Advanced Oracle SQL Programming

A Relational Database Management System (RDBMS) is a software system that allows you to create and manage a Relational Database. Minimum requirements for such a system are defined by both ANSI and ISO. The Structured Query Language (SQL) is the international standard language for relational database management systems. SQL is robust enough to be used by users with non-technical backgrounds, as well as by professional developers and administrators.

In this class, students will develop deeper insight into relational database design and RDBMS operation, learn concepts and specific SQL syntax for extended Oracle datatypes, learn analysis and tuning techniques to increase SQL performance, and master advanced features of Oracle SQL for large data sets and data warehouses.

Course Objectives:

- Apply the basic theory behind relational database design.
- Contribute to all phases of database design and development.
- Use all aspects of subqueries.
- Apply Oracle's features for querying hierarchical data models.
- Use Oracle's Object-Relational Model.
- Create object types.
- Use Oracle's collection types in SQL.
- Select appropriate date-related datatypes for your applications.
- Use Oracle's regular expression SQL functions to perform pattern matching and string manipulation.
- Create and manage temporary tables.
- Establish goals in SQL tuning to improve performance.
- Use Oracle Database 10*g*'s tuning tools.
- Describe how indexes are used in RDBMSs, and use them effectively.
- Use the various analytic functions provided by Oracle to perform sophisticated analysis.
- Use SQL*Plus to format reports and extract data.

Audience: Application developers, database administrators, system administrators and users who write applications and procedures that access an Oracle 10*g* database.

Prerequisites: *Oracle SQL Programming*.

Number of Days: 3 days

1. Course Introduction
- Course Objectives
- Overview
- Suggested References

2. Database Design Concepts
- Relational Databases
- The Relational Model
- Relational Operations
- The Database Design Process
- Normalization
- Second and Third Normal Forms
- Other Normal Forms
- Applications for Relational Databases

3. SQL Subqueries
- Overview Of Subqueries

Inline Views
Correlated Subqueries
EXISTS Clause vs. IN Clause
Group Comparisons: ANY and ALL
Scalar Subquery Expression
Subqueries and DML Statements
Subquery Factoring: The WITH Clause
Top-N and Bottom-N analysis
CREATE TABLE and Subqueries

4. Hierarchical Queries
Hierarchical Data
Hierarchical Terminology
Hierarchical Query
Hierarchical Pseudocolumns
SYS_CONNECT_BY_PATH
Processing Hierarchical Queries

5. Object Types
Object-Oriented Programming
Oracle's Object Relational Model
Creating Object Types
Querying Object Types
DML with Object Types
Object Methods
Object Views
VARRAYs
Nested Tables

6. Times, Dates, and Strings
Datetime Fields
Dates and Timestamps
Intervals
Date and Interval Literals
Date Arithmetic
Date Functions
Character Types
Session and Database Parameters
REGEXP Functions
Regular Expressions Supported by REGEXP
Applying REGEXP Functions

7. Temporary Tables
Undo and Redo
Temporary Tables Defined
Data Lifetime — Transaction vs. Session
Creating Temporary Tables
Managing Temporary Tables
Storage of Temporary Tables
Effects of DML and TRUNCATE

8. SQL Tuning Tools
Automated Statistics Gathering
The DBMS_STATS Package
SQL Tuning Advisor
SQL Tuning Sets
SQL Access Advisor
Retrieving Execution Plans
EXPLAIN PLAN
Using DBMS_XPLAN
Interpreting Explain Plan Results
SQL Trace
TKPROF

9. SQL Tuning
Tuning Goals
The Optimizer
Optimizer Statistics
Identifying SQL to Tune
Optimizer Hints
Optimizer Goal Hints
Access Path Hints
Join Hints
Additional Hints
Plan Stability
Creating Stored Outlines

10. Indexes
Indexes
B-tree and Composite Indexes
Reverse Key and Unique Indexes
Function-Based Indexes
Bitmap Indexes
Index-Organized Tables
Managing Indexes

11. Oracle Analytic Functions
Analytic Functions
OVER, PARTITION BY, and ORDER BY
Windowing
ROLLUP
CUBE
Grouping Sets
RANK
Modeling
Model Clauses

12. Data Warehouse Features