

KOENIG SOLUTIONS • COURSE OUTLINE

Performance Tuning and Optimizing SQL Databases

Learn to analyse SQL Server architecture, memory, and concurrency to troubleshoot and optimize database performance.

4 Days

32 HOURS

10

MODULES

55

TOPICS

10

HANDS-ON LABS

COURSE OVERVIEW

The Performance Tuning and Optimizing SQL Databases course is designed to equip learners with the knowledge and skills required to maintain and optimize the performance of SQL Server databases. This SQL performance tuning course delves into the intricacies of SQL Server architecture, including components, Scheduling, and Wait events. It covers a broad range of topics, from the fundamentals of SQL Server I/O, Database structures, and Memory management to the more advanced concepts of Concurrency, Transactions, and Query plan analysis. Participants will learn how to analyze and troubleshoot performance issues using tools such as Extended Events and the Query Store, understand the importance of accurate Statistics and indexing strategies for query optimization, and explore techniques for caching and recompilation to improve Execution plans. By completing this comprehensive performance tuning course, learners will develop a strong foundation in identifying and solving Performance bottlenecks, ensuring their SQL databases run efficiently and effectively.

WHO THIS COURSE IS FOR

The Performance Tuning and Optimizing SQL Databases course is designed for IT professionals focused on enhancing database efficiency and health.

Database Administrators

Database Developers

SQL Server Database Engineers

Data Analysts specializing in performance optimization

IT Professionals responsible for managing and maintaining SQL Server databases

System Engineers supporting database servers

Database Architects focused on optimizing database performance

SQL Server Consultants

Technical Support Personnel for SQL Server environments

Data Professionals preparing for the Microsoft Certified Solutions Expert (MCSE): Data Management and Analytics exam

What You Will Learn

- Describe SQL Server components, scheduling, and wait events
- Explain SQL Server I/O concepts and storage solutions
- Analyse database structure, data file, and TempDB internals
- Explain SQL Server and Windows memory architecture
- Apply concurrency, transaction, and locking concepts
- Implement statistics, indexing, and Columnstore strategies
- Analyse query execution plans and optimizer behaviour
- Troubleshoot plan cache issues using Extended Events and Query Store

COURSE SYLLABUS

10 Modules, 55 Topics

01

Lab

SQL Server Architecture, Scheduling, and Waits

This module provides a high-level architectural overview of SQL Server and its components. It delves into the SQL Server execution model, waits, and queues.

LESSONS

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

AFTER COMPLETING THIS MODULE, YOU WILL BE ABLE TO

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

02

Lab

SQL Server I/O

This module covers core I/O concepts, Storage Area Networks (SANs), and performance testing. It focuses on SQL Server I/O operations and how to test storage performance.

LESSONS

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

AFTER COMPLETING THIS MODULE, YOU WILL BE ABLE TO

Explain the core concepts of SQL I/O · Describe storage solutions · Set up and test I/O performance

03**Lab**

Database Structures

This module explores database structures, data files, and TempDB internals. It focuses on architectural concepts and best practices for user databases and TempDB.

LESSONS

- Database Structure Internals
- Data File Internals
- TempDB Internals

AFTER COMPLETING THIS MODULE, YOU WILL BE ABLE TO

- Understand the internal structure of databases
- Explain the internal setup of data files
- Describe the internal setup of TempDB

04**Lab**

SQL Server Memory

This module covers Windows and SQL Server memory internals, focusing on architectural concepts and best practices for SQL Server memory configuration.

LESSONS

Windows Memory · SQL Server Memory · In-Memory OLTP

AFTER COMPLETING THIS MODULE, YOU WILL BE ABLE TO

Understand the components of Windows memory · Explain SQL Server memory architecture · Describe In-Memory OLTP

05**Lab**

SQL Server Concurrency

This module covers transactions and locking internals, focusing on concurrency, transactions, isolation levels, and locking mechanisms.

LESSONS

Concurrency and Transactions · Locking Internals

AFTER COMPLETING THIS MODULE, YOU WILL BE ABLE TO

Explain concurrency and transactions · Understand SQL Server locking mechanisms

06**Lab**

Statistics and Index Internals

This module covers statistics and indexing, focusing on architectural concepts and best practices related to SQL Server statistics and indexes.

LESSONS

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

AFTER COMPLETING THIS MODULE, YOU WILL BE ABLE TO

- Understand statistics internals and cardinality estimation
- Explain the purpose and functioning of indexes
- Implement and use Columnstore indexes

07**Lab**

Query Execution and Query Plan Analysis

This module covers query execution and query plan analysis, focusing on the SQL Server optimizer and troubleshooting query plan issues.

LESSONS

- Query Execution and Optimizer Internals
- Query Execution Plans
- Analyzing Query Execution Plans
- Adaptive Query Processing

AFTER COMPLETING THIS MODULE, YOU WILL BE ABLE TO

- Understand query execution and the SQL Server optimizer
- Analyze query execution plans and troubleshoot common issues

08**Lab**

Plan Caching and Recompilation

This module explores plan caching and recompilation, including troubleshooting scenarios and best practices for optimizing the plan cache.

LESSONS

Plan Cache Internals · Troubleshooting Plan Cache Issues · Automatic Tuning · Query Store

AFTER COMPLETING THIS MODULE, YOU WILL BE ABLE TO

Understand plan cache functionality · Troubleshoot plan cache issues · Explain the Query Store and its benefits

09

Lab

Extended Events

This module provides an in-depth look at Extended Events, focusing on troubleshooting strategies and usage scenarios.

LESSONS

- Core Concepts of Extended Events
- Implementing and Working with Extended Events

AFTER COMPLETING THIS MODULE, YOU WILL BE ABLE TO

- Understand the core concepts of Extended Events
- Implement Extended Events for monitoring and troubleshooting

10

Lab

Monitoring, Tracing, and Baselining

This module covers tools and techniques for monitoring, tracing, and establishing performance baselines in SQL Server. It focuses on data collection strategies and analysis techniques.

LESSONS

- Monitoring and Tracing
- Baselining and Benchmarking

AFTER COMPLETING THIS MODULE, YOU WILL BE ABLE TO

- Understand various monitoring and tracing options
- Implement benchmarking and baselining techniques for performance optimization

HANDS-ON LABS

Practise What You Learn

#	MODULE	ACTIVITY
01	SQL Server Architecture, Scheduling, and Waits	SQL Server Architecture, Scheduling, and Waits
02	SQL Server I/O	Testing Storage Performance
03	Database Structures	Database Structures
04	SQL Server Memory	SQL Server Memory
05	SQL Server Concurrency	SQL Server Concurrency
06	Statistics and Index Internals	Statistics and Index Internals
07	Query Execution and Query Plan Analysis	Query Execution and Query Plan Analysis

#	MODULE	ACTIVITY
08	Plan Caching and Recompilation	Plan Caching and Recompilation
09	Extended Events	Extended Events
10	Monitoring, Tracing, and Baselining	Monitoring, Tracing, and Baselining

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Hands-on exercises throughout the course
- Delivery by certified instructors and subject matter experts
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

FLEXIBLE DELIVERY

Learn the Way That Suits You

Classroom Training

Live Online Classes (ILO)

Fly-Me-A-Trainer (FMAT)

Flexi (Self-Paced)

1-on-1 Training

Ready to Get Started?

Talk to a learning advisor about schedules, group training and customised delivery.

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