

# Course Outline | Microsoft SQL Server 2016 and 2017 System Administration Fundamentals

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3 day(s)

This 3 day course is intended for students who need to learn the essential skills necessary to maintain a Microsoft SQL Server 2016 or 2017 system infrastructure. Being concise and hands-on, it is aimed at quickly getting students familiar with the Microsoft SQL Server administration concepts, tools and utilities. The installation of SQL Server, covered in the first module of the course, is optional and can be omitted to free up time for other topics if desired.

The course focuses on managing a single on-premise SQL Server Database instance and does not delve into more advanced enterprise features such as high availability and replication. Neither do we consider cloud-based solutions in this course. That said, for delegates looking to get a strong grounding in SQL Server architecture and administration, perhaps before advancing on to more advanced features, this is an ideal course upon which to build.

Attendees will gain insight into the infrastructure and architecture of SQL Server, enabling individuals to fully understand the product with which they are dealing. Configuration of server instances and databases is given full treatment, as are database transaction logs, and the creation and maintenance of indexes. Concise treatment is given to managing SQL Server security, including both at the server and database level. The focus then shifts to examining how best to move and protect data, such as when importing or exporting it between heterogeneous data sources, backing it up to external media, and restoring data from a backup. Many tasks involved in the day to day administration of a SQL Server instance can be performed automatically, making an administrators life potentially simpler, and such is the subject matter in the module dealing with SQL Server Automation. The final part of the course looks at monitoring and troubleshooting SQL Server performance and related issues.

## Prerequisites

Students should be familiar with working in a Microsoft Windows Server operating system environment. Delegates should also have an understanding of the fundamental design of relational databases including, but not restricted to, the purpose of primary and foreign keys, entity relationships, and data normalization. A good working knowledge of the SQL language will also be assumed.

## Course Objectives

Upon successful completion of this course, students will be able to:

- Configure a SQL Server 2016 or 2017 Instance
- Create, Configure and Manage Databases
- Understand SQL Server Internal Storage Mechanisms
- Implement and Manage Indexes
- Understand and Implement SQL Server Security
- Understand Data Transfer Utilities
- Backup and Restore Databases
- Automate Tasks in SQL Server
- Monitor and Troubleshoot SQL Server
- Understand SQL Server Transactions and Locking

## Course Outline

### 1. Install and Configure a SQL Server Instance

- Overview of SQL Server 2016 and 2017
- Installing SQL Server (optional)
- Configuring Instance-Level Settings

### Configuring and Managing Databases

- Creating and Managing Database Files and Filegroups
- Configuring Databases
- System Databases
- TempDB Database Considerations

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- Managing Log Files

## SQL Server Internals

- How SQL Server Stores and Manages Data Internally
- Examining Internal Storage Mechanisms

## Creating and Managing Indexes

- SQL Server Index Architecture
- Clustered v Non-Clustered Indexes
- Creating and Modifying Indexes
- Missing and Unused Indexes
- Understanding and Managing Index Fragmentation
- Understanding and Managing Statistics

## SQL Server Security

- Managing Logins and Server Roles
- Managing Users and Database Roles
- Assigning and Managing Permissions
- Using Schemas

## Transferring Data

- Overview of Copying and Exporting Data
- Using BCP to Import and Export Data
- BULK INSERT
- OPENROWSET(BULK)
- SELECT INTO
- Using the SQL Server Import and Export Wizard
- Introducing SQL Server Integration Services (SSIS)

## Backups and Recovery

- Understanding Database Recovery Models
- Indirect Checkpoints
- Understanding Backup Types
- Backup Options
- Encrypted Backups
- Performing Database and Log Backups
- Backing Up System Databases
- Viewing Backup History
- Restoring Database and Log Backups
- Restoring System Databases

## SQL Server Automation

- Overview of SQL Server Automation
- The SQL Server Agent Service
- Configuring Credentials and Proxy Accounts
- Implementing Jobs
- Implementing Operators and Notifications
- Implementing Alerts
- Maintenance Plans

## Monitoring and Troubleshooting SQL Server

- Introduction to Monitoring SQL Server
- Using DMVs and DMFs
- Activity Monitor

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- Performance Monitor
- Introduction to Extended Events
- Diagnosing Common Issues

## Transactions and Locking

- Understanding Transactions
- Delayed Durability
- Understanding SQL Server Lock Management
- Diagnosing Concurrency Issues