10987: Performance Tuning and Optimizing SQL Databases
(4 Days)

About this Course

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.

Audience Profile

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.

At Course Completion

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.

Prerequisites

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

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

COURSE OUTLINE

Module 1: SQL Server Architecture, Scheduling, and Waits

- SQL Server Components and SQL OS
- Windows Scheduling vs SQL Scheduling
- Waits and Queues

Module 2: SQL Server I/O

- Core Concepts
- Storage Solutions
- I/O Setup and Testing

Module 3: Database Structures

- Database Structure Internals
- Data File Internals
- TempDB Internals

Module 4: SQL Server Memory

- Windows Memory
- SQL Server Memory
- In-Memory OLTP

Module 5: Concurrency and Transactions

- Concurrency and Transactions
- Locking Internals

Module 6: Statistics and Index Internals

- Statistics Internals and Cardinality Estimation
- Index Internals
- Columnstore Indexes

Module 7: Query Execution and Query Plan Analysis

- Query execution and optimizer internals
- Analyzing query plans

Module 8: Plan Caching and Recompilation

- Plan cache internals
- Troubleshooting plan cache issues

Module 9: Extended Events

- Extended events core concepts
- Implementing extended events

Module 10: Monitoring, Tracing, and Baselining

- Monitoring and tracing
- Baselining and benchmarking

Module 11: Troubleshooting Common Performance Issues

- Troubleshoot CPU performance
- Troubleshoot memory performance
- Troubleshoot I/O performance
- Troubleshoot Concurrency performance
- Troubleshoot TempDB performance