Advanced SQL: Improving Productivity, Performance and Security

Course Summary

Description

This course covers ANSI/ISO standard SQL, with examples in SQL Server, Oracle, DB2 luw and z/os, and MySQL, with emphasis on SQL Server and Oracle. Labs can be done in any of those database environments.

Objectives

- At the end of this course, students will be able to:
- Understand basic relational database design principles, and how tables and other objects are created and maintained
- Use a wide variety of tools and techniques to improve performance of complex queries on large databases
- Follow best practices to improve security of data
- Create and manage complex views, and handle updating of views, the Check Option, materialized views, and virtual columns
- Create and manage indexes, including knowing when to create, and when not to create, indexes, and the use of partitioning, clustering, filtered, full-text, and other types of indexes
- Create stored procedures, including the use of required and optional parameters, variables, conditional statements, looping, cursors, exception handling, transactions, and debugging
- Create user defined functions, including the use of parameters, and all language features; create scalar and table functions, and understand the differences between table functions, stored procedures, and views
- Create triggers, including table, database and server triggers, before, instead of, and after triggers, handling various events, using the "transition" data involved, and dealing with transaction issues

Topics

- Introduction
- View issues
- Index issues
- Stored procedures
- User-Defined Functions
- Triggers

Audience

This course is designed for application developers.

Prerequisites

Before taking this course, students should take SQL Basics and Intermediate or have equivalent work experience, and have several weeks of experience using SQL.

Duration

Two days

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Course Outline

I. Introduction

- A. The basics of relational database design
- B. The basics of maintenance
- C. Tools for diagnosing and improving performance
- D. Best practices for improving security

II. View issues

- A. Overview/review of creating views
- B. Updatability of views
- C. The Check option
- D. Materialized views
- E. Virtual columns

III. Index issues

- A. Overview/review of indexes
- B. Indexing for performance
- C. Special index types
    1. Partitioning
    2. Clustering
    3. Index-organized tables
    4. Filtered
    5. Full-text

IV. Stored procedures

- A. Overview/review of Microsoft's Transact-SQL, Oracle's PL/SQL, and other procedure languages
- B. Parameters: input, output, optional parameters with default values
- C. Variables, conditional statements, looping
- D. Returning a result set
- E. Exception handling
- F. Transaction handling
- G. Debugging
- H. Overloading

V. User-Defined Functions

- A. Scalar functions: parameters, default values
- B. Table functions, and comparison to views

VI. Triggers

- A. Triggers compared to stored procedures or user-defined functions
- B. Triggers compared to column constraints or application code
- C. Uses of triggers
- D. Defining a trigger
    1. Specifying a table-level, database-level, or server-level trigger
    2. Before, Instead Of, and After triggers
    3. Specifying the table (and possibly column(s)) controlled by the trigger
    4. Specifying the event(s) that fire the trigger
- E. Handling the old (Deleted) and new (Inserted) data values
- F. Handling commit/rollback issues in triggers
- G. Nested and recursive triggers

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