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ORACLE RAC COURSE CONTENT

Introduction to RAC

- ✓ The Dynamic Business Environment
- ✓ The Explosive Growth of Business Data
- ✓ Online and Real-Time Access to Corporate Data
- ✓ Data Warehousing, Packaged Applications, E-Commerce Operations
- ✓ Dependence on Database Management Systems
- ✓ High Performance Systems
- ✓ Introduction to Cluster Technology
- ✓ Benefits of Real Application Clusters (RAC)
- ✓ What is a DB Cluster?
- ✓ Architectures of DB Clusters
- ✓ What is a Cluster Interconnect?
- ✓ Problems with Other Architectures
- ✓ The IBM Shared-Nothing Configuration
- ✓ Microsoft Federated Servers Database
- ✓ Seeing the High Availability Spectrum
- ✓ Real Application Clusters
- ✓ Processing Prior to Cache Fusion
- ✓ Oracle Real Application Clusters
- ✓ Attributes of an Oracle RAC Cluster
- ✓ Building an Oracle RAC Cluster
- ✓ RAC Performance and Scalability

High Performance and Highly Available Databases High Performance

- ✓ Growth of Powerful Processors
- ✓ Why Parallel Processing?
- ✓ Opportunities for Parallelism
- ✓ Scalability
- ✓ Parallel Databases
- ✓ Types of Parallelism
- ✓ High Performance Computing Cluster – HPCC
- ✓ Clusterize Applications
- ✓ How Do You Clusterize Applications?

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- ✓ Highly Available Databases
- ✓ Need for Highly Available Data
- ✓ Failure
- ✓ Availability
- ✓ Reliability and Serviceability
- ✓ Fault-tolerant Systems
- ✓ Database Availability
- ✓ Clustered Systems
- ✓ Databases Issues
- ✓ Oracle RAC – High Performance and Highly Available Database

Database Clusters

- ✓ Overview of the Cluster Technology
- ✓ How Clusters Differ from Distributed Systems
- ✓ Clusters are Different from Fault-tolerant Systems
- ✓ Database Clusters
- ✓ Why Clusters?
- ✓ Types of Clusters
- ✓ Failover Clusters
- ✓ Scalable High Performance Clusters
- ✓ Application Server Clusters
- ✓ Other Types of Clusters
- ✓ Components of a Cluster
- ✓ Cluster Nodes
- ✓ Emerging Server Cluster Architectures
- ✓ Cluster Interconnect
- ✓ Essentials for Parallel Database Clusters
- ✓ Cluster Interconnect Products
- ✓ Infiniband Interconnect
- ✓ Cluster Ware
- ✓ Concurrent Database Access
- ✓ Failover Database Clusters
- ✓ Resources, Resource Type
- ✓ Resource Groups
- ✓ The Concept of a Virtual Server
- ✓ Failover Process

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- ✓ Examples
- ✓ Failover Cluster Architecture
- ✓ Oracle Database Service in HA Cluster
- ✓ Issues with FO Clusters – Hidden Risks
- ✓ Parallel Database Clusters
- ✓ Shared-Nothing Model
- ✓ Shared-Disk Model
- ✓ Microsoft SQL Server Federated Database
- ✓ IBM Offerings
- ✓ Requirements for Parallel Clusters
- ✓ Oracle's Instance Membership Recovery
- ✓ Cache Coherency and Lock Management

Real Application Cluster Architecture

- ✓ Overview of Oracle Real Application Clusters
- ✓ RMAN for RAC
- ✓ RAC Workload Management
- ✓ RAC Scalability
- ✓ High Availability
- ✓ Architecture
- ✓ Oracle11g Basic Processes
- ✓ Oracle11g Basic Internal Structures
- ✓ Oracle11g RAC Additional Processes
- ✓ Oracle11g RAC Additional SGA Areas
- ✓ RAC Server Components
- ✓ GCS Resource Modes and Roles
- ✓ Accessing RAC

RAC Server and Disk Technology Overview

- ✓ Oracle11g RAC Disk System
- ✓ Understanding Disks, LUNs, Volumes
- ✓ Raw Volumes
- ✓ File Systems

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Storage Technology and Redundancy

- ✓ Disk Systems
- ✓ Understanding I/O Path
- ✓ Host Bus Adapters (HBA)
- ✓ Storage Redundancy Components
- ✓ RAID and RAID Administration
- ✓ High Availability of Storage
- ✓ Logical Volume Managers

Storage Areas

- ✓ OCFS/OCFS2
- ✓ RAW Volumes
- ✓ ASM
- ✓ Other CFS Solutions

Redundancy

- ✓ Understanding RAID Redundancy

Capabilities

- ✓ Server Redundancy
- ✓ Redundancy Types

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RAC Installation and Configuration

- ✓ Architecture and Components
  - Servers and Operating System
  - Cluster Interconnect and Public Switch
  - Oracle Cluster ware
  - Shared Storage Subsystem
- ✓ Overview of Installation Steps
  - Installation of Oracle Cluster ware
  - Installation of Oracle for use with ASM
  - Installation of Oracle for production database use
- ✓ Oracle RAC Tools
  - crs_stat
  - olsnodes
  - srvctl
  - dbca
  - netca

Internals of Real Application Clusters

- ✓ Overview of Cache Fusion
- ✓ Evolution of Cache Fusion
- ✓ Nature of Cache Fusion
- ✓ Benefits of Cache Fusion
- ✓ Concurrency and Consistency
- ✓ Cache Coherency
- ✓ Global Cache Service
- ✓ SGA Components and Locking
- ✓ SGA – System Global Area
- ✓ Program Global Area (PGA)
- ✓ Buffer Cache Management
- ✓ What is a Dirty Block?
- ✓ Multi – Version Consistency Model
- ✓ RAC Components
- ✓ Global Cache Service
- ✓ Global Enqueque Service
- ✓ Row-Level Locks
- ✓ Global Resource Directory
- ✓ RAC Processes
- ✓ Resource Coordination

- ✓ Synchronization
- ✓ GCS Resource Modes and Roles
- ✓ Concept of Past Image
- ✓ Lock Modes
- ✓ Block Access Modes and Buffer States
- ✓ Cache Fusion Scenarios
- ✓ Block transfers using Cache Fusion – Examples
- ✓ Block Access, Grants, and Interrupts
- ✓ Cache Fusion and Recovery
- ✓ Recovery Features
- ✓ Recovery Methodology and Steps
- ✓ Recovery Process – Re-mastering Resources

RAC Administration

- ✓ Parameter Management
- ✓ Overview
- ✓ RAC and Initialization Parameters
- ✓ UNDO Management
- ✓ UNDO Management in RAC
- ✓ UNDO Table space Features
- ✓ System Rollback Segment
- ✓ Concept of Thread
- ✓ Thread Features
- ✓ Redo Thread Maintenance
- ✓ Segment Space Management
- ✓ Automatic Segment Space Management
- ✓ Manual Space Management
- ✓ Oracle Managed Files
- ✓ Using SQL*Plus
- ✓ Starting the Database in Cluster Mode
- ✓ Using Oracle DB Control for Clusters
- ✓ Configuration of DB control w/RAC

RAC Backup and Recovery

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- ✓ Overview of RAC backup and Recovery
- ✓ Export
- ✓ Cold Backup using Scripts
- ✓ Hot Backups using Scripts
- ✓ RMAN (Recovery Manager)
- ✓ Third Party Solutions
- ✓ Backup of RAC Database
- ✓ Using RMAN for Backups
- ✓ Backup Procedures RMAN and RAC
- ✓ Recovery in the RAC Environment
- ✓ Media Recovery in RAC Instances
- ✓ Using RMAN to Recover a RAC Environment
- ✓ Recovery in an OCFS Environment
- ✓ Recovery in a Raw File System Environment
- ✓ Parallel Recovery
- ✓ Standby Databases in RAC Configuration
- ✓ Setting up a Standby Database for a RAC Cluster to a Single-Instance (One Node)
- ✓ Configuration when the Standby Database is a Single Node System
- ✓ Cross-Instance Archival
- ✓ Archive Log Gap Resolution and FAL
  - ASM and RMAN
  - Performing advanced backup/ recovery techniques with ASM
  - SWITCH DATABASE TO COPY
  - Keeping ASM Clean

Failover and Load Balancing

- ✓ Services In-depth
  - Failover
  - Load Balancing
  - Planning and Configuration
- Connection Pools and Services
- The Load Balancing Advisory
- Monitoring Services

RAC Performance Monitoring and Tuning

- ✓ Analysis of Performance Issues
- ✓ Monitoring RAC Cluster Interconnect

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- ✓ Using performance views
  - Using AWR
  - ADDM for RAC
  - Using DB Control to Monitor RAC

RAC Design Consideration

- ✓ Designing equipment for RAC
- ✓ Effects of component failure
- ✓ Redundancy at every level
- ✓ Choosing Service/Nodes for Work

Sequences in RAC

- Table space Design Considerations
- Solid State Disk Considerations
- Table Locks and Latch Waits
- Scalability and Unpredictable Loads

Migration to RAC Databases

- ✓ Overview

Migration Methodology

- Moving from Single Instance to RAC
- Cloning Overview
- Migrating to Oracle 11g
- Rolling Upgrades

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