing backups and recoveries of CDBs and PDBs, ensuring data safety and continuity.
- **Performance Optimization:** Acquire skills to optimize the performance of databases within the Oracle Multitenant environment, including tuning and resource allocation.
- **Data Movement and Storage Management:** Understand and apply methods for effective data movement and storage management in a Multitenant architecture.

Audience

This course is introductory-level, but technical in nature. In order to participate in the hands-on labs you should have a basic understanding of database principles, basic scripting skills (in relation to Oracle) and basic analytics skills.

Pre-Requisites

Take Before: To be successful in the course, you should have skills equivalent to the topics in the course below or should have attended it as a pre-requisite:

- TTOR20519 Oracle 19c Database Administration I (Oracle 19c DBA I)

Agenda

Please note that this list of topics is based on our standard course offering, evolved from typical industry uses and trends. We'll work with you to tune this course and level of coverage to target the skills you need most. Topics, agenda and labs are subject to change, and may adjust during live delivery based on audience interests, skill-level and participation.

CDB Basics

- 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
- Impacts

CDB and Regular PDBs

- Creating a CDB
- Creating a CDB: Using SQL*Plus
- New Clause: SEED FILE_NAME_CONVERT
- New 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

Application PDBs and Application Installation

- 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

PDB Creation

- Cloning Regular PDBs
- Cloning Application Containers
- Plugging a Non-CDB into CDB
- Plugging a Non-CDB into CDB 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 Downtime PDB Relocation
- Proxy PDB: Query Across CDBs Proxying Root Replica
- Creating a Proxy PDB
- Dropping PDBs

CDB and PDB Management

- 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

Storage

- Objects in Tablespaces
- Tablespaces Created During PDB Creation
- Defining Default Permanent Tablespaces
- Temporary Tablespaces
- UNDO Tablespaces

Security

- 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

Backup and Duplicate 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
- Duplicating On-Premise CDB as Cloud Encrypted CDB
- Duplicating On-Premise Encrypted CDB as Cloud Encrypted CDB
- Migrating Cloud Encrypted CDB as On-Premise CDB
- Checking for Block Corruption

Recovery and Flashback

- 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 PrePlugin Backups
- CDB and PDB Flashback
- PDB Flashback and Clean Restore Point
- 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

Performance

- Tuning a CDB
- Sizing the CDB
- Testing the Estimates
- Managing SGA and PGA for PDBs
- Monitoring PDB Memory Usage
- AWR and ADDM Behavior
- PDB-Level Snapshot Views
- AWR Report
- ADDM Tasks: At the CDB Level Only
- 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
- Consolidated Database Replay Use Cases
- Use Cases: Source Workloads
- The Big Picture

Resources Allocation

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

Data Movement

- 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
- Using SQL*Loader with PDBs

Upgrade Methods

- Upgrading CDB and PDBs
- Converting and Upgrading Regular PDBs to Application PDBs
- Cross-Platform Transportable PDB

Time Permitting / Extras

- Using Xstreams with a CDB and PDB
- Creating a Standby of a CDB
- Instantiating a PDB on a Standby
- Scheduling Operations in a PDB
- Jobs Coordinator and Resources
- Mining Statements of a PDB Using LogMiner

Related Courses

TTOR20619	Oracle 19c Database Administration II / Oracle 19c DBA II
TTOR21519	Oracle 19c Database Tuning
TTOR21619	Oracle 19c Database Backup and Recovery
TTOR20719	Oracle 19c Database Multitenant Architecture
TTOR12019	Oracle 19c PL/SQL Fundamentals
TTSQL002	Introduction to SQL Programming Basics
TTSQL003	Introduction to Writing SQL Queries
TTSQL005	Advanced SQL Programming

All applicable course software, digital courseware files or course notes, labs, data sets and solutions, live coaching support channels, CodeCoach.AI anytime tutor access, and rich extended learning and post training resources are provided for you in our “easy access, single source, no install required” online **Learning Experience Platform (LXP)**, remote lab and content environment. Access periods vary by course. We’ll collaborate with you to ensure your team is set up and ready to go well in advance of the class. Please inquire about set up details and options for your specific course of interest.

For More Information

Please [contact us](#) or call 844-475-4559 toll free for more information about our training services (instructor-led, self-paced or blended), coaching and mentoring services, public course enrollment or questions, partner programs, courseware licensing options and more.