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Oracle Training

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Oracle Database Administrators

&

Operators

Course Outline

&

Schedule



Oracle 10g & 11g OCP & DBA Training Courses

(14 Weeks /10 hrs a week / 140 hours Course Outline)

Oracle Database Design, Creation, Management & Administration

Intended Audience:

This Track is intended for anyone who is absolutely interested in becoming an Oracle Database Administrator and is willing and available to hang in and push on with dedicated working Oracle Professionals (DBAs, Developers and Programmers) from whom they can benefit from some real life working experiences. The candidates will be directed on how and where to acquire information as professional DBAs do to survive as leaders in the work environment. At least 50% of the class time shall be devoted to hands on exercises. A desirable prerequisite for this class shall be the completion of a course in SQL or PL/SQL since the Track shall be primarily focused just on preparing the audience to the administration of the Oracle database.

Participants will understand and master the full concept and steps or process of working as a DBA. They will practically Create a Class database: setting the environment, starting an Oracle Instance, creating a Database, tablespaces, Rollback segments, tables, users, data dictionary, and other objects, based on data design models, and the commands to maintain and modify these data structures. Participants will learn how to insert, update and delete data using SQL's Data Manipulation Language, (DML). In addition, they will be able to write database transactions that perform the insertion, modification and deletion of data. Finally, this Track will demonstrate how to control both user and object level security in an Oracle database.

Recommended Stationary & Books:

1. 2" folder for DBA Notes from the class.
2. 3-4 Subject Note book – 9-1/2" x 6" x 15.2cm
3. 1 Dozen Assorted Color Sharpie permanent Markers, Pens & Colors
4. White Poster boards – 22" x 28" – pack of 10
5. OCP: Oracle 10g Certification Kit (1Z0-042 and 1Z0-043) – 2 books by Tim Buterbaugh, Chip Dawes, Bob Bryla, Doug Stuns, Joseph C. Johnson, Matthew Weishan Sybex (~ \$68 at Amazon.com)
6. Oracle Database 10g OCP Certification All-In-One Exam Guide – 1 book (Oracle Database 10g Handbook) By Damir Bersinic, John Watson (~\$66.99 from Amazon.com)
7. Oracle Database 11g DBA Handbook by Bob Bryla, Kevin Loney
8. Unix for Oracle DBAs Pocket reference by Donald K. Burlison
9. Laptop with minimum 160 gig hard drive, 2 Gig RAM (Running Vista or possibly Windows XP, VMWare & Linux)
10. Home PC with minimum 160 gig hard drive, 3 Gig RAM (Running Vista or possibly Windows XP, VMWare & Linux)

(Advanced DBAs Class)

1. Oracle 10g Grid & Real Application Clusters Mike Ault, Madhu Tamma Retail Price ~ \$50.00
2. Oracle Application Server 10g Essentials by Robert Stackowiak (Author), Donald Bales (Author), Rick Greenwald (Author)
3. Oracle DBA on Unix and Linux (Paperback) by Michael Wessler (Oracle 9i) (~\$31.99 Amazon.com) - <http://www.bookpool.com/sm/0672321580>

Books Online - Print out notes from these sites:

1. http://www.intelligentedu.com/free_it_certification_study_guides.html#Oracle
2. <http://www.cramsession.com/certifications/oracle/oracle10g-oca.asp>



DBA Course Outline

MONTH 1 – Architecture & Configuration

1-1: Overview of Oracle DBA tasks

- The evolution of hardware and the relation to Oracle
- Different DBA job roles (VP of DBA, developer DBA, production DBA, database Babysitter)

Responsibilities of a DBA

1. What do DBAs do
2. What must DBAs know
3. What could they be asked at Interviews

The Oracle General Architecture

4. Environment management (network, CPU, disk and RAM)
 5. Physical, Memory, & Process Structures
- * **SGA** = Database Buffer Cache + Redo Log Buffer + Shared Pool + Cursors + etc
 - * **PGA**
 - * **Processes**: - User processes; Server processes, Background processes: **dbwr, lgwr, ckpt, smon, pmon**, arch, reco, dnnn, lckn
 - * **Physical Files**: data files, redo log files, control files, pfile (init.ora), pswd file
 - **Instance** -> SGA + Background Processes.
 - **Database** -> Instance + Data Files
 - Oracle as a flexible, complex & robust RDBMS
 - Instance management (managing SGA regions)
 - Oracle table and index management

1-2: The OFA = Optimal Flexible Architecture

- a) Requirements & Benefits of OFA
- b) \$ORACLE_BASE & \$ORACLE_HOME

1-3: Logical & Physical Structures

1. **Tablespaces** -> Segment -> Extents -> Data block
2. **Segments**: data segments, undo/rollback segments, temporary segments, index segments, etc
3. **Files**: data files, redo log files, control files, pfile (initSID.ora), spfile, pswd file
4. **Types of Buffers**: free, dirty & pinned buffers, Dirty List, LRU & MRU

1-4: Oracle Installation on Windows Server

1. Configure Windows Server
2. Create Account at OTN
3. Download Oracle software & Install following OFA
4. Create a Database (**CLASSD**) using DB Assistant **dbca** and as per OFA

1-5: Connecting to the Database

1. Using db Control – url
2. Using iSql
3. Using SQL*Plus for DBA management
 - Connecting and executing SQL
 - Using the “as sysdba” syntax
4. Overview of SQL*Plus DBA commands (startup, etc.)

1-6: Oracle*Net configuration - nca

Architecture and Basic Configuration – using Assistants & Manually:

Net8: Sqlnet.ora, listener.ora & tnsnames.ora

- a) Creating the listener.ora file
- b) Creating the tnsnames.ora file
- c) The sqlnet.ora file
- d) Troubleshooting network connectivity
 - Verifying network connectivity: ping & tnsping
 - Testing database links

Quiz #2. (Diagram of the Oracle Architecture and Multiple choice)

1-7: The Oracle Data Block

- Header, Free space, Data space
- Review of the SGA:

Required SGA Components:

1. **Shared Pool**: Caches the most recently used SQL statements that have been issued by database users.
2. **Database Buffer Cache**: Caches the data that has been most recently accessed by database users.
3. **Redo Log Buffer**: Stores transaction information for recovery purposes

Optional SGA Components:

4. **Java Pool**: Caches the most recently used Java objects and application code when Oracle’s JVM option is used.
5. **Large Pool**: Caches data for large operations such as Recovery Manager (RMAN) backup and restore activities and Shared Server components
6. **Streams Pool**: Caches the data associated with queued message requests when Oracle’s Advanced Queuing option is used

1-8,9,10,11: SQL Using the Scott Schema

Prep for OCA

- Unlock Scott schema
- Exam samples questions
- DML – Select – Types of Joins etc

1-12: Creating Database Objects = SQL =: DDL, DML, DCL, TCL, DR

- a) Creating tablespaces, users, tables, indexes, sequences, synonyms, database links, etc
- b) Managing Storage Allocation, Undo/Rollback Segments (ora-1555), Table and Index Segments
- c) Manage Cluster Segments, Constraints, Roles, Resource Usage, Audit Database, Users: DB Access

MONTH 2 – Unix, Management, Backup & Recovery, Migration

2-1 Unix Commands common to DBAs

- a) Telnet and FTP
- b) VI editor
- c) Copy and moving files
- d) Creating Users and Permissions



2-2 Oracle in Unix/Linux

- e) Download & Install Oracle Oracle in Linux
- f) Create a Database CLASST in Linux
- g) Configure Sqlnet and connect via db_control

Oracle database management

2-3,4,5: Control file, UNDO and REDO management

- Explaining the use of control files
- Listing the Contents of the control File
- File locations for control Files
- Obtaining Control File Information
- Listing control file contents

UNDO management

- Displaying and Creating Undo segments
- Altering Undo Segments
- Determining the Number and Size of Undo segments
- Understanding flashback technology
- Troubleshooting Undo – snapshot too old

REDO management

- Redo log concepts for recovery
- Online redo log (log_buffer) online redo logs and archived redo logs
- Oracle ARCH and LGWR background processes
- Redo log dictionary queries
- Redo log switch frequency and performance
- Multiplexing the Online Redo Log Files
- Archiving the Oracle Redo Logs
- Recovery using the redo log files

2-6,7 Backup, Failures, Recovery & Restoration

- Review of Oracle Architecture
- Logical & Physical Backups
- Backup Methods: Hot (open) & cold (close) Backups,
- RMAN & Export Datadump Configurations
- BCT – block change tracking
- Failure Scenarios
- Recovery without Archiving; Enable Archiving
- Complete & Incomplete Recovery with Archiving
- Standby Database
- Backup Strategizing

2-8 Backup

- **Flashback** – Types of flashbacks
- A Step-by-Step Guide to Disaster Recovery Planning

2-9: MIGRATION: Loading/Populating a Database & Database Restructuring

- **Import / Export -> ExpDp / ImpDp**
- Database Migration Assistant
- **SQL Loader** (Flat files / non-oracle data)
 - Create table AS Select * from --- & Insert select * from ---
 - Restructure the ORCL database using 'backup control file to trace'

2-10: User and privilege management

- The **three security methods** (VPD, Grant security/role-based security, grant execute)
- Creating New Database Users
- Using pre-spawned Oracle connections
- Auditing User activity
- Identifying System and Object Privileges
- Granting and Revoking Privileges
- Creating and Modifying Roles
- Displaying user security Information from the Data Dictionary

2-11: Data dictionary

- Data dictionary Tables & Views essential for Administration Tuning & Backup
- Dynamic Performance Tables (**V\$Tables**), DBA Views, USER Views, All Views.

2-12: Overview of instance management

- Parameter files: init.ora, spfile.ora, listener.ora, tnsnames.ora
- Rules for sizing SGA components
- Automated Oracle memory management (AMM)

Initialization file management - **The INIT.ORA**

- Creating the spfile.ora from the init.ora file
- Using spfile
- Displaying init.ora values with v\$parameter

Data buffer configuration & sizing

- Inside the Oracle data buffers
- Using the KEEP pool
- Monitoring buffer effectiveness
- Using multiple block sizes (multiple buffer pools)

Shared pool and PGA configuration & Sizing

- Shared pool concepts and components
- Understanding the library cache
- Relieving shared pool contention
- Overview of PGA for sorting and hash joins
- Using sort_area_size, hash_area_size and pga_aggregate_target

MONTH 3 – Oracle objects & management

3-1: Oracle tables, views and materialized views

- Types of Oracle tables (regular, IOT, sorted hash clusters, nested tables)
- Oracle Views
- **materialized views**
- Uses of materialized views
- Creating, updating and managing materialized views

3-2: Oracle indexes

- Types of Oracle indexes (b-tree, bitmap, bitmap join index)
- Creating B*-Tree, bitmap and function-based Indexes
- Function-based indexes
- Finding indexing opportunities
- Index maintenance



Oracle constraints

- Costs & benefits of constraints
- **Types of Oracle indexes & constraints** (check, not null, unique, PK, FK)
- Cascading constraints

3-3: Schema, File & tablespace management

- Describing the relationship between data files, tablespaces and table
- Understanding Oracle segments
- Creating Tablespaces – using the autoextend option
- Changing the Size of Tablespaces – alter database datafile command
- Defining a TEMP tablespace
- Changing the default storage Settings for a tablespace
- Review of the storage parameters in DBA views (ASM, ASSM, pctfree, pctused and freelists).
- Monitoring Chained rows (fetch continued rows)
- Monitoring Insert and Update performance (pctused, APPEND)

Database Maintenance

- Reason for **reorgs** – chained rows, imbalanced freelists
- Reorganizing Tables using Export and Import
- Using CTAS to reorganize data
- Index rebuilding
- Backup & Recovery overview (hot & cold Backups, RMAN, block change tracking)

3-4: Patching the Oracle Software

- Types of Oracle Patches
- What is opatch?
- Installing & Using **Opatch** & OUI (Windows & Unix)
- **CPU = Critical Patch Update – Best Practices** - Optimizing CPU Implementation.

DB Documentation: using Scripts & RDA

Using Remote Diagnostic Agent a.k.a. RDA

- Download, Installation and Usage of rda

3-5: Oracle DBA Utilities

- Data pump (Imp and exp utilities)
- SQL*Loader - do Example with Class Schema.
- LogMiner
- Flashback
- DataGuard
- Oracle DBA utilities – Oracle dbms packages (dbms_redefinition)
- **Replication** (Streams, multimaster, materialized views)

3-6, 7: Database Development & ER Diagrams

- Reverse and Forward Engineering using **Erwin**
- Design Class Schema using Erwin.

MONTH 4 – Monitoring, Tuning & Upgrade to 11g

This section explores the methods used for monitoring all active components of the Oracle database.

4-1: Dictionary and v\$ views

- The dba_, all_ and user_ structures
- Querying the tables, indexes, and segments views
- Querying the **AWR** (STATSPACK) tables

Table & index monitoring

- Monitoring table extents and fragmentation
- Using the dba_tables and dba_segments views
- Monitoring table CBO statistics
- Monitoring table extents and fragmentation
- Locating chained rows - **Oracle block**
- Monitoring table & index growth
- Monitoring index usage
- Monitoring index fragmentation
- Locating un-used indexes
- Identifying IOT candidates
- Reorganizing Indexes with alter index rebuild
- Dropping Indexes
- Getting Index Information from the Data Dictionary

workload & trend monitoring

- Oracle automated workload tools
- Using v\$bhh to monitor buffer activity
- Using v\$sql and v\$sql_plan

4-2: Instance monitoring

- Monitoring with the **AWR** and STATSPACK
- Creating a time-series performance report
- Using www.statpackanalyzer.com
- Scripts for AWR and STATSPACK
- Plotting performance data (WISE, Excel, etc)
- Finding performance trends and signatures

Oracle environment monitoring

- Displaying and managing Oracle sessions (v\$session, v\$process)
- Using AWR to monitor disk, network and CPU consumption
- Monitoring the **alert log**
- Oracle trace/dump files

Viewing Information About the SGA – The V\$ views involved.

4-3: STATSPACK and AWR performance management

- Installing STATSPACK
- Running STATSPACK reports
- Interpreting a STATSPACK report
- Getting time series reports with STATSPACK
- Finding performance signatures with STATSPACK

This section explores the methods used for performance management in Oracle and shows tips and scripts for monitoring all components of any Oracle database. You will also learn the proper action to take when any area of Oracle becomes a bottleneck.

Bottleneck performance analysis

- Drill-down into AWR reports
- Top-5 timed events
- External Server Bottlenecks (Network, I/O, RAM, CPU)



- Network troubleshooting

Instance Tuning

- Changing init.ora optimizer parameters (index_optimizer_cost_adj, optimizer_mode)
- Managing region parameters (shared_pool_size, db_cache_size)
- Understanding instance contention (e.g. Buffer busy waits, library cache contention)

SQL and CBO behavior

- Introduction to cost-based optimization
- Changing the default optimizer modes
- Optimizer parameters
- Dynamic sampling
- Collecting table and index statistics (**dbms_stats**)
- Using column histograms and skewonly

4-4: Upgrade of 10g to 11g

- Backup current Databases
- Download & Install Oracle 11g
- Apply necessary patches
- Upgrade using dbuca; drop database after testing
- Repeat Upgrade using Oracle datapump
- Configure DB for production with all scripts – backup etc.

4-5, 6: RAC

- Introduction to RAC: TAF, CRS, ocr, srvctl,
- RAC Configuration – see notes
- Startup / Shutdown of RAC
- Sample Interview Questions.

4-7: Streams (Replication)

- Streams Configuration

4-8, 9: DataGuard (STANDBY DATABASES)

Ensuring Disaster Recovery for the Enterprise

- Introduction to STANDBY
- Standby Configuration – see notes
- Step-by-Step Instructions for Creating a Physical Standby DB
- Protection Modes
- DataGuard Physical vs Logical Standby
- Recovering Logical Standby

4-10: MS SQL Server

- Installation of SQL Server
- Create Database, Users, objects
- Backup, Recover, Restore
- Monitor & Tune SQL Server DB.

MONTH 4

Miscellaneous

4-11

Quiz #9. (Test covering Entire course)

OCF Preparation & Interview Questions - Rehearsals

- Interview Practicals and Strategic Planing
- Resume Techniques & Preparation

4-12

Live Referencing Project –UCCS- Back end

Purpose:

Every Student of the class is considered as worker as will and has the responsibility of engaging in this real life project and meeting all the date lines as shall be stipulated in class by the coordinator. Punctuality, dedication, attention to details and meeting date lines is the most important priorities for the project and its successful completion. Assistance from senior DBAs is available upon request during and after classes. Work references shall be provided only to those who successfully complete the project within the given the given time completing the course without this LR Project shall not warrant a reference from the institution. Our goal is to train practical DBAs who can handle typical DBA responsibilities comfortably upon completion of the course and this project. All work must be neatly presented in a word document (LR_Project) by all DBA candidates Expect this LR_Project.doc to be at least 25 pages long.

See Details on Project Handout

Quiz #5. (Diagram of the Oracle Architecture including all background processes and V\$tables)

Performance Monitoring, Trouble Shooting & Tuning

- **Monitoring tools/** Third party tools: DBArtisan, PSL, OPM, Toadsoft, Q-savant,
- Diagnosing Problems;
- Architecture & Tuning: Diagramatic relationships between Processes, V\$tables & Files.
- Views, **Scripts**, OEM Diagnosing & Tuning Packs



- Tuning Memory: Shared Pool, Buffer Cache, Redo Buffer cache
- Tuning Redo Mechanisms, Tuning Sorts, Tuning Rollback Segments
- **Applications Tuning:** SQL_Trace, Oracle_trace, Tkprof,
- **Explain plan:** Plan table
- Optimizing Load; I/O and Contention
- **Perfstat Configuration & Reporting.** (Being deprecated)

Quiz #6. (Diagram of the Oracle Architecture)

Managing Space Usage (Capacity planning)

- **Planning for Fault Tolerance:** - Mirrored Control Files & Mirrored Redo Log Files
- **Tablespaces & Data Files Management** (tablespace creation)
- **Database Block Size Management:** - Pctfree & Pctused
- **Controlling Extent Allocation:** - Initial - Next - pctincrease - minextents - maxextents

Capacity Planning and ER Diagrams

- Calculating table, tablespace, Database sizes; Spreadsheet calculations.
- Block size determination

Internet & the New DBA; Requested discursion Topics

- **Job Hunting**
 - Web sites for the DBAs
 - Getting your resume on the NET
- **Technical Help:** Sites needed by the DBA; CSI

Day 40.

4-12: A picture is worth a thousand words – Architecture Drawing

See Sample Oracle Architecture Drawing below – All should be able to draw this sample in about 30 minutes.

- Final Oracle Architecture Drawing – comparing drawings
- General Revision.

Proverbs 27:17 *As iron sharpens iron, so one man sharpens another.*

Amen.
ChoMA

