

Oracle Database 11g: Performance Tuning DBA Release 2

Duration: 5 Days

What you will learn

The course starts with an unknown database that requires tuning. The lessons will proceed through the steps a DBA will perform to acquire the information needed to identify problem areas, to diagnose common problems, and remedy those problems. The methodology used in the practices is primarily reactive. After configuring monitoring tools, and reviewing the available reports, the student will be presented with the Oracle architecture based on the SQL statement processing of SELECT and DML.

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. The DBA will be introduced to various methods of identifying the SQL statements that require tuning, and 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. A major task of DBA's is to maintain SQL performance across changes. This course introduces the DB Replay, and SQL Performance Analyzer tools to help the DBA test and minimize the impact of change.

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. 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 the Oracle documentation.

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

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

Audience

- Database Administrators
- Support Engineer
- Technical Consultant

Prerequisites

Suggested Prerequisites

- Oracle Database: SQL and PL/SQL Fundamentals
- Oracle Database 11g: Administration Workshop II DBA 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 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