10987-C: Performance Tuning and Optimizing SQL Databases

Course outline

Module 1: SQL Server Architecture, Scheduling, and Waits

This module covers high level architectural overview of SQL Server and its various components. It dives deep into SQL Server execution model, waits and queues.

Lessons

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

Lab : SQL Server Architecture, Scheduling, and Waits

After completing this module, you will be able to:

- 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

This module covers core I/O concepts, Storage Area Networks 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

Lab : Testing Storage Performance

After completing this module, you will be able to:

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

- Setup and test I/O

Module 3: Database Structures

This module covers Database Structures, Data File and TempDB Internals. It focuses on architectural concepts and best practices related to data files for user databases and TempDB.

Lessons

- Database Structure Internals
- Data File Internals
- TempDB Internals

Lab : Database Structures

After completing this module, you will be able to:

- 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

This module covers Windows and SQL Server Memory internals. It focuses on architectural concepts and best practices related to SQL Server Memory Configuration.

Lessons

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

Lab : SQL Server Memory

After completing this module, you will be able to:

- Describe the components of Windows memory
- Describe the components of SQL Server memory
- Describe In-Memory OLTP

Module 5: SQL Server Concurrency

This module covers Transactions and Locking Internals. It focuses on architectural concepts and best practices related to Concurrency, Transactions, Isolation Levels and Locking.

Lessons

- Concurrency and Transactions
- Locking Internals

Lab : SQL Server Concurrency

After completing this module, you will be able to:

- Explain concurrency and transactions
- Describe locking

Module 6: Statistics and Index Internals

This module covers Statistics and Index Internals. It focuses on architectural concepts and best practices related to Statistics and Indexes.

Lessons

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

Lab : Statistics and index Internals

After completing this module, you will be able to:

- 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

This module covers Query Execution and Query Plan Analysis. It focuses on architectural concepts of the Optimizer and how to identify and fix query plan issues.

- Query execution and optimizer internals
- Query execution plans
- Analyzing query execution plans
- Adaptive query processing

Lab : Query execution and query plan analysis

After completing this module, you will be able to:

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

Module 8: Plan Caching and Recompilation

This module covers Plan Caching and Recompilation. It focuses on architectural concepts, troubleshooting scenarios and best practices related to Plan Cache.

Lessons

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

Lab : Plan caching and recompilation

After completing this module, you will be able to:

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

Module 9: Extended Events

This module covers Extended Events. It focuses on architectural concepts, troubleshooting strategy and usage scenarios for Extended Events.

Lessons

- Extended events core concepts
- Working with extended events

Lab : Extended events

After completing this module, you will be able to:

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

Module 10: Monitoring, Tracing, and Baselining

This module covers tools and techniques to monitor, trace and baseline SQL Server performance data. It focuses on data collection strategy and techniques to analyze collected data.

Lessons

- Monitoring and tracing
- Baselining and benchmarking

Lab : Monitoring, Tracing and Baselining

After completing this module, you will be able to:

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