Oracle Database 19c: RAC Administration Workshop Live Class

Oracle Database

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

Course Overview

Learn To: Install and configure RAC Manage RAC Database Upgrade and patch RAC Database Manage backup and recovery for RAC Monitor and tune RAC Database Manage high availability of services Implement High Availability for connections and applications Configure RAC One Node Database Implement In-Memory Column Store in RAC Configure Multitenant Architecture in RAC Manage Quality of Service in RAC

What You Will Learn

Grid Infrastructure: Overview

- Objectives
- Cluster
- Clusterware
- Oracle Clusterware
- Clusterware Architecture and Cluster Services
- Features of Oracle Clusterware
- Oracle Clusterware Networking
- Oracle Clusterware Initialization
- GPnP Architecture: Overview
- How GPnP Works: Cluster Node Startup
- Grid Naming Service (GNS)
- Single-Client Access Name
- Client Database Connections
- Oracle ASM
- Oracle ACFS
- Oracle Flex ASM
- ASM Features and Benefits
- Quiz
- Summary
- Practice 1: Overview

RAC Databases Overview and Architecture

- Objectives
- Oracle RAC: Overview
- Typical Oracle RAC Architecture
- Oracle RAC One Node
- Oracle RAC One Node and Oracle Clusterware
- Cluster-Aware Storage Solutions
- Oracle RAC and Network Connectivity
- Benefits of Using RAC
- Clusters and Scalability
- Levels of Scalability
- Scaleup and Speedup
- Speedup/Scaleup and Workloads
- I/O Throughput Balanced: Example
- Necessity of Global Resources
- Additional Memory Requirement for RAC
- Parallel Execution with RAC
- Summary

Installing and Configuring Oracle RAC

- Objectives
- Installing the Oracle Database Software
- Creating the Cluster Database
- Database Type Selection
- Database Identification
- Storage Options
- Database Content
- Configuration Options
- Cluster Database Management Options
- Passwords for Database Schema Owners
- Create the Database
- Monitoring Progress
- Post-Installation Tasks
- Background Processes Specific to Oracle RAC
- Single Instance-to-RAC Conversion
- Considerations for Converting Single-Instance Databases to Oracle RAC
- Scenario 1: Using DBCA
- Step 1: Create an Image of the Single-Instance Database
- Example: Result of Step 1
- Step 2: Create an Oracle Cluster for RAC
- Example: Result of Step 2
- Step 3: Copy the Preconfigured Database Image
- Example: Database Structure File (*.dbc)
- Example: Result of Step 3

- Step 4: Create an Oracle RAC Database
- Scenario 2: Using rconfig
- Step 1: Check the Database Type
- Step 2: Modify the XML File for the rconfig Utility
- Example: ConvertToRAC_AdminManaged.xml
- Step 3: Perform Prerequisite Checks
- Step 4: Convert to an Oracle RAC Database
- Step 5: Verify the Conversion
- Example: Result of Using rconfig
- Quiz
- Summary
- Practice 3: Overview

Oracle RAC Administration

- Objectives
- Separation of Duty for Administering Oracle Real Application Clusters
- Enterprise Manager Cloud Control Cluster Database Home Page
- Cluster Database Home Page
- Cluster Database Instance Home Page
- Cluster Home Page
- Topology Viewer
- Enterprise Manager Alerts and RAC
- Enterprise Manager Metrics and RAC
- Enterprise Manager Blackouts and RAC
- Enterprise Manager Database Express
- Redo Log Files and RAC
- Automatic Undo Management and RAC
- Local Temporary Tablespaces
- Local Temporary Tablespace Organization
- Temporary Tablespace Hierarchy
- Local Temporary Tablespace Considerations
- Managing Local Temporary Tablespaces
- Local Temporary Tablespace Dictionary Views
- Starting and Stopping RAC Instances
- Starting and Stopping RAC Instances with srvctl
- Starting and Stopping RAC Instances with SQL*Plus
- Starting and Stopping Pluggable Databases in RAC
- Switch between Automatic and Manual Policies
- RAC Initialization Parameter Files
- SPFILE Parameter Values and RAC
- EM and SPFILE Parameter Values
- RAC Initialization Parameters
- Parameters That Require Identical Settings
- Parameters That Require Unique Settings
- Quiescing RAC Databases

- Terminating Sessions on a Specific Instance
- How SQL*Plus Commands Affect Instances
- Transparent Data Encryption and Keystores in RAC
- Quiz
- Summary
- Practice 4: Overview

Upgrading and Patching Oracle RAC

- Objectives
- Patch and Patch Set: Overview
- Types of Patches
- Obtaining Oracle RAC Patch Sets
- Obtaining Oracle RAC Patches
- Downloading Patches
- RAC Patching Methods
- Out-of-Place Upgrades with OUI
- Rolling Patches
- OPatch: Overview
- OPatch: General Usage
- Before Patching with OPatch
- Installing a Rolling Patch with OPatch
- OPatch Automation
- OPatch Automation: Examples
- OPatch Log and Trace Files
- Queryable Patch Inventory
- Alternative Methods of Patching
- Quiz
- Summary

Managing Backup and Recovery for RAC

- Objectives
- Instance Recovery and RAC
- Instance Recovery and Database Availability
- Instance Recovery and RAC
- Protecting Against Media Failure
- Media Recovery in Oracle RAC
- Parallel Recovery in RAC
- RAC and the Fast Recovery Area
- RAC Backup and Recovery Using EM
- Configuring RAC Recovery Settings with EM
- Archived Redo File Conventions in RAC
- Configuring RAC Backup Settings with EM
- Oracle Recovery Manager
- Configuring RMAN Snapshot Control File Location
- Configuring Control File and SPFILE Autobackup

- Cross-checking on Multiple RAC Clusters Nodes
- Channel Connections to Cluster Instances
- RMAN Channel Support for the Grid
- RMAN Default Autolocation
- Distribution of Backups
- Managing Archived Redo Logs Using RMAN
- Noncluster File System Local Archiving Scheme
- Configuring Non-Cluster, Local Archiving
- ASM and Cluster File System Archiving Scheme
- Configuring the CFS Archiving Scheme
- Restoring and Recovering
- Quiz
- Summary
- Practice 6: Overview

Global Resource Management Concepts

- Objectives
- Need for Global Concurrency Control
- Global Resource Directory (GRD)
- Global Resource Management
- Global Resource Remastering
- Global Resource Recovery
- Global Resource Management Related Background Processes
- Global Resource Access Coordination
- Global Enqueues
- Instance Locks
- Global Cache Management: Overview
- Global Cache Management Components
- Global Cache Buffer States
- Global Cache Management Scenarios for Single Block Reads
- Global Cache Scenarios: Overview
- Scenario 1: Read from Disk
- Scenario 2: Read-Write Cache Fusion
- Scenario 3: Write-Write Cache Fusion
- Scenario 4: Write-Read Cache Fusion
- Global Cache Management Scenarios for Multi-Block Reads
- Useful Global Resource Management Views
- Quiz
- Summary

RAC Database Monitoring and Tuning

- Objectives
- CPU and Wait Time Tuning Dimensions
- RAC-Specific Tuning
- Analyzing Cache Fusion Impact in RAC

- Typical Latencies for RAC Operations
- Wait Events for RAC
- Wait Event Views
- Global Cache Wait Events: Overview
- Global Enqueue Waits
- Session and System Statistics
- Most Common RAC Tuning Tips
- Index Block Contention: Considerations
- Oracle Sequences and Index Contention
- Undo Block Considerations
- High-Water Mark Considerations
- Concurrent Cross-Instance Calls: Considerations
- Monitoring RAC Database and Cluster Performance
- Cluster Database Performance Page
- Determining Cluster Host Load Average
- Determining Global Cache Block Access Latency
- Determining Average Active Sessions
- Determining Database Throughput
- Accessing the Cluster Cache Coherency Page
- Viewing the Database Locks Page
- AWR Snapshots in RAC
- AWR Reports and RAC: Overview
- Active Session History Reports for RAC
- Automatic Database Diagnostic Monitor for RAC
- What Does ADDM Diagnose for RAC?
- EM Support for ADDM for RAC
- EM Database Express Performance Hub
- Monitoring RAC With Cluster Health Advisor (CHA)
- Quiz
- Summary
- Practice 8: Overview

Managing High Availability of Services

- Objectives
- Oracle Services
- Service Usage in an Oracle RAC Database
- Parallel Operations and Services
- Service-Oriented Buffer Cache Access
- Service Characteristics
- Default Service Connections
- Restricted Service Registration
- Creating Service with Enterprise Manager
- Creating Services with SRVCTL
- Managing Services with Enterprise Manager
- Managing Services with EM

- Managing Services with srvctl
- Using Services with Client Applications
- Services and Connection Load Balancing
- Services and Transparent Application Failover
- Using Services with the Resource Manager
- Services and Resource Manager with EM
- Using Services with the Scheduler
- Services and the Scheduler with EM
- Using Distributed Transactions with RAC
- Distributed Transactions and Services
- Service Thresholds and Alerts
- Services and Thresholds Alerts: Example
- Service Aggregation and Tracing
- Top Services Performance Page
- Service Aggregation Configuration
- Service, Module, and Action Monitoring
- Service Performance Views
- Quiz
- Summary
- Practice 9: Overview

High Availability for Connections and Applications

- Objectives
- Types of Workload Distribution
- Client-Side Connect-Time Load Balancing
- Fast Application Notification (FAN): Overview
- Fast Application Notification: Benefits
- Implementing FAN Events
- FAN and Oracle Integrated Clients
- FAN-Supported Event Types
- FAN Event Reasons
- FAN Event Status
- FAN Event Format
- Load Balancing Advisory: FAN Event
- Server-Side Callouts Implementation
- Server-Side Callout Parse: Example
- Server-Side Callout Filter: Example
- Server-Side ONS
- Optionally Configuring the Client-Side ONS
- UCP JDBC Fast Connection Failover: Overview
- JDBC/ODP.NET FCF Benefits
- Load Balancing Advisory
- UCP JDBC/ODP.NET Runtime Connection Load Balancing: Overview
- Connection Load Balancing in RAC
- Monitoring LBA FAN Events

- Transparent Application Failover: Overview
- TAF Basic Configuration on Server-Side: Example
- TAF Basic Configuration on a Client-Side: Example
- TAF Preconnect Configuration: Example
- TAF Verification
- FAN Connection Pools and TAF Considerations
- Transaction Guard and Application Continuity
- What Is Transaction Guard?
- Benefits of Transaction Guard
- How Transaction Guard Works
- Using Transaction Guard
- Creating Services for Transaction Guard
- What Is Application Continuity?
- Benefits of Application Continuity
- How Does Application Continuity Work?
- RAC and Application Continuity
- Using Application Continuity
- Creating Services for Application Continuity
- Quiz
- Summary
- Practice 10 Overview: Using Application Continuity

Oracle RAC One Node

- Objectives
- Oracle RAC One Node
- Creating an Oracle RAC One Node Database
- Verifying an Existing RAC One Node Database
- Oracle RAC One Node Online Relocation
- Online Relocation Considerations
- Performing an Online Relocation
- Online Relocation Illustration
- Online Maintenance: Rolling Patches
- Adding an Oracle RAC One Node Database to an Existing Cluster
- Converting a RAC One Node Database to RAC
- Converting a Single Instance Database to RAC One Node
- Converting a RAC Database to RAC One Node
- Quiz
- Summary
- Practice 11: Overview

Oracle Database In-Memory in RAC

- Objectives
- In-Memory Column Store
- Advantages of In-Memory Column Store
- In-Memory Column Store Pools

- Implementing In-Memory Column Store
- In-Memory Column Store Population
- Prioritization of In-Memory Population
- In-Memory Column Store and Oracle RAC
- In-Memory FastStart
- In-Memory FastStart Architecture
- Enabling In-Memory FastStart
- FastStart Area in Oracle RAC
- How the Database Reads from the FastStart Area
- Summary
- Practice 12: Overview

Multitenant Architecture and RAC

- Objectives
- Non-CDB Architecture
- Multitenant Architecture: Benefits
- CDB in a Non-RAC Environment
- Containers
- Terminology
- Data Dictionary Views
- Connection to a Non-RAC CDB
- Switching Connection
- Oracle RAC and Multitenant Configuration
- Oracle RAC and Multitenant Architecture
- Creating a RAC CDB
- Hosting a RAC CDB
- Creating a RAC CDB Including PDBs
- After CDB Creation
- Connecting Using CDB/PDB Services
- Opening a PDB in a RAC CDB
- Closing a PDB in a RAC CDB
- Types of Services
- Managing Services
- Affinitizing PDB Services
- Adding a PDB to a RAC CDB
- Dropping a PDB from a RAC CDB
- Quiz
- Summary
- Practice 13: Overview