NE-20761C
Querying Data with Transact-SQL

Summary

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<td>Intermediate</td>
<td>SQL Server</td>
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Introduction
This 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 70-781.

Audience Profile
The main purpose of the 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. As such, the primary target audience for this course is: Database Administrators, Database Developers and BI professionals.

Prerequisites
Before attending this course, students must have:
- Working knowledge of relational databases

Course Objectives
After completing this course, students will be able to:
- Describe key capabilities and components of SQL Server
- 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
- 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

Course Content

Module 1: Introduction to Microsoft SQL Server
This 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 Tools
- Working with SQL Server Management Studio
- Creating and Organizing T-SQL Scripts

Module 2: Introduction to T-SQL Querying
This module describes the elements of T-SQL and their role in writing queries. Describe the use of sets 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
- Using Books Online
After completing this module, students will be able to:
- Describe relational databases and Transact-SQL queries
- Describe the on-premise and cloud-based editions and versions of SQL Server
- 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

Lab: Working with SQL Server Tools
- Working with SQL Server Management Studio
- Creating and Organizing T-SQL Scripts
### Module 3: Writing SELECT Queries

This 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
- Using Column and Table Aliases
- Using a Simple CASE Expression

### Module 4: Querying Multiple Tables

This module describes how to write queries that combine data from multiple sources in Microsoft SQL Server.

**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

### Module 5: Sorting and Filtering Data

This 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

### Module 6: Working with SQL Server Data Types

This module introduces the data types SQL Server uses to store data.

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

**Lab:** Working with SQL Server Data Types
- Querying a cube using MDX
- Creating a Calculated Member

### Module 7: Using DML to Modify Data

This module describes how to create DML queries, and why you would want to.

**Lessons**
- Inserting Data
- Modifying and Deleting Data

**Lab:** Using DML to Modify Data
- Inserting Data
- Updating and Deleting Data

### Module 8: Using Built-In Functions

This module introduces some of the many built-in functions in SQL Server.

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

**Lab:** Using Built-In Functions
Module 9: Grouping and Aggregating Data
This 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 Aggregate Functions
- Writing Queries That Use Distinct Aggregate Functions
- Writing Queries that Filter Groups with the HAVING Clause

After completing this module, students will be able to:
- Describe how to use 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 10: Using Subqueries
This 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 the GROUP BY Clause
- Writing Queries That Use Self-Contained Subqueries
- Writing Queries That Use Scalar and Multi-Result Subqueries
- Using APPLY Operators

After completing this module, students will be able to:
- Describe the built-in aggregate function in SQL Server and write queries using it.
- Write queries that separate rows using the GROUP BY clause.
- Write queries that use the HAVING clause to filter groups.

Module 11: Using Table Expressions
Previously 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 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 Use Inline Table-Valued Expressions

After completing this module, students will be able to:
- 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 Operators
This 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 Functions
This 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 windows
• Write queries that use window aggregate functions
• Write queries that use window ranking functions
• Write queries that use window offset functions

Module 14: Pivoting and Grouping Sets
This module describes write queries that pivot and unpivot result sets. Write queries that specify multiple groupings with grouping sets.
Lessons
• Writing Queries with PIVOT and UNPIVOT
• Working with Grouping Sets
Lab: Pivoting and Grouping Sets

Module 15: Executing Stored Procedures
This 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

Module 16: Programming with T-SQL
This 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
• Declaring Variables and Delimiting Batches
• Using Control-Of-Flow Elements
• 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 Handling
This 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 Transactions
This module describes how to implement transactions.

Lessons
- Transactions and the database engines
- Controlling transactions

Lab: Implementing Transactions
- Controlling transactions with BEGIN, COMMIT, and ROLLBACK

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
- Adding error handling to a CATCH block

Create and manage transactions with transaction control language (TCL) statements
- Use SET XACT_ABORT to define SQL Servers handling of transactions outside TRY/CATCH blocks

Associated Certifications & Exam
This course prepares students to write Exam 70-761: Querying Data with Transact-SQL.
On successful completion of this course students will receive a Torque IT attendance certificate.