

Oracle Real Application Clusters is used to create a cluster of servers that a single database can be deployed across. This allows for high fault tolerance, failover and scalability. Applications utilizing a RAC database are coded the same as they are for a non-RAC environment, therefore, migration to a RAC system is seamless.

This hands-on course teaches students all aspects of Oracle 10g RAC administration. Students will begin with a solid foundation in Oracle Clusterware and RAC architecture. Students will then install and configure both Clusterware and the database software, as well as cover the administration of both pieces of software using command line utilities. Important topics such as failover, flashback, and backup and recovery are all covered in detail. Students will get hands-on experience with Automatic Storage Management. The course ends with troubleshooting and tuning a RAC system.

Course Objectives:

- Explain the architecture of a RAC system.
- Install and configure Oracle Clusterware and Oracle Database Software in a RAC Environment.
- Add, remove, backup, and recover voting disks and the OCR.
- Correctly set RAC initialization parameters.
- Start and stop individual RAC instances and an entire RAC database.
- Manage redo log files and undo tablespaces for a RAC database.
- Configure and Manage Services in a RAC Environment.
- Configure Transparent Application Failover for client load balancing, connect-time, and application failover.
- Configure a RAC database for archiving redo logs and flashback database mode.
- Backup and recover a RAC database and its components.
- Prepare, configure, add, and remove nodes to an existing cluster.
- Set up and manage an ASM instance.
- Migrate a RAC database to ASM.
- Locate and interpret the contents of critical RAC alert and RAC component log files.
- Monitor and diagnose performance issues with built-in utilities, views, reports, and the OEM.

Audience: Database administrators new to the RAC environment.

Prerequisites: *Oracle 10g Database Administration* and at least 6 months of administration experience recommended.

Number of Days: 5 days

<p>1. Course Introduction Course Objectives Overview Suggested References</p>	<p>Shared Storage Nodes and Interconnects Virtual IP Addresses Oracle Software</p>
<p>2. Cluster Architecture Cluster Architecture</p>	<p>Oracle Cluster Registry (OCR) The RAC Voting Disk</p>

3. **Oracle Clusterware**
 - What is Oracle Clusterware?
 - Oracle Clusterware Components
 - Oracle Clusterware Processes
 - Oracle Clusterware and Shared Storage
 - Oracle Clusterware Preinstallation Steps
 - Node Preparation
 - Configuring SSH User Equivalency
 - Installing Oracle Clusterware
 - cluvfy – The Cluster Verification Utility
 - Oracle Clusterware Postinstallation Steps
4. **Installing DB Software and Creating a RAC Database**
 - Installation Overview
 - Configuring the OS Environment
 - Verifying System Readiness with the CVU
 - Installing the Database Software
 - Troubleshooting Installation Setup
 - Recommended Postinstallation Tasks
 - Running the VIPCA
 - Creating a Cluster Database Using DBCA
 - Database Pre-Creation Tasks
 - Initialization Parameters
5. **RAC Database Architecture**
 - Oracle Single-Instance Architecture
 - Overview of RAC
 - RAC Architecture
 - RAC Instances and Parameter Files
 - RAC Database Components
 - RAC Instance Background Processes
 - Global Resource Directory
 - Overview of Cache Fusion
 - Cache Fusion Components – GES and GCS
 - Cache Fusion Components – Resource Master and GRD
 - Cache Fusion Background Processes
 - Application Connection to RAC
6. **Managing Oracle Clusterware**
 - About Oracle Clusterware
 - Backing Up and Recovering Voting Disks
7. **RAC Instance Management**
 - Adding and Removing Voting Disks
 - The OCR
 - Changing the OCR Configuration
 - Adding and Removing an OCR Location
 - Backing Up and Recovering the OCR
 - Restoring from Automatic OCR Backups
 - Moving or Replacing the OCR
 - Repairing the OCR Configuration
 - Troubleshooting the OCR
 - Overview of RAC Instance Management
 - Starting and Stopping a RAC Database
 - Starting and Stopping a RAC Instance
 - RAC Database Identical Parameters
 - RAC Database Unique Parameters
 - Changing Parameter Values
 - Administering Undo Tablespaces in RAC
 - Administering Redo Logs in RAC
8. **RAC Utilities**
 - The ocrcheck Utility
 - The ocrdump Utility
 - The crs_stat Utility
 - The crsctl Utility
 - The Server Control (SRVCTL) Utility
 - SRVCTL ADD
 - SRVCTL CONFIG
 - SRVCTL ENABLE and DISABLE
 - SRVCTL GETENV
 - SRVCTL MODIFY
 - SRVCTL RELOCATE
 - SRVCTL STATUS

SRVCTL REMOVE
 SRVCTL START
 SRVCTL STOP

9. Services

Overview of Services
 Types of Services
 Creating Services with DBCA
 Creating Services with SRVCTL
 Preferred and Available Instances for Services
 Using Services
 Managing Services
 Service Views
 Tracing with Services

10. Failover

Transparent Application Failover (TAF)
 Client-Side vs. Server-Side TAF
 Configuring TAF on the Client
 Configuring TAF on the Server
 Using OEM to Configure TAF
 Using SRVCTL to Configure TAF
 Using DBCA to Configure TAF
 The DMBS_SERVICE Package
 Connecting to the Database with TAF
 Monitoring TAF Connections

11. RAC Backup and Recovery

Overview of RAC Backup and Recovery
 Log Archiving in RAC
 Undo Tablespaces in RAC
 Using Flashback Features in RAC
 Deploying a Flash Recovery Area in RAC
 Performing RMAN Backups of a RAC Database
 Performing Non-RMAN Backups
 Preparing to Restore and Recover with RMAN
 Recover the RAC Database with RMAN
 Recovering Without RMAN

12. Cluster Management

Overview of Cluster Management Tasks
 Extending the Clusterware Home Directory
 Extending the ASM Home Directory
 Extending the Database Software Home Directory

Creating a Listener on the New Node

Creating the New Instance
 Verifying the New Instance
 Removing a Node

13. Automatic Storage Management

ASM Overview
 ASMLib
 Installing ASM
 Creating an ASM Instance
 ASM Initialization Parameters
 Accessing an ASM Instance
 ASM Startup and Shutdown
 Creating a Disk Group
 Changing a Disk Group
 Creating and Managing a Database
 Using Oracle-Managed Files
 Creating and Managing a Tablespace
 Creating and Managing Redo Logs
 Creating and Managing Control Files
 Creating and Managing Archive Logs

14. ASM in a RAC Environment

Overview of ASM and RAC
 Migrating a RAC Database to ASM
 Overview of Recovery Manager (RMAN) and ASM
 Creating ASM Instances for a RAC Database
 Migrating SPFILES
 Migrating Tablespaces
 ASM and RAC Specifics

15. RAC Troubleshooting

The Oracle Clusterware Alert Log
 Clusterware Component Log Files
 Using crsctl to Diagnose Cluster Issues
 Using diagcollection.pl

- Checking Interconnect Settings
- cluvfy – Verifying Clusterware
 - Component Integrity
- cluvfy – Verifying Cluster Registry
 - Integrity
- cluvfy – Verifying Cluster Integrity
- RAC Database Alerts
- The racdiag.sql Script
- The oradebug Utility

16. RAC Tuning

- RAC Tuning Methodology
- Using Performance Views in RAC
- Monitoring Cache Fusion
- Global Cache Latencies
- Monitoring Cache Transfers
- OEM – Cluster Database Performance
- OEM – RAC-Related Reports
- Using AWR in the RAC Environment
- Generating AWR Reports
- Analyzing AWR Reports
- Using ADDM in the RAC Environment
- Analyzing ADDM Reports
- RAC Tuning Tips

17. Appendix – Preparing a RAC Node

- Checking the Hardware Requirements
- Identifying Network Requirements
- Verifying the Installed Operating System
 - and Software Requirements
- Configuring Operating System Users
 - and Groups
- Generating RSA and DSA Keys
- Adding the Keys to an Authorized Key
 - File
- Configuring SSH User Equivalency
- Configuring the Operating System
 - Environment
- Configuring the Network
- Verifying the Network Configuration
- Preparing the Operating System and
 - Software
- Configuring Installation Directories and
 - Shared Storage
- Choosing Directories