

## Oracle Database Performance Tuning DBA (40 hrs.)

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 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

Technical Consultant

**Prerequisites:** Oracle Database 11g: Administration Workshop I

**Suggested Prerequisites:** Oracle Database 11g: Administration Workshop II

## 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
- Top SQL Reports
- Common Tuning Problems & Tuning During the Life Cycle
- ADDM Tuning Session
- Performance Versus Business Requirements
- Limit the Scope & Setting the Priority
- 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 Manager
- 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 Statspack**

- Installing Statspack
- Capturing Statspack Snapshots
- Reporting with Statspack
- Statspack Considerations
- Statspack and AWR Reports
- Reading a Statspack Report
- Statspack and AWR