

# Oracle 12c Administration I

## Course Overview

In this course, students will focus on configuration on supported systems. Also how the database fits in with other systems.

This is a 5-day class

## Course Objectives

Upon successful completion of this course, students will be able to understand configuration for installation, configuration of a host system, using Oracle Restart framework, troubleshooting tips, how the database fits with other systems, internals of the database, database failures and other topics.

## Course Outline

### 1 ORACLE DATABASE ARCHITECTURE OVERVIEW

- The Database Instance
- Database Memory Structures
- Database Process Structures
- Database Storage Architecture
- Oracle Clusterware

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## 2 CONFIGURING THE HOST FOR STANDALONE INSTALLATION

- Host Configuration Overview
- Choosing a Database Host
- Choosing an Operating System
- Proprietary Unix vs Open-Source Linux
- Making the OS Selection
- Prepare an Oracle LINUX Installation
- Perform Oracle LINUX Installation
- Configure the LINUX Host
- Step 1 - Confirm General System Requirements
- Step 2 - Confirm The Operating System Platform
- Step 3 - Confirm LINUX Package Requirements
- Step 4 - Confirm Network Configuration
- Configure Host for Virtualization
- VM Technologies
- Configure Oracle Linux for Virtualization
- Step 1 - Download Linux Updates
- Step 2 - Check Linux Kernel
- Step 3 - Download Latest yum Configuration File
- Step 4 - Enable Oracle Linux Add-ons
- Step 5 - Install VirtualBox
- Oracle Optimal Flexible Architecture
- OFA Goals
- ORACLE\_BASE
- ORACLE\_HOME
- Database Files
- Multiple ORACLE\_HOMES
- Database Software Upgrades
- Multiple Oracle Software Installations

## 3 GRID INFRASTRUCTURE CONFIGURATION

- Configure the Linux Installation
- About ASM Devices
- Configure Linux Devices for ASM
- Partitioning a Device
- Oracle ASMLib
- Configure MS Windows Devices

## 4 GRID INFRASTRUCTURE CONFIGURATION

- Perform the Installation
- Download
- Unpack the Installation Package
- Launch the Installation Session
- The Installation Dialog
- Verify the Installation
- Operating System Confirmation
- Oracle Utilities Setup
- SQL\*Plus Confirmation
- Using EM Cloud Control
- Troubleshooting Problems

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## 5 DATABASE INSTALLATION CONFIGURATION

- Configure a Linux Installation
- System Groups & Users
- Configure Kernel Parameters
- Create the Physical Directories
- Configure MS Windows Installation
- Prerequisite Checks & Fixup Utility

## 6 DATABASE INSTALLATION

### ABOUT THE INSTALLATION

- The Installation Tools
- About The Installation Dialog
- The Installation Session Log

### PERFORM INSTALLATION ON LINUX

- Download
- Unpack The Installation Files
- Set Environment Variables
- Launch The Installation
- SERVER CLASS INSTALLATION DIALOG
- More About The Global Database Name
- About Enterprise Manager Cloud Control
- Secure The New Database

### PERFORM INSTALLATION ON WINDOWS

- Launch The Installation
- POST---INSTALLATION CONFIGURATION
- Required Environment Variables
- Defining The Environment Variables
- About SSH
- VERIFY THE INSTALLATION
- SQL\*PlusConfirmation
- Operating System Confirmation
- Firewall Configuration
- Accessing EM Database Express

## 7 CREATING DATABASES USING DBCA

- About DBCA
- DBCA Templates
- Are You Sure?
- DEFAULT CONFIGURATION DATABASE
- ADVANCED MODE DATABASE
- File Location Variables
- Database Vault and Label Security
- CONFIGURE AN EXISTING DATABASE
- DELETE A DATABASE
- MANAGE TEMPLATES
- MANUALLY CREATE A DATABASE
- The CREATE DATABASE Command

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## 8 USING ORACLE RESTART

WHAT IS ORACLE RESTART?

What Oracle Restart Does

Is Oracle Restart Deprecated?

Registering With Oracle Restart

More About srvctl

Terminal Session Configuration

COMPONENT STATUS USING SRVCTL

Database Status

Grid Infrastructure Status

Oracle Home Status

CONFIGURATION USING SRVCTL

Examining A Database Configuration

Examining The Listener Configuration

Examining The ASM Configuration

Manual Registration

Listener Configuration Modification

Database Configuration Modification

STARTUP/SHUTDOWN USING SRVCTL

Why Use srvctl?

MANAGING ORACLE RESTART

Obtaining Oracle Restart Status

Start/Stop Oracle Restart

## 9 PREPARING FOR A DATABASE UPGRADE

What is a Database Upgrade?

Database Upgrade Methods

Real World Database Upgrade

Develop A Database Upgrade Plan

ABOUT THE DATABASE VERSION

Direct Upgrade

The COMPATIBLE Database Parameter

PRE-UPGRADE PREPARATIONS

Oracle Warehouse Builder

Oracle Label Security (OLS)

Oracle Database Vault

Locating The Older Database Installations

THE PRE-UPGRADE INFORMATION TOOL

Pre-Upgrade Information Tool Files

Run The Pre-Upgrade Information Tool

Examining The Pre-Upgrade Information Tool Results

## 10 UPGRADE TO ORACLE DATABASE 12C

Launch DBUA

Database Upgrade Dialog

## 11 POST-UPGRADE TASKS

Post-Upgrade Checklist

Enable Unified Auditing

Migrate to Unified Auditing

Database Parameter Changes

Enable New Features

Source Destination Specific Post-Upgrade Tasks

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## 12 ORACLE ARCHITECTURE: THE SYSTEMS INFRASTRUCTURE

- About Enterprise Architectures
- The Relational Database
- Legacy Computing Models
- The Multi-Tiered Computing Model
- Scaling Up
- Cloud-Based Deployment
- ORACLE INFRASTRUCTURE ECOSYSTEM
- USING ORACLE ENTERPRISE MANAGER
- More About EM
- Using EM Database Express
- Using EM Cloud Control

## 13 ORACLE ARCHITECTURE: THE DATABASE HOST

- The Database Server Stack
- PROCESSOR LAYER
- CPU Resources
- Memory Resources
- I/O & STORAGE PROCESSING
- OS LAYER PROCESSING MODES
- DATABASE SERVER VIRTUALIZATION
- STORAGE VIRTUALIZATION
- ORACLE DATABASE SERVER STACK
- ORACLE ENGINEERED SYSTEMS
- Oracle Exadata Database Platform
- Exalogic Cloud Machine
- Exalytics BI Machine

## 14 ORACLE ARCHITECTURE: PRINCIPLES & TECHNOLOGY CONCEPTS

- Grid Computing Principles
- Why Grid Computing?
- What Is Grid Computing?
- PARALLELIZATION PRINCIPLES
- Hardware Parallelization
- Grid Computing Devices
- Clustered Database Servers
- CLOUD COMPUTING PRINCIPLES
- Multi-Tenancy

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## 15 ORACLE ARCHITECTURE: THE RDBMS INSTALLATION & THE DATABASE INSTANCE

- The Database Server Software
- Database Versions & Releases
- Database Editions
- Using PRODUCT\_COMPONENT\_VERSION View
- The Core Database Components
- Using V\$VERSION View
- Understanding The Database Version Number
- The COMPATIBLE Database Parameter
- DATABASE INSTANCE ELEMENTS
- Individual Elements Of A Database Instance
- Physical Database Elements
- An Operational Database installation
- DATABASE INSTANCE CONFIGURATIONS
- Single Instance
- Parameter Files & Instance Configuration
- MAX\_STRING\_SIZE Parameter Example
- Independent Instances
- Clustered Instances
- The Database Instance In A Multi-tenant Configuration
- RE-CONFIGURING A DATABASE INSTANCE
- Static Vs. Dynamic Parameters
- Dynamic Parameter Setting
- Parameter Setting Scope
- Parameter Setting Level
- Setting Upgrade Related Parameters
- DATABASE COMPONENTS
- Advanced Data Functionality Components
- Security Components
- High-Performance Components
- Administration Components
- Database Feature Usage

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## 16 ORACLE DATABASE INSTANCE: MEMORY ARCHITECTURE

- Shared & Private Memory
- SGA INTERNALS
  - The Buffer Cache
  - The Database Smart Flash Cache
  - The Redo Log Buffer
  - The Shared Pool
  - The Large Pool
  - The Java Pool
  - Unified Auditing Queues
- PGA INTERNALS
  - What Is Inside The PGA?
  - Tunable & Non-tunable PGA Space
  - Client-Side Cursors
  - Where Is The PGA Stored?
  - PGA/UGA In Shared Server Mode
  - PGA/UGA With Optional Large Pool
- LOB OBJECTS & MEMORY HANDLING
  - LOB Buffer Caching
  - Shared I/O Pool
  - LOB Workspace & The PGA
- INSTANCE MEMORY MANAGEMENT
  - About Automatic Memory Management
  - Default Settings
  - Configure MEMORY\_TARGET Parameter
  - Configure SGA\_TARGET Parameter
  - Configure PGA\_AGGREGATE\_TARGET Parameter
  - PGA\_AGGREGATE\_LIMIT Parameter
  - Configure Memory Using EM DE

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## 17 ORACLE DATABASE INSTANCE: BACKGROUND PROCESS ARCHITECTURE

- Foreground vs. Background
- ABOUT THE BACKGROUND PROCESSES
  - The Background Processes
  - Linux System Processes
  - The DBWR Process
  - The LGWR Process
  - Checkpoints And The CKPT Process
  - The SMON Process
  - The PMON Process
  - The LREG Process
  - The ARCH Process
  - The RECO Process
  - The CJQx Process
  - The DBRM Process
  - The Management Framework Processes
  - Flashback Data Archive (FBDA) Process
  - Fault Diagnostics
  - Other Housekeeping Processes
  - Background Process Performance Monitors
- THREADED MODE
  - About Process Mode
  - About Threaded Mode
- KERNEL ERRORS & EXCEPTIONS
  - The Error Message
  - The Error Message Stack
  - Kernel Errors & Core Dumps
  - ORA-006xx & ORA-07445 Errors
  - Understanding The Kernel Errors
  - The Kernel Module
  - Kernel Module Arguments
  - Diagnostic Modules
  - The Call Stack Trace
  - ORA-600/ORA-7445/ORA-700 Error Lookup Tool



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## 18 ORACLE DATABASE INSTANCE: FOREGROUND PROCESS ARCHITECTURE

- Dedicated Server Mode
- Session Details From V\$SESSION View
- Session Details From EM Database Express
- What Is The Impact Of Dedicated Server Mode?
- SHARED SERVERS MODE
- Processing SQL In Shared Servers Mode
- Comparing Dedicated Server & Shared Servers Mode
- Dedicated Server Mode Client Connection
- Dedicated Server Mode SQL Statement Execution
- Shared Servers Mode Client Connection
- Shared Servers Mode SQL Statement Execution
- Consider Dedicated Server Mode
- Consider Shared Servers Mode
- Shared Servers Mode Advantages
- CHOOSING THE SQL EXECUTION MODE
- Instance-Level SQL Execution Mode Configuration
- Session-Level SQL Execution Mode Configuration
- PARALLEL SQL EXECUTION
- What Is Parallel Execution?
- The Impact On SQL Statement Execution
- SQL STATEMENT EXECUTION
- Parse Phase
- Execute Phase
- Fetch Phase
- SQL OPTIMIZATION & EXECUTION PLANS
- Optimization Methods
- Rule-Based Optimizer
- Cost-Based Optimizer
- Automatic Tuning Optimizer
- Adaptive Execution Plans
- Adaptive Statistics

## 19 ORACLE DATABASE STORAGE ARCHITECTURE: LOGICAL DATABASE OBJECTS

- About Database Objects
- Relational Database Objects List
- Database-Resident Program Units
- Additional Database Objects
- Database Objects Illustrated
- DATABASE OBJECTS CONTEXT
- The Data Dictionary Schema(s)
- Making An Object Reference
- Explicit Schema Context
- Explicit Database Context
- Partition Context
- EDITIONS CONTEXT & REDEFINITION
- About Application Upgrades
- About Application Downtime
- The Edition Hierarchy
- The Editions In Action

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## 20 ORACLE DATABASE STORAGE ARCHITECTURE: PHYSICAL DATABASE FILES

- About the Database Files
- SERVER PARAMETER FILES
- CONTROL FILES
- REDO LOG FILES
- DIAGNOSTIC FILES
- What Are The Diagnostic Files?
- EM Cloud Control Access
- The MAX\_DUMP\_FILE\_SIZE Parameter
- The DIAGNOSTIC\_DEST Parameter
- The Log Files
- Text Alert Log Contents
- Viewing Text Alert Log Contents
- Viewing Alert Log Errors
- Maintaining The Alert Log
- The Trace Files
- Background Process Trace Files
- SQL Execution Process (User) Trace Files
- Incident Dump Files
- Core Dump Files
- Trace Files At The OS Level
- Sample DIAG Trace File
- Monitoring Trace File Space Usage
- Maintaining The Trace Directories
- FILES IN A MULTI-TENANT DATABASE

## 21 ORACLE DATABASE STORAGE ARCHITECTURE: TABLESPACES

- Tablespaces & Data Files
- Peering Into The Tablespace Storage Hierarchy
- More About Clustered Table Storage
- More About The RowID
- Hybrid Columnar Compression
- TEMPORARY SEGMENTS
- About Temporary Segments
- About Temporary Tablespace Groups
- Advantages
- INDEX SEGMENTS
- B-tree Index Segments
- Bitmap Index Segments

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## 22 ORACLE DATABASE INTERNAL MECHANISMS: DATA CONCURRENCY

System vs User Locks

Internal Locks

Using V\$LOCK\_TYPE View

Latches

Using V\$LATCH View

Mutexes & V\$MUTEX\_SLEEP

User Locks

MANAGE & MONITOR SYSTEM LOCKS

About Database Wait Events

Concurrency Wait Events (Mutex)

Concurrency Wait Events (Latch)

Spinning Vs. Sleeping

Using EM Cloud Control

Using AWR