

10987 - Performance Tuning and Optimizing SQL Databases

Duration: 4 days

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.

Pre-requisites:

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.

Module 1: SQL Server Architecture, Scheduling, and Waits

Lessons

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

Lab : SQL Server Architecture, Scheduling, and Waits

- Describe the SQL Server components and SQL OS
- Describe the differences between Windows Scheduling and SQL scheduling
- Describe waits and queues

Module 2: SQL Server I/O

Lessons

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

Lab : Testing Storage Performance

- Describe the core concepts of SQL I/O
- Describe storage solutions
- Setup and test I/O

Module 3: Database Structures

Lessons

- Database Structure Internals
- Data File Internals
- TempDB Internals

Lab : Database Structures

- Describe the internal setup of database structures
- Describe the internal setup of data files.
- Describe the internal setup of TempDB

Module 4: SQL Server Memory

Lessons

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

Module 5: Concurrency and Transactions

Lessons

- Concurrency and Transactions
- Locking Internals

Lab : Concurrency and Transactions

- Explain concurrency and transactions
- Describe locking

Module 6: Statistics and Index Internals

Lessons

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

Lab : Statistics and index Internals

- Describe statistics internals
- Explain cardinality estimation
- Describe why you would use Columnstore indexes and be able to implement one

Module 7: Query Execution and Query Plan Analysis

Lessons

- Query execution and optimizer internals
- Analyzing query plans

Lab : Query execution and query plan analysis

- Describe query execution and optimizer
- Analyze query plans and resolve common issues

Module 8: Plan Caching and Recompilation

Lessons

- Plan cache internals
- Troubleshooting plan cache issues
- Query store

Lab : Plan caching and recompilation

- Describe plan cache
- Troubleshoot plan cache issues
- Describe query store and why you would use it

Module 9: Extended Events

Lessons

- Extended events core concepts
- Implementing extended events

Lab : Extended events

- Describe the core concepts of extended events
- Implement extended events

Module 10: Monitoring, Tracing, and Baselineing

Lessons

- Monitoring and tracing
- Baselineing and benchmarking

Lab : Monitoring, Tracing and Baselineing

- Describe various options for monitoring and tracing
- Describe various options for benchmarking and baselineing

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.

Module 11: Troubleshooting Common Performance Issues

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

Lessons

Lab : Troubleshooting common performance issues

- Troubleshoot common performance issues