Microsoft

SQL Server:
Performance Tuning and Optimization

Workshop*PLUS*

Learn what it takes to develop, support, monitor, and tune high performing applications on SQL Server. It is SQL Server version agnostic course and most of the fundamentals can be applied across all supported versions of SQL Server.

Target Audience:

To help ensure the high-quality knowledge transfer expected by the attendees of this four-day workshop, the class size is limited to a maximum of 16 students who meet the following criteria:

- *Students should have a minimum of 2-3 years of experience with SQL Server (any version)*

Students should be performing one of the following job roles:

- *Database administrators*
- *Database developers*
- *Database support engineers*
- *Database architects*
- *Independent software vendor (ISV) developers*

Overview

SQL Server: Performance Tuning and Optimization is a four-day course that provides an in-depth study into the aspects of SQL Server that affect application performance.

Students will learn about the internals of the SQL Server engine such as the memory manager and the task scheduler, table and index structures, locking and concurrency, query optimization and programming efficiency. Students will also be introduced Microsoft Azure SQL Database performance.

Through lectures, demonstrations, and hands-on labs, students will discover the new performance-related features in the latest version of SQL Server, while working with the existing features. They will understand dynamic management views (DMVs) and Extended Events, optimize queries, examine memory management and process scheduling, troubleshoot locking and blocking, and improve programming efficiency.

Technical Highlights
After attending this workshop, students will be able to:
- Analyze performance bottlenecks
- Design an effective index strategy
- Diagnose and avoid blocking and deadlocks
- Analyze execution plans
- Develop efficient queries and stored procedures

Syllabus

This workshop runs for **four** full days. Students should anticipate consistent start and end times for each day. Early departure on any day is not recommended.

Module 1: Architecture
- Lesson: Introduction to SQL Operating System
- Lesson: Windows Memory Management
- Lesson: SQL Server Memory Management
- Lesson: SQL Server Disk I/O
- Lesson: SQL Server Task Scheduling
- Lesson: SQL Server Waits and Queues
- Lesson: SQL Server Data File Architecture
- Lesson: SQL Server Page Architecture
- Lesson: SQL Server Transactional Log Architecture
- Lesson: Delayed Transaction Durability
- Lesson: Using Resource Governor

Module 2: Table and Index Structure
- Lesson: SQL Server Index Architecture
- Lesson: SQL Server Indexing Strategy
- Lesson: SQL Server Index Utilization
- Lesson: SQL Server Missing Indexes
- Lesson: SQL Server Index Compression
- Lesson: SQL Server Index Partitioning
- Lesson: Other SQL Server Index Types
- Lesson: SQL Server Index Maintenance
- Lesson: SQL Server Statistics
- Lesson: SQL Server Statistics Maintenance

Module 3: Locking and Concurrency
- Lesson: Locking Concepts
- Lesson: Isolation Levels
- Lesson: Transaction Modes
- Lesson: Blocking
- Lesson: Deadlocks
- Lesson: Latches and Spinlocks

Module 4: Query Optimization
- Lesson: Query Compilation and Execution
- Lesson: Query Optimizations
- Lesson: Understanding of Execution Plans
- Lesson: Query Tuning Cardinality Estimation
- Lesson: Query Tuning SARGability
- Lesson: Query Tuning Hints and Plan Guides
- Lesson: Query Tuning, Query Troubleshooting, and Plan Cache
- Lesson: Overview of the Query Store
- Lesson: Query Store - Tracking Queries
- Lesson: Query Store - Troubleshooting
- Lesson: Query Store Internals
- Lesson: Overview of Query Live Statistics

Module 5: SQL Server Tools
- Lesson: SQL Server Built-In Tools
- Lesson: SQL Server Dynamic Management Views
- Lesson: SQL Server Management Data Warehouse
- Lesson: SQL Server Extended Events
- Lesson: Monitoring with Performance Counters
- Lesson: Overview of Performance Analysis of Logs
- Lesson: Overview of PSSDIAG and SQLDIAG
- Lesson: Overview of RML Utilities
- Lesson: Overview of SQL Nexus
- Lesson: SQL Server Tuning Methods

Module 6: SQL Server in Azure
- Lesson: Azure Fundamentals
- Lesson: Azure IaaS Fundamentals
- Lesson: Best Practices for SQL Server on Azure IaaS
- Lesson: Azure SQL Database Fundamentals
- Lesson: Using Azure SQL Database Elastic Pools
- Lesson: Monitoring an Azure SQL Database
- Lesson: Performance Considerations for Stretch Database

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