

PERFORMANCE TUNING AND OPTIMIZING SQL DATABASES

DURATION: 4 DAYS

COURSE OVERVIEW

This four-day instructor-led course provides students who manage and maintain SQL Server databases with the knowledge and skills to performance tune and optimize their databases.

TARGET AUDIENCE

The primary audience for this course is individuals who administer and maintain SQL Server databases and are responsible for optimal performance of SQL Server instances that they manage. These individuals also write queries against data and need to ensure optimal execution performance of the workloads. The secondary audiences for this course are individuals who develop applications that deliver content from SQL Server databases.

COURSE OBJECTIVES

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

COURSE CONTENT

Module 1: SQL Server Architecture, Scheduling, and Waits

SQL Server Components and SQL OS

Windows Scheduling vs SQL Scheduling

Waits and Queues

Lab: SQL Server Architecture, Scheduling, and Waits

Module 2: SQL Server I/O

Core Concepts

Storage Solutions

I/O Setup and Testing

Lab: Testing Storage Performance

Module 3: Database Structures

Database Structure Internals

Data File Internals

Temp DB Internals

Lab: Database Structures

Module 4: SQL Server Memory

Windows Memory

SQL Server Memory

In-Memory OLTP

Lab: SQL Server Memory

Module 5: Concurrency and Transactions

Concurrency and Transactions

Locking Internals

Lab: Concurrency and Transactions

Module 6: Statistics and Index Internals

Statistics Internals and Cardinality Estimation

Index Internals

Column store Indexes

Lab: Statistics and index Internals

Module 7: Query Execution and Query Plan Analysis

Query execution and optimizer internals

Analyzing query plans

Lab: Query execution and query plan analysis

Module 8: Plan Caching and Recompilation

Plan cache internals

Troubleshooting plan cache issues

Query store

Lab: Plan caching and recompilation

Module 9: Extended Events

Extended events core concepts

Implementing extended events

Lab: Extended events

Module 10: Monitoring, Tracing, and Baselineing

Monitoring and tracing

Baselineing and benchmarking

Lab: Monitoring, Tracing and Baselineing

Module 11: Troubleshooting Common Performance Issues

Troubleshoot CPU performance

Troubleshoot memory performance

Troubleshoot I/O performance

Troubleshoot Concurrency performance

Troubleshoot Temp DB performance

Lab: Troubleshooting common performance issues

COURSE PREREQUISITES

In addition to their professional experience, students who attend this training should already have the following technical knowledge:

1. Basic knowledge of the Microsoft Windows operating system and its core functionality.
2. Working knowledge of database administration and maintenance
3. Working knowledge of Transact-SQL.