MOC 10774 A Querying Microsoft SQL Server 2012

Course Summary

Description

This 5-day instructor led course provides students with the technical skills required to write basic Transact-SQL queries for Microsoft SQL Server 2012. This course is the foundation for all SQL Server-related disciplines; namely, Database Administration, Database Development and Business Intelligence. This course helps people prepare for exam 70-461. Many of the exercises in this course are SQL Azure enabled.

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

- Write SELECT Queries
- Query Multiple Tables
- Use Built-In Functions
- Use Subqueries
- Execute Stored Procedures
- Use Set Operators
- Implement Error Handling
- Implementing Transactions
- Use Table Expressions
- Sort and Filter Data
- Use Window Ranking, Offset and Aggregate Functions
- Query SQL Server Metadata
- Program with T-SQL
- Improve Query Performance

Topics

- Introduction to Microsoft SQL Server 2012
- Getting Started with SQL Azure
- Introduction to T-SQL Querying
- Writing SELECT Queries
- Querying Multiple Tables
- Sorting and Filtering Data
- Working with SQL Server 2012 Data Types
- Using Built-In Functions
- Grouping and Aggregating Data
- Using Subqueries
- Using Table Expressions
- Using Set Operators
- Using Window Ranking, Offset and Aggregate Functions
- Pivoting and Grouping Sets
- Querying SQL Server Metadata
- Executing Stored Procedures
- Programming with T-SQL
- Implementing Error Handling
- Implementing Transactions
- Improving Query Performance

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Course Summary (cont'd)

Audience

This course is intended for Database Administrators, Database Developers, and Business Intelligence professionals. The course will very likely be well attended by SQL power users who aren't necessarily database-focused or plan on taking the exam; namely, report writers, business analysts and client application developers.

Prerequisites

Before attending this course, students must have:

- Working knowledge of relational databases.
- Basic knowledge of the Microsoft Windows operating system and its core functionality.

Before attending this course, students should have:

- Basic understanding of virtualization technology (Classroom labs utilize virtual machines)

Duration

Five days

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Course Outline

I. Introduction to Microsoft SQL Server 2012

This module introduces the SQL Server platform and major tools. It discusses editions, versions, tools used to query, documentation sources, and the logical structure of databases.

A. Introducing Microsoft SQL Server 2012
B. Getting Started with SQL Server Management Studio

Lab : Working with SQL Server 2012 Tools

- Working with SQL Server Management Studio
- Creating and Organizing T-SQL scripts
- Using Books Online

II. Getting Started with SQL Azure

This module introduces you to the concepts of SQL Azure. If the virtual machines in your classroom are able to connect to the internet and you have a Windows Azure account you may be able to connect to your Azure server and database. Many of the labs in the rest of this course are enabled for you to perform the lab while connected to your own Azure database in the cloud.

A. Overview of SQL Azure
B. Working with SQL Azure

III. Introduction to T-SQL Querying

This module introduces Transact SQL as the primary querying language of SQL Server. It discusses the basic structure of T-SQL queries, the logical flow of a SELECT statement, and introduces concepts such as predicates and set-based operations.

A. Introducing T-SQL
B. Understanding Sets
C. Understanding Predicate Logic
D. Understanding the Logical Order of Operations in SELECT statements

Lab : Introduction to Transact-SQL Querying

- Executing Basic SELECT Statements
- Executing queries which filter data using predicates
- Executing queries which sort data using ORDER BY

IV. Writing SELECT Queries

This module introduces the fundamentals of the SELECT statement, focusing on queries against a single table.

A. Writing Simple SELECT Statements
B. Eliminating Duplicates with DISTINCT
C. Using Column and Table Aliases
D. Writing Simple CASE Expressions

Lab : Writing Basic SELECT Statements

- Write simple SELECT Statements
- Eliminate Duplicates Using Distinct
- Use Table and Column Aliases
- Use a Simple CASE Expression

V. Querying Multiple Tables

This module explains how to write queries which combine data from multiple sources in SQL Server. The module introduces the use of JOINs in T-SQL queries as a mechanism for retrieving data from multiple tables.

A. Understanding Joins
B. Querying with Inner Joins
C. Querying with Outer Joins
D. Querying with Cross Joins and Self Joins

Lab : Querying Multiple Tables

- Writing Queries That Use Inner Joins
- Writing Queries That Use Multiple-Table Inner Join
- Writing Queries That Use Self Joins
- Writing Queries That Use Outer Loins
- Writing Queries That Use Cross Join

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Course Outline (cont'd)

VI. Sorting and Filtering Data

This module explains how to enhance queries to limit the rows they return, and to control the order in which the rows are displayed. The module also discusses how to resolve missing and unknown results.

A. Sorting Data
B. Filtering Data with a WHERE Clause
C. Filtering with the TOP and OFFSET-FETCH Options
D. Working with Unknown and Missing Values

Lab : Sorting and Filtering Data

- Writing Queries That Filter Data Using a WHERE Clause
- Writing Queries That Filter Data Using an ORDER BY Clause
- Writing Queries That Filter Data Using the TOP Option
- Writing Queries That Filter Data Using the OFFSET-FETCH Clause

VII. Working with SQL Server 2012 Data Types

This module explains the data types SQL Server uses to store data. It introduces the many types of numeric and special-use data types. It also explains conversions between data types, and the importance of type precedence.

A. Introducing SQL Server 2012 Data Types
B. Working with Character Data
C. Working with Date and Time Data

Lab : Working with SQL Server 2012 Data Types

- Writing Queries That Return Date and Time Data
- Writing Queries That Use Date and Time Functions
- Writing Queries That Return Character Data
- Writing Queries That Use Character Functions

VIII. Using Built-In Functions

This module introduces the use of functions that are built in to SQL Server Denali, and will discuss some common usages including data type conversion, testing for logical results and nullability.

A. Writing Queries with Built-In Functions
B. Using Conversion Functions
C. Using Logical Functions
D. Using Functions to Work with NULL

Lab : Using Built-In Functions

- Write queries which use conversion functions
- Write queries which use logical functions
- Write queries which test for nullability

IX. Grouping and Aggregating Data

This module introduces methods for grouping data within a query, aggregating the grouped data and filtering groups with HAVING. The module is designed to help the student grasp why a SELECT clause has restrictions placed upon column naming in the GROUP BY clause as well as which columns may be listed in the SELECT clause.

A. Using Aggregate Functions
B. Using the GROUP BY Clause
C. Filtering Groups with HAVING

Lab : Grouping and Aggregating Data

- Write queries which use the GROUP BY clause
- Write queries which use aggregate functions
- Write queries which use distinct aggregate functions
- Write queries which filter groups with the HAVING clause

X. Using Subqueries

This module will introduce the use of subqueries in various parts of a SELECT statement. It will include the use of scalar and multi-result subqueries, and the use of the IN and EXISTS operators.

A. Writing Self-Contained Subqueries
B. Writing Correlated Subqueries
C. Using the EXISTS Predicate with Subqueries

Lab : Using Subqueries

- Write queries which use self-contained subqueries
- Write queries which use scalar and multi-result subqueries
- Write queries which use correlated subqueries and EXISTS predicate

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XI. Using Table Expressions

This module introduces T-SQL expressions which return a valid relational table, typically for further use in the query. The module discusses views, derived tables, common table expressions and inline table-valued functions.

A. Using Derived Tables
B. Using Common Table Expressions
C. Using Views
D. Using Inline Table-Valued Functions

Lab : Using Table Expressions

- Write Queries Which Use Views
- Write Queries Which Use Derived Tables
- Write Queries Which Use Common Table Expressions
- Write Queries Which Use Inline Table-Valued Functions

XII. Using Set Operators

This module introduces operations involving multiple sets of data. It will cover the use of the UNION, UNION ALL, APPLY, CROSS APPLY, OUTER APPLY operators as well as the EXCEPT and INTERSECTS operators.

A. Writing Queries with the UNION Operator
B. Using EXCEPT and INTERSECT
C. Using APPLY

Lab : Using Set Operators

- Write queries which use UNION set operators and UNION ALL multi-set operators
- Write queries which use CROSS APPLY and OUTER APPLY operators
- Write queries which use EXCEPT and INTERSECT operators

XIII. Using Window Ranking, Offset and Aggregate Functions

This module introduces window functions including ranking, aggregate and offset functions. Much of this functionality is new to SQL Server 2012. It will cover the use of T-SQL functions such as ROW_NUMBER, RANK, DENSE_RANK, NTILE, LAG, LEAD, FIRST_VALUE and LAST_VALUE to perform calculations against a set, or window, of rows.

A. Creating Windows with OVER
B. Exploring Window Functions

Lab : Using Window Ranking, Offset and Aggregate Functions

- Write queries which use ranking functions
- Write queries which use offset functions
- Write queries which use window aggregate functions

XIV. Pivoting and Grouping Sets

This module discusses techniques for pivoting data in T-SQL as well to introduce the fundamentals of the GROUPING SETS clause. It will also cover the use of GROUP BY ROLLUP and GROUP BY CUBE syntax in SQL Server 2012.Lessons

A. Writing Queries with PIVOT and UNPIVOT
B. Working with Grouping Sets

Lab : Pivoting and Grouping Sets

- Write queries which use the PIVOT operator
- Write queries which use the UNPIVOT operator
- Write queries which use the GROUPING SETS subclause

XV. Querying SQL Server Metadata

This module introduces the use of SQL Server system objects in T-SQL queries. It will cover the use of system catalog views, system stored procedures, system functions, and dynamic management objects.

A. Querying System Catalog Views and Functions
B. Executing System Stored Procedures
C. Querying Dynamic Management Objects

Lab : Querying SQL Server Metadata

- Querying System Catalog Views
- Querying System Functions
- Querying System Dynamic Management Views

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XVI. Executing Stored Procedures
This module introduces the use of existing stored procedures in a T-SQL querying environment. It discusses the use of EXECUTE, how to pass input and output parameters to a procedure, and how to invoke system stored procedures.

A. Querying Data with Stored Procedures
B. Passing Parameters to Stored Procedures
C. Creating Simple Stored Procedures
D. Working with Dynamic SQL

Lab : Executing Stored Procedures

- Use the EXECUTE statement to invoke stored procedures
- Pass parameters to stored procedures
- Execute system stored procedures

XVII. Programming with T-SQL
This module provides a basic introduction to T-SQL programming concepts and objects. It discusses batches, variables, control of flow elements such as loops and conditionals, how to create and execute dynamic SQL statements, and how to use synonyms.

A. T-SQL Programming Elements
B. Controlling Program Flow

Lab : Programming with T-SQL

- Declaring Variables and Delimiting Batches
- Using Control-of-Flow Elements
- Generating Dynamic SQL
- Using Synonyms

XVIII. Implementing Error Handling
This module introduces the use of error handlers in T-SQL code. It will introduce the difference between compile errors and run-time errors, and will cover how errors affect batches. The module will also cover how to control error handling using TRY/CATCH blocks, the use of the ERROR class of functions, and the use of the new THROW statement.

A. Using TRY / CATCH Blocks
B. Working with Error Information

Lab : Implementing Error Handling

- Redirecting Errors with TRY / CATCH
- Using THROW to Pass an Error Message Back to a Client

XIX. Implementing Transactions
This module introduces the concepts of transaction management in SQL Server. It will provide a high-level overview of transaction properties, cover the basics of marking transactions with BEGIN, COMMIT and ROLLBACK.

A. Transactions and the Database Engine
B. Controlling Transactions

Lab : Implementing Transactions

- Controlling transactions with BEGIN, COMMIT, and ROLLBACK
- Adding error handling to a CATCH block

XX. Improving Query Performance
This module introduces the concepts of system resource usage and the performance impact of querying SQL Server 2012. It will cover, at a high level, the use of indexes in SQL Server, the use of execution plans in SQL Server Management Studio, and the use of SET options to view system resource usage when executing queries. It will also compare set-based operations with cursor-based operations.

A. Factors in Query Performance
B. Displaying Query Performance Data

Lab : Improving Query Performance

- Viewing Query Execution Plans
- Viewing Index Usage and Using SET STATISTICS Statements

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