

Querying SQL Server Advanced

Summary: Duration – 4 days - 16 hours (09:30-13:30 every day), Level - 300 (MS Scale), Delivery method - Virtual Instructor-led class or In-class

This is an intermediate to advanced course in SQL Server querying using Transact-SQL. The training is focused on extending the fundamental querying skills by exploring more complex SQL scenarios, deeper data analysis techniques, and efficient query design. The main goal of the course is to develop practical skills in writing advanced queries using modern SQL constructs such as subqueries, derived tables, common table expressions (CTEs), windowing functions, and advanced filtering. The course emphasizes hands-on practice and instructor-led labs to reinforce concepts.

AUDIENCE:

The primary audience of this class are professionals who already have basic experience with writing SQL queries and want to advance their T-SQL skills. This includes Data Analysts, BI Developers, Data Engineers, and experienced users of SQL Server who need to work with more complex datasets and querying logic.

The secondary audience includes database developers and administrators looking to optimize queries and structure data retrieval more efficiently through ranking, windowing, and subquerying techniques.

Prerequisites:

- Basic proficiency with SELECT, JOIN, WHERE, GROUP BY
- Understanding of relational databases and SQL syntax
- Familiarity with Microsoft SQL Server Management Studio (SSMS)
- Prior completion of a fundamentals-level SQL course or equivalent experience

AFTER THE TRAINING ATTENDEES WILL BE ABLE TO:

- Write complex SELECT statements using nested logic and filtering
- Use advanced string, date/time, and conversion functions
- Apply GROUP BY with advanced expressions and HAVING filters
- Create and use subqueries, derived tables, CTEs, and views
- Apply windowing functions and ranking logic (ROW_NUMBER, RANK, DENSE_RANK, NTILE)
- Combine sets of data and use CASE expressions for conditional logic
- Build reusable logic patterns for advanced reporting and analytics

TOPICS:

DAY 1

Module 1: Join, Group BY and Complex Filters – Fast Recall

A review and deepening of foundational concepts with emphasis on edge cases and performance:

Lessons:

- ✓ Multi-table JOINS: inner, outer, self joins
- ✓ Advanced filtering using multiple conditions and sub-clauses
- ✓ GROUP BY with complex expressions
- ✓ HAVING clause for aggregated conditions

Lab:

- ✓ Build multi-table JOIN queries
- ✓ Apply filtering with compound WHERE and HAVING
- ✓ Group data and compute summaries with conditions
- ✓ Identify and resolve logical conflicts in query filters

In the end of every training day every student will receive LAB Exercises for homework. They can make the exercises whenever it is possible for them in the day ahead. If they have questions, our instructor will answer in the Q&A session on the next training day.

After completing this module, you will be able to:

- ✓ Write advanced JOIN statements across multiple tables
 - ✓ Apply filtering logic using WHERE and HAVING clauses correctly
 - ✓ Group and aggregate data effectively with additional expressions
- Identify issues in filtering logic and optimize query structure

DAY 2

Module 2: Complex Queries and Expressions (09:30am - 13:30am EEST)

This module explores advanced SQL expressions and built-in functions that solve practical transformation and data quality tasks.

Lessons:

- ✓ Dealing with NULLs in logical expressions
- ✓ Using COALESCE, ISNULL, NULLIF
- ✓ String functions: CONCAT, LEFT/RIGHT, CHARINDEX, REPLACE
- ✓ Date and time functions: DATEDIFF, DATEADD, FORMAT, GETDATE
- ✓ Type conversions: CAST, CONVERT, implicit pitfalls

Lab:

- ✓ Write expressions that handle NULLs gracefully
- ✓ Clean and extract string values
- ✓ Perform date arithmetic and create dynamic time windows
- ✓ Convert data types and handle mismatches

In the end of every training day every student will receive LAB Exercises for homework. They can make the exercises whenever it is possible for them in the day ahead. If they have questions our instructor will answer in the Q&A session on the next training day.

After completing this module, you will be able to:

- ✓ Use expressions to transform data directly in the query
 - ✓ Handle NULLs using best practices and built-in functions
 - ✓ Work confidently with strings and datetime values
- Apply proper data type conversion techniques in complex cases

DAY 3

Module 3: Subqueries and Derived Tables (09:30am - 13:30am EEST)

Modularize logic and build layered, reusable queries using subqueries and temporary result sets. This module explores techniques for nesting queries, extracting intermediate logic into derived tables, and structuring reusable data retrieval using Common Table Expressions (CTEs) and Views. These techniques are essential for writing clean, maintainable SQL code that solves complex analytical problems step by step.

Lessons:

- ✓ Scalar subqueries and correlated subqueries
- ✓ Derived tables and nesting
- ✓ Views and their design for reusable logic
- ✓ Common Table Expressions (CTEs): definition and usage patterns

Lab:

- ✓ Write queries using subqueries in SELECT, FROM, and WHERE
- ✓ Nest subqueries and evaluate performance impact
- ✓ Create reusable derived tables
- ✓ Build and query simple CTEs

In the end of every training day every student will receive LAB Exercises for homework. They can make the exercises whenever it is possible for them in the day ahead. If they have questions our instructor will answer in the Q&A session on the next training day.

After completing this module, you will be able to:

- ✓ Understand and apply subqueries for flexible logic
- ✓ Create derived tables and use them in FROM clauses
- ✓ Implement and reuse views for cleaner design
- ✓ Use CTEs for modular and recursive queries

DAY 4

Module 4: Ranking and Windowing (09:30am - 10:30am EEST)

This module introduces the analytic SQL layer, used heavily in reporting, segmentation, and deduplication scenarios. Participants will learn how to apply ranking functions and windowing techniques to perform calculations across sets of rows related to the current row. These tools enable advanced analysis such as row numbering, grouping within partitions, running totals, and comparative logic, all without collapsing result sets.

Lessons:

- ✓ Overview of window functions
- ✓ Ranking functions: ROW_NUMBER, RANK, DENSE_RANK, NTILE
- ✓ PARTITION BY and ORDER BY usage in windowing
- ✓ Differences between window functions and aggregates

Lab: Querying Multiple Tables

- ✓ Write ranking queries using window functions
- ✓ Segment datasets using NTILE and partitioning
- ✓ Compare aggregate and window-based summaries
- ✓ Solve deduplication problems using ROW_NUMBER()

In the end of every training day every student will receive LAB Exercises for homework. They can make the exercises whenever it is possible for them in the day ahead. If they have questions our instructor will answer in the Q&A session on the next training day.

After completing this module, you will be able to:

- ✓ Use ranking functions for analysis and segmentation
 - ✓ Understand and apply PARTITION BY / ORDER BY in analytic queries
 - ✓ Distinguish use cases for aggregates vs windowing
- Solve typical business logic problems using ranking techniques

DAY 4

Module 5: Review and Practice with Instructor (10:30am - 13:30pm EEST)

This module is dedicated to consolidating the knowledge acquired throughout the course. Participants will engage in guided practice sessions, solve practical scenarios, and revisit key concepts through real-life use cases. The instructor will facilitate a hands-on Q&A session, provide personalized feedback, and help students apply advanced SQL techniques in integrated, end-to-end queries.

Lessons:

- ✓ Recap of all modules
- ✓ Instructor walkthroughs
- ✓ Q&A discussion session

Lab: Review and Final Challenge

- ✓ Solving a complete business scenario
- ✓ Combining joins, subqueries and CTEs
- ✓ Using ranking and window functions
- ✓ Final hands-on challenge with instructor feedback

After completing this module, you will be able to:

- ✓ Apply advanced SQL techniques in a realistic scenario
- ✓ Analyze complex data models and write modular, layered queries
- ✓ Design queries combining multiple techniques: joins, subqueries, windowing
- ✓ Solve real-life business problems using SQL end-to-end
- ✓ Validate and optimize your SQL logic through instructor guidance