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What is Querying Data with Transact-SQL (M20761)?

This Microsoft training course is designed to introduce students to Transact-SQL. It is designed in such a way that the first three days can be taught as a course to students requiring the knowledge for other courses in the SQL Server curriculum. Days 4 & 5 teach the remaining skills required to take exam 70-761. The main purpose of the training course is to give students a good understanding of the Transact-SQL language which is used by all SQL Server-related disciplines; namely, Database Administration, Database Development and Business Intelligence.

Who is Querying Data with Transact-SQL (M20761) intended for?

The primary target audience for this training course is: Database Administrators, Database Developers and BI professionals.

Candidates will need:

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

What are the objectives of Querying Data with Transact-SQL (M20761)?

After completing this training course, students will be able to:

- Describe key capabilities and components of SQL Server 2016.
- Describe T-SQL, sets, and predicate logic.
- Write a single table SELECT statement.
- Write a multi-table SELECT statement.
- Write SELECT statements with filtering and sorting.
- Describe how SQL Server uses data types.

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- Write DML statements.
- Write queries that use built-in functions.
- Write queries that aggregate data.
- Write subqueries.
- Create and implement views and table-valued functions.
- Use set operators to combine query results.
- Write queries that use window ranking, offset, and aggregate functions.
- Transform data by implementing pivot, unpivot, rollup and cube.
- Create and implement stored procedures.
- Add programming constructs such as variables, conditions, and loops to T-SQL code.

Module 1: Introduction to Microsoft SQL Server 2016This module introduces SQL Server, the versions of SQL Server, including cloud versions, and how to connect to SQL Server using SQL Server Management Studio.Lessons

- The Basic Architecture of SQL Server
- SQL Server Editions and Versions
- Getting Started with SQL Server Management Studio

Lab : Working with SQL Server 2016 Tools

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

After completing this module, you will be able to:

- Describe relational databases and Transact-SQL queries.
- Describe the on-premise and cloud-based editions and versions of SQL Server

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- Describe how to use SQL Server Management Studio (SSMS) to connect to an instance of SQL Server, explore the databases contained in the instance, and work with script files that contain T-SQL queries.

Module 2: Introduction to T-SQL QueryingThis module describes the elements of T-SQL and their role in writing queries. Describe the use of sets in SQL Server. Describe the use of predicate logic in SQL Server. Describe the logical order of operations in SELECT statements.Lessons

- Introducing T-SQL
- Understanding Sets
- Understanding Predicate Logic
- Understanding the Logical Order of Operations in SELECT statements

Lab : Introduction to T-SQL Querying

- Executing Basic SELECT Statements
- Executing Queries that Filter Data using Predicates
- Executing Queries That Sort Data Using ORDER BY

After completing this module, you will be able to:

- Describe the role of T-SQL in writing SELECT statements.
- Describe the elements of the T-SQL language and which elements will be useful in writing queries.
- Describe the concepts of the set theory, one of the mathematical underpinnings of relational databases, and to help you apply it to how you think about querying SQL Server
- Describe predicate logic and examine its application to querying SQL Server.
- Explain the elements of a SELECT statement, delineate the order in which the elements are evaluated, and then apply this understanding to a practical approach to writing queries.

Module 3: Writing SELECT QueriesThis module introduces the fundamentals of the SELECT statement, focusing on queries against a single table.Lessons

- Writing Simple SELECT Statements
- Eliminating Duplicates with DISTINCT
- Using Column and Table Aliases
- Writing Simple CASE Expressions

Lab : Writing Basic SELECT Statements

- Writing Simple SELECT Statements
- Eliminating Duplicates Using DISTINCT

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- Describe the structure and format of the SELECT statement, as well as enhancements that will add functionality and readability to your queries
- Describe how to eliminate duplicates using the DISTINCT clause
- Describe the use of column and table aliases
- Understand and use CASE expressions

Module 4: Querying Multiple TablesThis module describes how to write queries that combine data from multiple sources in Microsoft SQL Server 2016.Lessons

- Understanding Joins
- Querying with Inner Joins
- Querying with Outer Joins
- Querying with Cross Joins and Self Joins

Lab : Querying Multiple Tables

- Writing Queries that use Inner Joins
- Writing Queries that use Multiple-Table Inner Joins
- Writing Queries that use Self-Joins
- Writing Queries that use Outer Joins
- Writing Queries that use Cross Joins

After completing this module, you will be able to:

- Explain the fundamentals of joins in SQL Server 2016
- Write inner join queries
- Write queries that use outer joins
- Use additional join types

Module 5: Sorting and Filtering DataThis module describes how to implement sorting and filtering.Lessons

- Sorting Data
- Filtering Data with Predicates
- Filtering Data with TOP and OFFSET-FETCH
- Working with Unknown Values

Lab : Sorting and Filtering Data

- Writing Queries that Filter Data using a WHERE Clause
- Writing Queries that Sort Data Using an ORDER BY Clause
- Writing Queries that Filter Data Using the TOP Option

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- Explain how to add an ORDER BY clause to your queries to control the order of rows displayed in your query's output
- Explain how to construct WHERE clauses to filter out rows that do not match the predicate.
- Explain how to limit ranges of rows in the SELECT clause using a TOP option.
- Explain how to limit ranges of rows using the OFFSET-FETCH option of an ORDER BY clause.
- Explain how three-valued logic accounts for unknown and missing values, how SQL Server uses NULL to mark missing values, and how to test for NULL in your queries.

.Module 6: Working with SQL Server 2016 Data TypesThis module introduces the data types SQL Server uses to store data.Lessons

- Introducing SQL Server 2016 Data Types
- Working with Character Data
- Working with Date and Time Data

Lab : Working with SQL Server 2016 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 Return Character Functions

After completing this module, you will be able to:

- Explore many of the data types SQL Server uses to store data and how data types are converted between types
- Explain the SQL Server character-based data types, how character comparisons work, and some common functions you may find useful in your queries
- Describe data types that are used to store temporal data, how to enter dates and times so they will be properly parsed by SQL Server, and how to manipulate dates and times with built-in functions.

Module 7: Using DML to Modify DataThis module describes how to create DML queries, and why you would want to.Lessons

- Inserting Data
- Modifying and Deleting Data

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After completing this module, you will be able to:

- Use INSERT and SELECT INTO statements
- Use UPDATE, MERGE, DELETE, and TRUNCATE.

Module 8: Using Built-In FunctionsThis module introduces some of the many built in functions in SQL Server 2016.Lessons

- Writing Queries with Built-In Functions
- Using Conversion Functions
- Using Logical Functions
- Using Functions to Work with NULL

Lab : Using Built-In Functions

- Writing Queries That Use Conversion Functions
- Writing Queries that use Logical Functions
- Writing Queries that Test for Nullability

After completing this module, you will be able to:

- Describe the types of functions provided by SQL Server, and then focus on working with scalar functions
- Explain how to explicitly convert data between types using several SQL Server functions
- Describe how to use logical functions that evaluate an expression and return a scalar result.
- Describe additional functions for working with NULL

Module 9: Grouping and Aggregating DataThis module describes how to use aggregate functions.Lessons

- Using Aggregate Functions
- Using the GROUP BY Clause
- Filtering Groups with HAVING

Lab : Grouping and Aggregating Data

- Writing Queries That Use the GROUP BY Clause
- Writing Queries that Use Aggregate Functions
- Writing Queries that Use Distinct Aggregate Functions
- Writing Queries that Filter Groups with the HAVING Clause

After completing this module, you will be able to:

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- Write queries that separate rows using the GROUP BY clause.
- Write queries that use the HAVING clause to filter groups.

Module 10: Using SubqueriesThis module describes several types of subquery and how and when to use them.Lessons

- Writing Self-Contained Subqueries
- Writing Correlated Subqueries
- Using the EXISTS Predicate with Subqueries

Lab : Using Subqueries

- Writing Queries That Use Self-Contained Subqueries
- Writing Queries That Use Scalar and Multi-Result Subqueries
- Writing Queries That Use Correlated Subqueries and an EXISTS Clause

After completing this module, you will be able to:

- Describe where subqueries may be used in a SELECT statement.
- Write queries that use correlated subqueries in a SELECT statement
- Write queries that use EXISTS predicates in a WHERE clause to test for the existence of qualifying rows
- Use the EXISTS predicate to efficiently check for the existence of rows in a subquery.

Module 11: Using Table ExpressionsPreviously in this course, you learned about using subqueries as an expression that returned results to an outer calling query. Like subqueries, table expressions are query expressions, but table expressions extend this idea by allowing you to name them and to work with their results as you would work with data in any valid relational table. Microsoft SQL Server 2016 supports four types of table expressions: derived tables, common table expression (CTEs), views, and inline table-valued functions (TVFs). In this module, you will learn to work with these forms of table expressions and learn how to use them to help create a modular approach to writing queries.Lessons

- Using Views
- Using Inline Table-Valued Functions
- Using Derived Tables
- Using Common Table Expressions

Lab : Using Table Expressions

- Writing Queries That Use Views
- Writing Queries That Use Derived Tables
- Writing Queries That Use Common Table Expressions (CTEs)
- Writing Queries That Sue Inline Table-Valued Expressions

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- Write queries that return results from views.
- Use the CREATE FUNCTION statement to create simple inline TVFs.
- Write queries that create and retrieve results from derived tables.
- Write queries that create CTEs and return results from the table expression.

Module 12: Using Set OperatorsThis module introduces how to use the set operators UNION, INTERSECT, and EXCEPT to compare rows between two input sets.Lessons

- Writing Queries with the UNION operator
- Using EXCEPT and INTERSECT
- Using APPLY

Lab : Using Set Operators

- Writing Queries That Use UNION Set Operators and UNION ALL
- Writing Queries That Use CROSS APPLY and OUTER APPLY Operators
- Writing Queries That Use the EXCEPT and INTERSECT Operators

After completing this module, students will be able to:

- Write queries that use UNION to combine input sets.
- Write queries that use UNION ALL to combine input sets
- Write queries that use the EXCEPT operator to return only rows in one set but not another.
- Write queries that use the INTERSECT operator to return only rows that are present in both sets
- Write queries using the CROSS APPLY operator.
- Write queries using the OUTER APPLY operator

Module 13: Using Windows Ranking, Offset, and Aggregate FunctionsThis module describes the benefits to using window functions. Restrict window functions to rows defined in an OVER clause, including partitions and frames. Write queries that use window functions to operate on a window of rows and return ranking, aggregation, and offset comparison results.Lessons

- Creating Windows with OVER
- Exploring Window Functions

Lab : Using Windows Ranking, Offset, and Aggregate Functions

- Writing Queries that use Ranking Functions
- Writing Queries that use Offset Functions
- Writing Queries that use Window Aggregate Functions

After completing this module, students will be able to:

- Describe the T-SQL components used to define windows, and the relationships between them.
- Write queries that use the OVER clause, with partitioning, ordering, and framing to define

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Module 14: Pivoting and Grouping SetsThis module describes write queries that pivot and unpivot result sets. Write queries that specify multiple groupings with grouping setsLessons

- Writing Queries with PIVOT and UNPIVOT
- Working with Grouping Sets

Lab : Pivoting and Grouping Sets

- Writing Queries that use the PIVOT Operator
- Writing Queries that use the UNPIVOT Operator
- Writing Queries that use the GROUPING SETS CUBE and ROLLUP Subclauses

After completing this module, students will be able to:

- Describe how pivoting data can be used in T-SQL queries.
- Write queries that pivot data from rows to columns using the PIVOT operator.
- Write queries that unpivot data from columns back to rows using the UNPIVOT operator.
- Write queries using the GROUPING SETS subclause.
- Write queries that use ROLLUP AND CUBE.
- Write queries that use the GROUPING_ID function.

Module 15: Executing Stored ProceduresThis module describes how to return results by executing stored procedures. Pass parameters to procedures. Create simple stored procedures that encapsulate a SELECT statement. Construct and execute dynamic SQL with EXEC and sp_executesql.Lessons

- Querying Data with Stored Procedures
- Passing Parameters to Stored procedures
- Creating Simple Stored Procedures
- Working with Dynamic SQL

Lab : Executing Stored Procedures

- Using the EXECUTE statement to Invoke Stored Procedures
- Passing Parameters to Stored procedures
- Executing System Stored Procedures

After completing this module, students will be able to:

- Describe stored procedures and their use.
- Write T-SQL statements that execute stored procedures to return data.
- Write EXECUTE statements that pass input parameters to stored procedures.
- Write T-SQL batches that prepare output parameters and execute stored procedures.
- Use the CREATE PROCEDURE statement to write a stored procedure.
- Create a stored procedure that accepts input parameters.
- Describe how T-SQL can be dynamically constructed.
- Write queries that use dynamic SQL.

Module 16: Programming with T-SQLThis module describes how to enhance your T-SQL code with programming elements.Lessons

- T-SQL Programming Elements
- Controlling Program Flow

Lab : Programming with T-SQL

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- Using Variables in a Dynamic SQL Statement
- Using Synonyms

After completing this module, students will be able to:

- Describe how Microsoft SQL Server treats collections of statements as batches.
- Create and submit batches of T-SQL code for execution by SQL Server.
- Describe how SQL Server stores temporary objects as variables.
- Write code that declares and assigns variables.
- Create and invoke synonyms
- Describe the control-of-flow elements in T-SQL.
- Write T-SQL code using IF...ELSE blocks.
- Write T-SQL code that uses WHILE.

Module 17: Implementing Error HandlingThis module introduces error handling for T-SQL.Lessons

- Implementing T-SQL error handling
- Implementing structured exception handling

Lab : Implementing Error Handling

- Redirecting errors with TRY/CATCH
- Using THROW to pass an error message back to a client

After completing this module, students will be able to:

- Implement T-SQL error handling.
- Implement structured exception handling.

Module 18: Implementing TransactionsThis module describes how to implement transactions.Lessons

- Transactions and the database engines
- Controlling transactions

Lab : Implementing Transactions

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

After completing this module, students will be able to:

- Describe transactions and the differences between batches and transactions.
- Describe batches and how they are handled by SQL Server.
- Create and manage transactions with transaction control language (TCL) statements.
- Use SET XACT_ABORT to define SQL Servers handling of transactions outside TRY/CATCH

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other courses in the SQL Server curriculum. Days 4 & 5 teach the remaining skills required to take exam 70-761.