Advanced T-SQL Querying, Programming and Tuning for SQL Server 2005, 2008 and 2012

Course Summary

Description

The course focuses on writing and tuning queries and programming with T-SQL in SQL Server 2005, 2008 and 2012. In this course you will learn the details and capabilities of T-SQL in the following areas: Logical Query Processing; Query Tuning; Subqueries, Window Ranking and Offset Functions, Joins and Set Operations; Aggregating and Pivoting Data; Window Aggregate Functions; TOP, OFFSET-FETCH and APPLY; Data Modification; Working with Date and Time; Programmable Objects (Dynamic SQL, Views, User Defined Functions, Stored Procedures, Triggers, Transactions and Concurrency, Exception Handling); Graphs, Trees and Hierarchies.

Along the course you will learn how to use T-SQL to solve practical problems such as: Relational Division, Ranking and Offsets, Missing and Existing Values (Gaps and Islands), Separating Elements, Running Totals, Pivoting and Unpivoting, Custom Aggregations, Dynamic Analysis of Grouping Sets, TOP and OFFSET-FETCH Problems, Top N Per Group, Paging, Aggregate over Columns, Data De-duplication, Handling Sequences, Treatment of Temporal Intervals (Overlaps, Max Concurrent, Packing), Dynamic Filtering, and more.

You will learn how to tune your queries, how to develop efficient routines including user defined functions, stored procedures and triggers, work in multi-user environments with transactions and isolation levels, and use dynamic SQL securely and efficiently.

You will also learn how to maintain and query hierarchical data. You will learn what graphs, trees and hierarchies are, what the common requests against graphs are, and how to write T-SQL code to handle those requests. Several different solutions will be presented including: Enumerated Paths, Nested Sets, Nested Iterations using Recursive Queries, and using the HIERARCHYID datatype.

The course provides a dedicated module focusing on query tuning. The module covers internals and index tuning, index access methods, temporary tables, set vs. cursors, and query tuning using query revisions. Moreover, query tuning is in the heart of this course and is incorporated in the different modules throughout the course. With each querying/programming problem the discussions will revolve around logical aspects, set-based vs. procedural programming and optimization of the solutions.

Objectives

At the end of this course, students will be able to:

- Understand logical query processing
- Understand SQL Server's internal data structures
- Be able to analyze and tune query performance
- Be able to analyze query execution plans
- Be able to solve complex querying and programming problems
- Think in terms of sets
- Be able to compare set based and cursor based solutions
- Use window functions to improve solutions
- Handle date and time data including intervals
- Describe performance problems related to use of user defined functions and possible workarounds
- Understand execution plan caching and reuse
- Understand transactions and concurrency aspects of database programming
- Know how to handle hierarchical data and write recursive queries
- Describe T-SQL enhancements in SQL Server 2008 and 2012

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Course Summary (cont'd)

Topics

- Logical Query Processing
- Query Tuning
- Multi-Table Queries, Ranking and Offset Functions
- Aggregating and Pivoting Data
- TOP, OFFSET-FETCH and APPLY
- Data Modification
- Working with Date and Time
- Programmable Objects
- Graphs, Trees and Hierarchies

Audience

This course is intended for: T-SQL Programmers, DBAs, Architects, and Analysts and those that need to write or review T-SQL code in SQL Server 2005, 2008 and 2012

Prerequisites

Before attending this course, it is recommended that students have at least one year of T-SQL querying and programming experience in SQL Server.

Duration

Five days

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Course Outline

I. Logical Query Processing
   A. Logical Query Processing Order
   B. Logical Query Processing Example
   C. Phase Details
   D. Set Operations

II. Query Tuning
   A. Internals and Index Tuning
   B. Temporary Tables
   C. Sets vs. Cursors
   D. Query Tuning with Query Revisions

III. Multi-Table Queries, Ranking and Offset Functions
   A. Subqueries and Table Expressions
   B. Window Ranking and Offset Functions
   C. Joins
   D. Set Operators
   E. LAB 03A

IV. Aggregating and Pivoting Data
   A. Window Aggregate Functions
   B. Pivoting and Unpivoting Data
   C. Custom Aggregations
   D. Grouping Sets
   E. LAB 04A

V. TOP, OFFSET-FETCH and APPLY
   A. TOP and OFFSET-FETCH
   B. APPLY
   C. LAB 05A

VI. Data Modification
   A. Inserting Data
   B. Sequences
   C. Deleting Data
   D. Updating Data
   E. Merging Data
   F. The OUTPUT Clause
   G. LAB 06A

VII. Working with Date and Time
   A. Date and Time Datatypes
   B. Date and Time Functions
   C. Date and Time Challenges
   D. Date and Time Querying Problems
   E. LAB 07

VIII. Programmable Objects
   A. Dynamic SQL
   B. Views and Inline Table Functions
   C. User Defined Functions
   D. Stored Procedures
   E. Triggers
   F. Transactions and Concurrency
   G. Exception Handling
   H. LAB 08A

IX. Graphs, Trees and Hierarchies
   A. Graphs, Described
   B. Materialized Paths
   C. Custom
   D. Using the HIERARCHYID datatype
   E. Nested Sets
   F. Nested Iterations
   G. Loops
   H. Recursive Queries