

## Performance Tuning and Optimizing SQL Databases (3 days)



### Overview

This instructor-led course is intended for students who manage and maintain Microsoft® SQL Server® databases with the knowledge and skills needed to performance tune and optimise their databases.

### Target Audience

This course is intended for database professionals who needs to fulfil a database role with the view of optimising performance of the databases or whose role has expanded to include database technologies.

### Prerequisites

This course requires that you meet the following prerequisites:

- Working knowledge of Transact-SQL (ability to write Transact-SQL queries)
- Working knowledge of database administration and maintenance.
- Core Windows Server skills.
- Writing Queries Using Microsoft® SQL Server® 2012/2014 Transact-SQL.

### Course Summary

After completing this course, students will be able to:

- Describe the high level architectural overview of SQL Server and its various components.
- Describe the SQL Server execution model, waits and queues.
- Describe core I/O concepts, Storage Area Networks and performance testing.
- Describe architectural concepts and best practices related to data files for user databases and TempDB.
- Describe architectural concepts and best practices related to Concurrency, Transactions, Isolation Levels and Locking.
- Describe architectural concepts of the Optimizer and how to identify and fix query plan issues.
- Describe architectural concepts, troubleshooting scenarios and best practices related to Plan Cache.
- Describe architectural concepts, troubleshooting strategy and usage scenarios for Extended Events.
- Explain data collection strategy and techniques to analyze collected data.
- Understand techniques to identify and diagnose bottlenecks to improve overall performance

## ***Module 1: SQL Server Architecture, Scheduling, and Waits***

- Module Overview
- Lesson 1: SQL Server Components and SQLOS
- Lesson 2: Windows Scheduling vs. SQL Server Scheduling
- Lesson 3: Waits and Queues
- Lab: SQL Server Architecture, Scheduling, and Waits

## **Module 2: SQL Server I/O**

- Module Overview
- Lesson 1: Core Concepts of I/O
- Lesson 2: Storage Solutions
- Lesson 3: I/O Setup and Testing
- Lab: Testing Storage Performance

## **Module 3: Database Structures**

- Module Overview
- Lesson 1: Database Structure Internals
- Lesson 2: Data File Internals
- Lesson 3: tempdb Internals
- Lab: Database Structures

## **Module 4: SQL Server Memory**

- Module Overview
- Lesson 1: Windows Memory
- Lesson 2: SQL Server Memory
- Lesson 3: In-Memory OLTP
- Lab: SQL Server Memory

## **Module 5: SQL Server Concurrency**

- Module Overview
- Lesson 1: Concurrency and Transactions
- Lesson 2: Locking Internals
- Lab: Concurrency and Transactions

## **Module 6: Statistics and Index Internals**

- Module Overview
- Lesson 1: Statistics Internals and Cardinality Estimation
- Lesson 2: Index Internals
- Lesson 3: Columnstore Indexes
- Lab: Statistics and Index Internals

## ***Module 7: Query Execution and Query Plan Analysis***

- Module Overview
- Lesson 1: Query Execution and Query Optimizer Internals
- Lesson 2: Query Execution Plans
- Lesson 3: Analyzing Query Execution Plans
- Lab: Query Execution and Query Plan Analysis

## ***Module 8: Plan Caching and Recompilation***

- Module Overview
- Lesson 1: Plan Cache Internals
- Lesson 2: Troubleshooting with the Plan Cache
- Lesson 3: Query Store
- Lab: Plan Caching and Recompilation

## ***Module 9: Extended Events***

- Module Overview
- Lesson 1: Extended Events Core Concepts
- Lesson 2: Working with Extended Events
- Lab: Extended Events

## ***Module 10: Monitoring, Tracing, and Baselines***

- Module Overview
- Lesson 1: Monitoring and Tracing
- Lesson 2: Baselineing and Benchmarking
- Lab: Monitoring, Tracing, and Baselineing