

FS-2050A SQL Server Performance Tuning (Duration 5Days)



What will you learn?

This class will give you a wealth of practical optimization techniques that you can put into production as soon as you return to work and we ensure you understand **why** and **how** a technique works rather than just what the technique is. This usually means we will explain how SQL Server works internally while discussing a specific topic. This course helps you prepare for the **Exam 70-764 & 70-462**.

Who is the Audience?

Intended for SQL Server administrators who are responsible for the performance of their database servers and installation and also SQL Server developers who are responsible for developing SQL Server queries and stored procedures.

Primary responsibilities will include:

- Providing database administration tasks.
- Monitoring SQL Server instance and database performance.
- Investigate and Resolve the Performance bottlenecks.

What are the Prerequisites?

- Experience with SQL Server.
- Understanding of Database concept.
- Experience with SQL Server administration.
- Experience with Transact-SQL Programming.
- Knowledge of SQL Server performance tuning concept.

What are the Course Objectives?

After completing this course, students will be able to:

- Identify the System Performance Bottlenecks and Top Performance Killers in SQL Server.
- Analyze the SQL Server Performance metrics such as WaitStats, LatchStats and etc.
- Use the SQL Server trace tools such as SQLTrace, Extended Events, SQL Profiler and Performance Monitor Data Collector Set.
- Analyze, Design and Deploy Indexes in order to support multiple queries within the database workload.
- Analyze and resolve Bookmark Lookup and Statistics related issues in Execution Plans.
- Understand the Performance Tuning exceptions and tricks within SQL Server environment.
- Analyze and resolve fragmentation, transaction blocking and deadlocks.
- Configure Database and Instance for the optimum performance.

What are the Course Outlines?

Module 1: SQL Query Performance Tuning

This module introduces the performance tuning process, baseline creation and the focus points.

Lessons:

- The Performance Tuning Process.
- Performance Vs. Price.
- The Performance Baseline.

- Where to Focus Efforts in Tuning.
- The Top 11 SQL Server Performance Killers.

Labs:

- Hardware Performance Baseline by SQLIO.
- Capture SQL Server Performance Baseline.
- Stress Out SQL Server by Excessive Workloads.

Module 2: System Performance Analysis

This module describes how to use performance capturing tools and identifying performance bottlenecks.

Lessons:

- Performance Monitor Tool.
- Analyze Hardware Resource Bottlenecks.
- Retrieve Performance Monitor Data by DMVs.
- Resolve Hardware Performance Bottlenecks.
- Analyze the Overall Performance of SQL Server.

Labs:

- Create Performance Baseline with Perfmon tool.
- Create Multiple Files and File Groups.
- Place Indexes on Different File Groups.
- Partitioning a Table.

Module 3: SQL Server Performance Analysis

This module describes SQL Server internal tracing tools and analysis of index effectiveness on queries.

Lessons:

- The Basics of the SQL Server Profiler Tool
- How to Analyze Costly Queries by SQL Server Profiler Tool
- How to Combine baseline Measurement with Data Collected by SQL Server Profiler
- How to Track Query Performance by DMV
- How to Analyze Effectiveness of Index and Join Strategies for the SQL Query
- How to Measure the Cost of SQL Query Using SQL Utilities

Labs:

- Trace the Database by SQL Profiler.
- Trace the Database by SQL Trace.
- Analyze Execution Plan.
- Analyze Execution Plan by Statistics.

Module 4: Index Analysis

This module describes the index object, benefits and drawbacks of each different type of indexes along with general recommendation for each index type.

Lessons:

- What an Index Is

- The Benefits and Overhead of an Index
- General Recommendation for Index Design
- Clustered and Non-Clustered Index Behavior and Comparison
- Recommendation for Clustered and Non-Clustered Index
- Advanced Indexing Techniques
- Special Index Types

Labs:

- Analyzing a Clustered Index
- Design and Create Proper Index
- Tune Person.Address Table

Module 5: Database Engine Tuning Advisor

This module describes how to use database tuning advisor tool, benefits & drawbacks of the tool and how internally it works.

Lessons:

- How the Database Engine Tuning Advisor Works
- How to use Database Engine Tuning Advisor
- The limitations of Database Engine Tuning Advisor

Labs:

- Capture the Workload.
- Replace the Trace Workload.

Module 6: Bookmark Lookup Analysis

This module describes how bookmark lookup operation works and what is the drawbacks of this along with resolution methods.

Lessons:

- The Purpose of Bookmark Lookups
- Drawbacks of Using Bookmark Lookups
- Analysis of the Cause of Bookmark Lookups
- Techniques to Resolve Bookmark Lookups

Labs:

- Analyze the Bookmark Lookup
- Resolve the Bookmark Lookup

Module 7: Database Engine Tuning Advisor

This module describes what is use of Statistics and how to maintain the Statistics object to keep the queries perform optimally.

Lessons:

- The role of Statistics in Query Optimization
- The importance of Statistics on Columns with Indexes
- The importance of Statistics on Non-Indexed Columns used in Join and Filter Criteria
- Analysis a Single-Column and Multi-Column Statistics
- The Computation of Selectivity of a Column for Indexing
- Statistics Maintenance

- Effective Evaluation of Statistics used in a Query Execution

Labs:

- Analyze Actual Execution Plan for Missing Statistics.
- Create Statistics Object on a Column.
- Create Regular Statistics Maintenance Job.

Module 8: Fragmentation Analysis

This module describes what is internal and external fragmentation in Indexes and how it occurs along with the effect on performance.

Lessons:

- The causes of Index Fragmentation, Including an Analysis of Page Splits.
- The overhead costs associated with fragmentation.
- How to analyze the amount of fragmentation.
- Techniques used to resolve fragmentation.
- The significance of the FILLFACTOR in helping to control fragmentation.
- How to automate the fragmentation analysis process.

Labs:

- Analyze the Internal and External.
- Resolve the Fragmentation.
- Create an Automated Index Defragment.

Module 9: Execution Plan Cache Analysis

This module describes how to read and interpret the execution plan and what are the most expensive operators in execution plan.

Lessons:

- Execution Plan generation and caching.
- The SQL Server components used to generate an execution plan.
- Strategies to optimize the cost of execution plan generation.
- Factors affecting parallel plan generation.
- How to analyze execution plan caching.
- Query plan hash and query hash as mechanisms for identifying queries to tune.
- Ways to improve the re-usability of execution plan caching.

Labs:

- Retrieve the Execution Plans.
- Resolve the Parameter Sniffing Issue.

Module 10: Stored Procedure Recompilation

This module describes how to analyze the cause of recompilation and what is the benefit and drawback of this process.

Lessons:

- The benefits and drawbacks of Recompilation.
- How to identify the statements causing Recompilation.
- How to analyze the causes of Recompilation.

- ways to avoid Recompilation.

Labs:

- Analyze Cause of Recompilations.
- Resolve Cause of Recompilations.

Module 11: Query Design Analysis

This module describes how to analyze the query and rewrite them in order to increase the performance and reduce resource utilization.

Lessons:

- Aspects of Query design that affect performance.
- How query design use indexes effectively.
- The role of optimizer hints on query performance.
- The role of database constraints on query performance.
- Query designs that are less resource intensive.
- Query designs that use the procedure cache effectively.
- Query design that reduce network overhead.
- Techniques to reduce the Transaction cost of a query.

Labs:

- Analyze the Query Design.
- Rewrite the Queries.

Module 12: Blocking Analysis

This module describes the fundamental of blocking, ACID property and how isolation levels can affect on blocking scenarios .

Lessons:

- The fundamentals of blocking in SQL Server.
- The ACID properties of a transactional database.
- Database locks granularity, escalation, modes and compatibility.
- ANSI Isolation Levels.
- The effect of indexes on locking.
- Resolutions and Recommendations to avoid blocking.
- Techniques to automate blocking detection and information collection processes.

Labs:

- Analyzing the Blocking Issues.
- Resolving the Blocking Issue.
- Notifying the Administrator.

Module 13: Deadlock Analysis

This module describes fundamental of deadlock and ways to analyze and resolve the deadlock.

Lessons:

- Deadlock Fundamentals.
- Error Handling to Catch a deadlock.
- Ways to analyze the cause of a deadlock.

- Techniques to resolve a deadlock.

Labs:

- Capture the Deadlock.
- Analyze the Captured Deadlock.
- Resolve the Deadlock Root Cause.

Module 14: Cursor Cost Analysis

This module describes fundamental of cursors, types of cursors in SQL Server and what are benefits and drawbacks of cursors.

Lessons:

- The fundamentals of cursors.
- A cost analysis of different characteristics of cursors.
- The benefits and drawbacks of a default result set over cursors.
- Recommendations to minimize the cost overhead of cursors.

Labs:

- Analyze the Cursor Overhead.
- Redesign the Cursor Statement.

Module 15: Database Workload Optimization

This module describes what is database workload and how to identify the costly queries along with measures on the baseline.

Lessons:

- The characteristics of a database workload.
- The steps involved in database workload optimization.
- How to identify costly queries in the workload.
- How to measure the baseline resource use and performance of costly queries.
- How to apply techniques to optimize costly queries.
- How to analyze of the query optimization on the overall workload.

Labs:

- Capture the Workload.
- Analyze the Join Hints.
- Optimize the Workload.

About Trainer:



Hamid is SQL Server Data BI Platform Expert with more than 10 years' of professional experience, He is holding Microsoft Certified Master: SQL Server 2008, Microsoft Certified Solutions Master: Charter-Data Platform, Microsoft Data Platform MVP Award and CIW Database Design Specialist Certifications. Being a consultant allows him to work directly with customers to help solve questions regarding database issues for SQL Server and PowerBI. He had trained more than 200 students from Banking, Manufacturing, Insurance and Technology industries in well-known training centers in Malaysia.