

ITMT 1077

Course Syllabus

1. Name of Course: Troubleshooting & Optimizing Microsoft SQL Server 2005

2. Number of Clock Hours: 16

3. Course Description:

This course teaches database administrators working in enterprise environments how to determine and troubleshoot performance issues using Microsoft SQL Server 2005. The primary focus of this workshop is to teach the overall process of troubleshooting. It includes establishing monitoring standards and baselines, determining performance thresholds, and focusing the investigation on specific issues. Prerequisites: ITMT 1076 Administering & Automating Microsoft SQL Server 2005 Databases.

4. Course Objectives

After completing this course, students will be able to:

- Explain the methodology of narrowing down a performance issue to a particular database environment area.
- Apply the guidelines for monitoring database servers and instances by using Profiler and Sysmon.
- Apply the guidelines for auditing and comparing test results.
- Determine which indicators to monitor.
- Implement a monitoring solution.
- Audit monitoring results to identify problem areas.
- Explain the methodology of narrowing down a performance issue to a particular database environment object.
- Explain the use of SQLdiag tool to analyze outputs.
- Explain the use of Profiler to narrow a troubleshooting search to a specific issue.
- Analyze Sysmon and Profiler traces.
- Analyze Profiler traces using SQL Server queries.
- Determine performance issues by using SQLdiag.exe.
- Explain the methodology of optimizing the query environment.
- Describe the query performance troubleshooting process.
- Explain how Database Tuning Advisor can be used to troubleshoot the query environment.
- Review an execution plan for clues to poor performance.
- Perform index analysis by using DTA.
- Explain the methodology of troubleshooting connectivity issues.
- Describe the areas to audit for common connectivity issues.
- Explain the SQL Server 2005 endpoints.
- Troubleshoot Server-Not-Found issues.
- Troubleshoot an authentication error message.
- Troubleshoot endpoint issues.
- Explain the methodology of troubleshooting data issues.

- Explain the process of troubleshooting data integrity issues.
- Explain how torn pages can be resolved using a single-page restore.
- Troubleshoot and repair torn pages.
- Troubleshoot data integrity issues.
- Explain the methodology of troubleshooting concurrency issues.
- Explain what latches are and how they can be useful in troubleshooting long wait times.
- Choose a blocking monitoring solution.
- Identify the objects involved in a deadlock issue.
- Identify the objects involved in a blocking issue.
- Determine concurrency issues by using latch wait types.

5. Rationale:

Upon completion of this course, students will have a better understanding of Microsoft SQL Server 2005, a power database system.

6. Required Materials:

Microsoft Official Curriculum, MOC 2790, included.

7. Evaluation

Those who participate in class discussions, complete course lab work, and miss no more than three class meetings will be awarded 1.6 continuing education units.

8. Course Outline

Unit 1: Building a Monitoring Solution for SQL Server Performance Issues

This unit provides an opportunity for the student to build a monitoring solution that will help to identify SQL Server performance issues. Students will design a baseline performance monitoring solution.

Lessons

- Narrowing Down a Performance Issue to an Environment Area
- Guidelines for Monitoring Database Servers and Instances by Using Profiler and Sysmon
- Guidelines for Auditing and Comparing Test Results

Lab: Building a Monitoring Solution for SQL Server Performance Issues

- Determining Which Indicators to Monitor
- Implementing a Monitoring Solution
- Auditing Monitoring Results to Identify Problem Areas

After completing this unit, students will be able to:

- Explain the methodology of narrowing down a performance issue to a particular database environment area.

- Apply the guidelines for monitoring database servers and instances by using Profiler and Sysmon.
- Apply the guidelines for auditing and comparing test results.
- Determine which indicators to monitor.
- Implement a monitoring solution.
- Audit monitoring results to identify problem areas.

Unit 2: Troubleshooting Database and Database Server Performance Issues

This unit provides an opportunity for students to troubleshoot SQL Server performance issues. Students analyze the sample monitoring output to determine the issue. This unit includes information on a new feature in SQL Server 2005 which allows students to automatically sync a Sysmon log and Profiler trace. It also allows students to load and perform analysis against a Profiler trace using SQL Server queries. Finally, it allows students to run SQLdiag.exe as an additional troubleshooting tool.

Lessons

- Narrowing Down a Performance Issue to a Database Object
- How Profiler Can Help Narrow a Search to a Specific Issue
- How the SQLdiag Tool Can Be Used to Analyze Outputs

Lab: Troubleshooting Database and Database Server Performance Issues

- Analyzing Sysmon and Profiler Traces
- Analyzing a Profiler Trace by Using SQL Server Queries
- Determining Database Server Issues by Using SQLdiag.exe

After completing this unit, students will be able to:

- Explain the methodology of narrowing down a performance issue to a particular database environment object.
- Explain the use of SQLdiag tool to analyze outputs.
- Explain the use of Profiler to narrow a troubleshooting search to a specific issue.
- Analyze Sysmon and Profiler traces.
- Analyze Profiler traces using SQL Server queries.
- Determine performance issues by using SQLdiag.exe.

Unit 3: Optimizing the Query Performance Environment

This unit gives students an opportunity to determine the database-level reasons for poor query performance, like bad indexes and outdated index column statistics. Students are provided with samples from a Profiler trace or a listing of poorly performing queries and directed to investigate possible reasons.

Lessons

- The Methodology of Optimizing a Query Environment
- The Query Performance Troubleshooting Process

Lab: Optimizing the Query Performance Environment

- Reviewing an Execution Plan for Clues to Poor Performance
- Performing Index Analysis by Using the Database Tuning Advisor (DTA)

After completing this unit, students will be able to:

- Explain the methodology of optimizing the query environment.
- Describe the query performance troubleshooting process.
- Explain how Database Tuning Advisor can be used to troubleshoot the query environment.
- Review an execution plan for clues to poor performance.
- Perform index analysis by using DTA.

Unit 4: Troubleshooting SQL Server Connectivity Issues

This unit explains the troubleshooting of common SQL Server problems. Examples include DNS issues, network authentication issues, and SQL Server 2005 endpoint issues.

Lessons

- The Methodology of Troubleshooting SQL Server Connectivity Issues.
- Areas to Troubleshoot for Common Connectivity Issues.
- What Are SQL Server 2005 Endpoints?

Lab: Troubleshooting SQL Server Connectivity Issues

- Troubleshooting Server-Not-Found Issues.
- Troubleshooting an Authentication Error Message.
- Troubleshooting Endpoint Issues.

After completing this unit, students will be able to:

- Explain the methodology of troubleshooting connectivity issues.
- Describe the areas to audit for common connectivity issues.
- Explain the SQL Server 2005 endpoints.
- Troubleshoot Server-Not-Found issues.
- Troubleshoot an authentication error message.
- Troubleshoot endpoint issues.

Unit 5: Troubleshooting SQL Server Data Issues

This unit lets students troubleshoot issues at a data level. One exercise will be used to identify and recover a torn page. The second exercise is a business unit report which contains invalid data. The goal is for the Database Administrator to track down the reasons for the invalid data.

Lessons

- The Methodology of Troubleshooting SQL Server Data Issues
- The Process of Troubleshooting Data Integrity Issues
- How Torn Pages Can be Resolved Using a Single-Page Restore

Lab: Troubleshooting SQL Server Data Issues

- Troubleshooting and Repairing Torn Pages
- Troubleshooting a Data Issue

After completing this unit, students will be able to:

- Explain the methodology of troubleshooting data issues.
- Explain the process of troubleshooting data integrity issues.
- Explain how torn pages can be resolved using a single-page restore.
- Troubleshoot and repair torn pages.
- Troubleshoot data integrity issues.

Unit 6: Troubleshooting SQL Server Data Concurrency Issues

This module lets the students identify the offending objects that cause concurrency issues. The first exercise shows students how to determine stored procedures involved in a deadlocked situation. The second exercise shows students how to determine the source of a blocking issue. The third exercise shows students how to evaluate wait types and latches.

Lessons

- The Methodology of Troubleshooting Concurrency Issues
- What Are SQL Server Latches?
- Activity: Choosing a Blocking Monitoring Solution

Lab: Troubleshooting SQL Server Data Concurrency Issues

- Identifying the Objects Involved in a Deadlock
- Identifying the Objects Involved in a Blocking Issue
- Determining Concurrency Issues by Using Latch Wait Types

After completing this unit, students will be able to:

- Explain the methodology of troubleshooting concurrency issues.
- Explain what latches are and how they can be useful in troubleshooting long wait times.
- Choose a blocking monitoring solution.
- Identify the objects involved in a deadlock issue.
- Identify the objects involved in a blocking issue.
- Determine concurrency issues by using latch wait types.