

## Oracle Database 11g: Performance Tuning DBA Release 2

**Duration:** 5 Days

### What you will learn

This Oracle Database 11g Performance Tuning training starts with an unknown database that requires tuning. You'll then learn the steps a DBA performs to identify problem areas, diagnose common problems and fix them.

Learn To:

Describe Oracle tuning methodology.

Use Oracle supplied tools for monitoring and diagnosing SQL and Instance tuning issues.

Use database advisors to correct performance problems proactively.

Identify problem SQL statements & tune SQL performance problems.

Monitor the Instance Performance using Enterprise Manager.

Tune instance components, primarily using Instance parameters.

Benefits to You

Ensure fast, reliable, secure and easy to manage performance. Optimize database workloads, lower IT costs and deliver a higher quality of service by enabling smooth and rapid consolidation within your Datacenter.

Course Methodology

The methodology used in the practices is primarily reactive. After configuring monitoring tools and reviewing the available reports, you'll be presented with the Oracle architecture based on the SQL statement processing of SELECT and DML.

SQL Tuning

The SQL tuning section assumes that the DBA has little or no ability to change the code. The DBA will influence the SQL performance with available tools, and will be introduced to various methods of identifying the SQL statements that require tuning (as well as the diagnostic tools needed to find ways to change the performance).

This will include the use of statistics, outlines and profiles to influence the optimizer, adding and rebuilding indexes and using the SQL Advisors. This course introduces the DB Replay and SQL Performance Analyzer tools to help you test and minimize the impact of change.

Instance Tuning

Instance tuning uses the same general method of observing a problem, diagnosing the problem and implementing a solution. The instance tuning lessons cover the details of major tunable components and describe how you can influence the instance behavior. For each lesson, we will examine the relevant components of the architecture.

**EZY Intellect Pte. Ltd.,**

**#1 Changi North Street 1, Singapore – 498789. [www.ezyintellect.com](http://www.ezyintellect.com)**

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The class only discusses the architecture to the level required to understand the symptoms and solutions. More detailed explanations are left to other courses, reference material and Oracle documentation.

## Final Lessons

The last lesson of this course is a recap of the best practices discovered in the previous lessons, along with miscellaneous recommendations. The goal is to finish the course with a best practices list for students to take away.

Database Administrators  
Support Engineer  
Technical Consultant

## Related Training

### *Required Prerequisites*

Oracle Database 11g: Administration Workshop II Release 2  
Oracle Database 11g: Administration Workshop I Release 2

## Course Objectives

Use the Oracle Database tuning methodology appropriate to the available tools  
Utilize database advisors to proactively tune an Oracle Database Instance  
Use the tools based on the Automatic Workload Repository to tune the database  
Diagnose and tune common SQL related performance problems  
Diagnose and tune common Instance related performance problems  
Use Enterprise Manager performance-related pages to monitor an Oracle Database

## Course Topics

### Introduction

This lesson introduces the Performance Tuning course objectives and agenda

### Basic Tuning Tools

Monitoring tools overview  
Enterprise Manager  
V\$ Views, Statistics and Metrics  
Wait Events

### Using Automatic Workload Repository

Managing the Automatic Workload Repository Create AWR Snapshots  
Real Time SQL Monitoring (a 11.1 feature new lesson in NF L-15)

### Defining Problems

Defining the Problem  
Limit the Scope & Setting the Priority

Top SQL Reports  
Common Tuning Problems & Tuning During the Life Cycle  
ADDM Tuning Session  
Performance versus Business Requirements  
Performance Tuning Resources & Filing a Performance Service Request  
Monitoring and Tuning Tools: Overview

### **Using Metrics and Alerts**

Metrics, Alerts, and Baselines  
Limitation of Base Statistics & Typical Delta Tools  
Oracle Database 11g Solution: Metrics  
Benefits of Metrics  
Viewing Metric History Information & Using EM to View Metric Details  
Statistic Histograms & Histogram Views  
Database Control Usage Model & Setting Thresholds  
Server-Generated Alerts, Creating and Testing an Alert & Metric and Alert Views

### **Using Baselines**

Comparative Performance Analysis with AWR Baselines  
Automatic Workload Repository Baselines  
Moving Window Baseline  
Baselines in Performance Page Settings & Baseline Templates  
AWR Baselines & Creating AWR Baselines  
Managing Baselines with PL/SQL & Baseline Views  
Performance Monitoring and Baselines & Defining Alert Thresholds Using a Static Baseline  
Using EM to Quickly Configure & Changing Adaptive Threshold Settings

### **Using AWR Based Tools**

Automatic Maintenance Tasks  
ADDM Performance Monitoring  
Active Session History: Overview

### **Monitoring an Application**

What Is a Service? Service Attributes & Service Types  
Creating Services & Managing Services in a Single-Instance Environment  
Everything Switches to Services.  
Using Services with Client Applications & Using Services with the Resource Manager  
Services and Resource Manager with EM & Using Services with the Scheduler  
Using Services with Parallel Operations & Metric Thresholds  
Service Aggregation and Tracing & Service Aggregation Configuration.  
Client Identifier Aggregation and Tracing & Service Performance Views

### **Identifying Problem SQL Statements**

SQL Statement Processing Phases & Role of the Oracle Optimizer  
Identifying Bad SQL, Real Time SQL Monitoring (a 11.1 feature new lesson in NF L-15) & TOP SQL Reports  
What Is an Execution Plan? Methods for Viewing Execution Plans & Uses of Execution Plans

DBMS\_XPLAN Package: Overview & EXPLAIN PLAN Command  
Reading an Execution Plan, Using the V\$SQL\_PLAN View & Querying the AWR  
SQL\*Plus AUTOTRACE & SQL Trace Facility  
How to Use the SQL Trace Facility  
Generate an Optimizer Trace

### **Influencing the Optimizer**

Functions of the Query Optimizer, Selectivity, Cardinality and Cost & Changing Optimizer Behavior  
Using Hints, Optimizer Statistics & Extended Statistics  
Controlling the Behavior of the Optimizer with Parameters  
Enabling Query Optimizer Features & Influencing the Optimizer Approach  
Optimizing SQL Statements, Access Paths & Choosing an Access Path  
Join & Sort Operations  
How the Query Optimizer Chooses Execution Plans for Joins  
Reducing the Cost

### **Using SQL Performance Analyzer**

Real Application Testing: Overview & Use Cases  
SQL Performance Analyzer: Process & Capturing the SQL Workload  
Creating a SQL Performance Analyzer Task & SPA (NF Lesson 9) DBMS\_SQLTUNE.CREATE\_TUNING\_TASK  
Optimizer Upgrade Simulation & SQL Performance Analyzer Task Page  
Comparison Report & Comparison Report SQL Detail  
Tuning Regressing Statements & Preventing Regressions  
Parameter Change Analysis & Guided Workflow Analysis  
SQL Performance Analyzer: PL/SQL Example & Data Dictionary Views

### **SQL Performance Management**

Maintaining SQL Performance and Optimizer Statistics & Automated Maintenance Tasks  
Statistic Gathering Options & Setting Statistic Preferences  
Restore Statistics  
Deferred Statistics Publishing: Overview & Example  
Automatic SQL Tuning: Overview  
SQL Tuning Advisor: Overview  
Using the SQL Access Advisor  
SQL Plan Management: Overview

### **Using Database Replay**

The Big Picture & System Architecture  
Capture & Replay Considerations  
Replay Options & Analysis  
Database Replay Workflow in Enterprise Manager  
Packages and Procedures  
Data Dictionary Views: Database Replay  
Database Replay: PL/SQL Example  
Calibrating Replay Clients

## **Tuning the Shared Pool**

Shared Pool Architecture & Operation  
The Library Cache & Latch and Mutex  
Diagnostic Tools for Tuning the Shared Pool  
Avoiding Hard & Soft Parses  
Sizing the Shared Pool & Avoiding Fragmentation  
Data Dictionary Cache & SQL Query Result Cache  
UGA and Oracle Shared Server  
Large Pool & Tuning the Large Pool

## **Tuning the Buffer Cache**

Oracle Database Architecture: Buffer Cache  
Database Buffers  
Buffer Hash Table for Lookups  
Working Sets  
Buffer Cache Tuning Goals and Techniques  
Buffer Cache Performance Symptoms & Solutions  
Automatically Tuned Multiblock Reads  
Flushing the Buffer Cache (for Testing Only)

## **Tuning PGA and Temporary Space**

SQL Memory Usage & Performance Impact  
SQL Memory Manager  
Configuring Automatic PGA Memory & Setting PGA\_AGGREGATE\_TARGET Initially  
Monitoring & Tuning SQL Memory Usage  
PGA Target Advice Statistics & Histograms  
Automatic PGA and Enterprise Manager & Automatic PGA and AWR Reports  
Temporary Tablespace Management: Overview & Monitoring Temporary Tablespace  
Temporary Tablespace Shrink & Tablespace Option for Creating Temporary Table

## **Automatic Memory Management**

Oracle Database Architecture, Dynamic SGA & Memory Advisories  
Granule & Manually Adding Granules to Components  
Increasing the Size of an SGA Component, SGA Sizing Parameters & Manually Resizing Dynamic SGA Parameters  
Automatic Shared Memory Management & Memory Broker Architecture  
Behavior of Auto-Tuned & Manually Tuned SGA Parameters  
Using the V\$PARAMETER View & Resizing SGA\_TARGET  
Disabling, Configuring & Monitoring Automatic Shared Memory Management (ASMM)  
Automatic Memory Management

## **Tuning Segment Space Usage**

Space and Extent Management & Locally Managed Extents  
How Table Data Is Stored & Anatomy of a Database Block  
Minimize Block Visits  
The DB\_BLOCK\_SIZE Parameter  
Small & Large Block Size: Considerations  
Block Allocation, Free Lists & Block Space Management with Free Lists

Automatic Segment Space Management

Migration and Chaining, Shrinking Segments & Table Compression: Overview

### **Tuning I/O**

I/O Architecture, File System Characteristics, I/O Modes & Direct I/O

Bandwidth versus Size & Important I/O Metrics for Oracle Databases

I/O Calibration and Enterprise Manager, I/O Calibration and the PL/SQL Interface & I/O Statistics and Enterprise Manage

Stripe and Mirror Everything

Using RAID

I/O Diagnostics

Database I/O Tuning

What Is Automatic Storage Management?

### **Performance Tuning Summary**

Best practices identified throughout the course

Summarize the performance tuning methodology

### **Appendix B: Using Stats pack**

Installing Stats pack

Capturing Stats pack Snapshots

Reporting with Stats pack

Stats pack Considerations

Stats pack and AWR Reports

Reading a Stats pack Report Stats

pack and AWR

### **Related Courses**

Oracle Database 11g: Performance Tuning