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SQL Server from Zero to Working Knowledge

A Practical 3-Day Introduction to Microsoft SQL Server, T-SQL, Administration, Tooling and Modern Deployment

FA-0426 · 3-Day

DevOps, Cloud & Infrastructure · Cybersecurity · Data & Analytics

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Introduction

Microsoft SQL Server is no longer something a beginner can understand simply by learning a handful of SELECT, INSERT, and UPDATE statements. A person working with SQL Server today is likely to encounter databases running on traditional Windows servers, Linux, virtual machines, cloud platforms, managed database services, and increasingly containers. They may connect through SQL Server Management Studio, Visual Studio Code, command-line utilities, application drivers, or development frameworks. A useful beginner course therefore needs to explain both **SQL as a language** and **SQL Server as an operating database platform**.

This three-day course is designed for learners starting with little or no database knowledge. It begins with the relational database concepts needed to understand what SQL Server is actually doing, before progressing into practical Transact-SQL, database objects, security, backup and recovery, routine administration, stored procedures, functions, and triggers. The objective is not to turn a first-time learner into a database administrator in three days. Instead, the course establishes the practical foundation required to use SQL Server safely, understand an existing SQL Server environment, perform common administrative tasks, write useful SQL, and continue into more specialized development or DBA training.

The course also deliberately distinguishes **Microsoft SQL Server**, the database engine, from the tools used to work with it. The primary development environment can be Visual Studio Code with Microsoft's official MSSQL extension, while SQL Server Management Studio (SSMS) is introduced as the more comprehensive Windows-oriented administration environment. This distinction has become increasingly relevant: Microsoft currently lists **SSMS 22** as the current GA generation, while the official MSSQL extension for VS Code now includes database management, backup and restore, object exploration, and local SQL Server container capabilities in addition to query editing. Azure Data Studio, which previously occupied part of this space, reached retirement on February 28, 2026.

Version awareness is equally important. The current major release is **SQL Server 2025 (17.x)**, while organizations will continue to operate SQL Server 2022, 2019, 2017, and older installations for years. SQL Server 2025 also changed parts of the edition landscape, including increased Standard and Express limits, the introduction of Standard Developer and Enterprise Developer editions, discontinuation of Web edition, and an Express database-size limit of 50 GB. These differences will be discussed at the level appropriate for a beginner rather than treated as a feature-by-feature licensing course.

Modern deployment will be introduced in the same practical manner. Learners will see how SQL Server can run conventionally, inside Linux-based Docker containers, and on AWS. Microsoft now provides SQL Server 2025 Linux container images, and the VS Code MSSQL extension can itself create development SQL Server containers. On AWS, learners will be introduced to the distinction between **SQL Server on Amazon EC2**, **Amazon RDS for SQL Server**, and **Amazon RDS Custom for SQL Server** rather than attempting full cloud administration during an introductory three-day course.

The instructor brings **over 30 years of industry experience** and will approach the course from the perspective of how SQL Server is actually encountered and used in production environments. The emphasis will therefore be on real industry-demanded knowledge, terminology, workflows, troubleshooting awareness, and good operational habits rather than turning the programme into an unnecessarily academic study of database theory.

Learning outcomes

By the end of the course, participants should be able to:

- Explain relational database concepts and the role of Microsoft SQL Server
- Distinguish SQL, T-SQL, SQL Server, databases, instances, schemas, and database objects
- Recognize the major SQL Server versions and editions commonly encountered
- Understand important differences between SQL Server 2017, 2019, 2022, and 2025
- Install or connect to a SQL Server environment suitable for development and learning
- Use Visual Studio Code with the Microsoft MSSQL extension
- Navigate SQL Server Management Studio and understand when it is preferable to VS Code
- Recognize other SQL Server clients and command-line tools
- Create databases, schemas, tables, relationships, and constraints
- Write fundamental T-SQL queries
- Filter, sort, aggregate, and combine relational data
- Use joins, subqueries, common table expressions, and basic set operations
- Insert, update, and delete data safely
- Understand transactions and basic concurrency concepts
- Create views, stored procedures, functions, and basic triggers
- Understand indexes and basic query-performance considerations
- Understand SQL Server authentication, logins, users, roles, and permissions

- Perform fundamental backup and restore operations
- Recognize essential SQL Server administrative and monitoring responsibilities
- Understand SQL Server Agent and scheduled administrative jobs
- Understand the purpose of system databases and SQL Server configuration components
- Recognize conventional, virtualized, containerized, and cloud deployment models
- Understand at a high level how SQL Server is deployed using Docker
- Distinguish Amazon EC2, Amazon RDS for SQL Server, and Amazon RDS Custom
- Apply appropriate basic security, maintenance, and operational practices

Prerequisites

- No previous Microsoft SQL Server experience required
- No previous database administration experience required
- No previous SQL programming experience required
- Basic computer and operating-system familiarity
- Basic understanding of files, folders, applications, and networking concepts
- Familiarity with Visual Studio Code is helpful but not required
- Basic command-line familiarity is helpful for the Docker component but not essential
- Administrative rights on the training workstation may be required for software installation

Training outline

1. Microsoft SQL Server and Relational Database Foundations

Database and Relational Database Concepts

1. Tables, rows and columns
2. Primary and foreign keys
3. Relationships and referential integrity
4. Database normalization fundamentals
5. Relational Database Management Systems

Understanding Microsoft SQL Server

1. SQL versus T-SQL
2. SQL Server instances and databases

3. Database Engine architecture
4. Schemas and database objects
5. System and user databases

SQL Server Versions and Editions

1. SQL Server 2017, 2019, 2022 and 2025
2. Compatibility levels
3. Enterprise, Standard and Express editions
4. Enterprise Developer and Standard Developer editions
5. Evaluation and LocalDB
6. Important SQL Server 2025 changes
7. Upgrade and backward-compatibility considerations

2. SQL Server Installation, Connectivity and Client Tools

SQL Server Environment Fundamentals

1. Server and instance naming
2. Default and named instances
3. SQL Server services
4. TCP/IP and port 1433
5. Connection strings

SQL Server Management Studio

1. SSMS 22
2. Object Explorer
3. Query Editor
4. Administrative interfaces
5. Strengths and limitations

Visual Studio Code and MSSQL Extension

1. MSSQL extension installation
2. Connection profiles
3. Object Explorer

4. Query Editor
5. Database management capabilities
6. Backup and restore capabilities
7. Local container integration
8. Strengths and limitations

Other SQL Server Client Options

1. sqlcmd
2. SQL Database Projects
3. Application database drivers
4. Azure Data Studio retirement
5. Client selection considerations

3. T-SQL Fundamentals

Database and Table Creation

1. CREATE DATABASE
2. CREATE TABLE
3. Common SQL Server data types
4. NULL and NOT NULL
5. IDENTITY columns
6. Primary and foreign keys
7. UNIQUE, DEFAULT and CHECK constraints

Retrieving Data

1. SELECT
2. Column aliases
3. DISTINCT
4. TOP
5. WHERE
6. ORDER BY

Filtering and Expressions

1. Comparison operators
2. Logical operators
3. BETWEEN
4. IN
5. LIKE
6. NULL handling
7. CASE expressions

Working with Multiple Tables

1. INNER JOIN
2. LEFT and RIGHT JOIN
3. FULL JOIN
4. Table aliases
5. Multi-table relationships

Aggregating Data

1. COUNT
2. SUM
3. AVG
4. MIN and MAX
5. GROUP BY
6. HAVING

Modifying Data

1. INSERT
2. UPDATE
3. DELETE
4. Safe data-modification practices

Intermediate Query Fundamentals

1. Subqueries

2. Common Table Expressions
3. UNION and UNION ALL
4. Common built-in functions
5. Date and string handling

4. Transactions, Database Objects and Programmability

Transaction Fundamentals

1. ACID concepts
2. BEGIN TRANSACTION
3. COMMIT
4. ROLLBACK
5. Basic locking and concurrency awareness

Views

1. Creating views
2. Altering views
3. Using views
4. View limitations

Stored Procedures

1. Procedure structure
2. Input parameters
3. Output parameters
4. Variables
5. Control-of-flow fundamentals
6. Executing stored procedures
7. ALTER and DROP procedures

User-Defined Functions

1. Scalar functions
2. Table-valued functions
3. Functions versus stored procedures

Triggers

1. DML triggers
2. INSERT, UPDATE and DELETE events
3. inserted and deleted tables
4. Trigger execution considerations
5. Appropriate trigger usage

5. Indexes and Basic Performance Awareness

SQL Server Index Fundamentals

1. Heaps
2. Clustered indexes
3. Nonclustered indexes
4. Primary keys and indexes
5. Index benefits and overhead

Query Performance Fundamentals

1. Execution plans
2. Table scans and index seeks
3. Statistics
4. Common beginner performance problems
5. Query Store awareness

6. SQL Server Security and Administration

Authentication and Authorization

1. Windows authentication
2. SQL Server authentication
3. Logins and database users
4. Server roles
5. Database roles
6. GRANT, DENY and REVOKE
7. Principle of least privilege

SQL Server Administrative Structure

1. master
2. model
3. msdb
4. tempdb
5. SQL Server Configuration Manager
6. Server and database properties

Database Storage Fundamentals

1. Data files
2. Log files
3. Filegroups
4. Database growth
5. Transaction log fundamentals

Backup and Recovery Fundamentals

1. Recovery models
2. Full backups
3. Differential backups
4. Transaction log backups
5. Restore fundamentals
6. Backup verification
7. Recovery objectives awareness

Routine Administration and Monitoring

1. Database status
2. Active connections
3. Sessions and requests
4. Blocking awareness
5. Disk and database growth
6. Error logs
7. Basic health monitoring

SQL Server Agent

1. Jobs
2. Job steps
3. Schedules
4. Job history
5. Maintenance automation
6. Express edition limitations

7. Modern SQL Server Deployment Models

Traditional SQL Server Deployment

1. Windows Server deployment
2. SQL Server on Linux
3. Physical and virtual machines
4. On-premises versus cloud-hosted SQL Server

SQL Server with Docker

1. SQL Server Linux container images
2. SQL Server 2025 container images
3. Container lifecycle
4. Port mapping
5. Environment variables
6. Persistent storage
7. Development and testing use cases
8. VS Code local SQL container capability

SQL Server on AWS

1. SQL Server on Amazon EC2
2. Amazon RDS for Microsoft SQL Server
3. Amazon RDS Custom for SQL Server
4. Managed versus self-managed responsibilities
5. Backup, patching and administration differences
6. Deployment-selection considerations

8. Operational Practices and Next Steps

SQL Server Operational Fundamentals

1. Naming conventions
2. Change management
3. Script-first administration
4. Source control for SQL
5. Development versus production environments
6. Documentation practices

Security and Reliability Awareness

1. Avoiding routine use of privileged accounts
2. Password and credential handling
3. Patch and version management
4. Backup responsibility
5. Testing restores
6. Production change precautions

Continuing SQL Server Development

1. Advanced T-SQL
2. Query optimization
3. Advanced administration
4. High availability and disaster recovery
5. Automation and PowerShell
6. Cloud database administration

Scope Note

For a three-day beginner programme, Docker and AWS are intentionally treated primarily as **deployment awareness and instructor-demonstration topics** rather than full hands-on administration modules. Likewise, advanced subjects such as Always On Availability Groups, replication, clustering, deep execution-plan analysis, SSIS, enterprise high availability, advanced indexing, and comprehensive performance tuning are better addressed in subsequent courses. This preserves sufficient time for participants to develop usable SQL and fundamental administration skills rather than merely being exposed to an excessive number of features.

Disclaimer

This training outline is intended to serve as a structured guideline for delivery and represents the anticipated scope of the programme at the time of preparation. The instructor may, at their professional discretion, modify, reorder, expand, reduce, substitute, or omit individual topics to accommodate participant experience, available time, software or platform changes, operational requirements, and the pace of the class. Such adjustments may be made without prior notice where they are considered necessary to preserve the relevance, quality, and practical effectiveness of the training.

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