

## **ITMT 1075**

### **Course Syllabus**

**1. Name of Course:** Designing High Availability for Microsoft SQL Server 2005

**2. Number of Clock Hours:** 24

#### **3. Course Description:**

This course provides students with the knowledge and skills to design high availability database solutions using Microsoft SQL Server 2005. The course focuses on teaching experienced database administrators working in enterprise environments to design database solutions that meet the availability needs of their organization. It emphasizes that students should think broadly about high availability, which includes thinking about the database itself and about their entire environment, including business needs; regulatory requirements; and network, systems, and database considerations during design. Students will also learn how to document and test the high availability database solution. Prerequisites: ITMT 1074 Designing Security for a Microsoft SQL Server 2005.

#### **4. Course Objectives**

After completing this module, students will be able to:

- Identify high-availability requirements and constraints.
- Analyze high-availability requirements.
- Determine appropriate high-availability solutions.
- Design the platform for clustering.
- Design the SQL Server cluster implementation.
- Design recovery strategies and test plan for database clustering.
- Migrate and upgrade SQL Server clusters.
- Design an operations plan for clustering to maximize availability.
- Determine storage requirements for SQL Server databases.
- Determine storage requirements for SQL Server components and files.
- Design a highly-available storage solution for each database resource.
- Design a backup and restore strategy for the database.
- Explain the different considerations for designing a log shipping solution.
- Design log shipping server roles and topology.
- Design a strategy for upgrading log shipping.
- Design an operations plan for log shipping to maximize availability.
- Explain the different considerations for designing a database mirroring solution.
- Design the database roles and topology for database mirroring.
- Convert existing high-availability solutions to database mirroring.
- Design an operations plan for database mirroring to maximize availability.
- Explain the different considerations for designing a replication solution.
- Design a replication solution.
- Design a strategy for upgrading replication.
- Design an operations plan for replication to maximize availability.
- Evaluate the weaknesses in each high-availability technology.

- Maximize availability by combining high-availability technologies.
- Document high-availability solutions.
- Create a test plan for high-availability solutions.

#### **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 2788, included.

#### **7. Evaluation**

Those who participate in class discussions, complete course lab work, and miss no more than three class meetings will be awarded 2.4 continuing education units.

#### **8. Course Outline**

##### **Module 1: Selecting the Appropriate High-availability Solution**

This module provides the guidelines for identifying business requirements and technical and non-technical constraints of high-availability. This module also explains the guidelines for analyzing the requirements and constraints for high-availability. Finally, this module provides a brief overview of existing high-availability technologies and explains the process and guidelines for determining the appropriate high-availability technology that can be used to meet business requirements and constraints.

##### **Lessons**

- Identifying High-availability Requirements and Constraints
- Analyzing High-availability Requirements and Constraints
- Determining Appropriate High-availability Solutions

##### **Lab 1: Proposing a High-availability Solution**

- Gathering Requirements
- Prioritizing Requirements
- Determining Appropriate High-availability Technology
- Proposing a High-availability Solution

After completing this module, students will be able to:

- Identify high-availability requirements and constraints.
- Analyze high-availability requirements.
- Determine appropriate high-availability solutions.

##### **Module 2: Designing a Clustering Solution**

This module provides the considerations and guidelines for designing a SQL Server cluster implementation. This module also provides the guidelines for designing recovery strategies and formulating the test plan for database clustering. Next, this module explains the considerations for migrating and upgrading SQL Server clusters. Finally, this module explains the process of creating an operations plan for clustering. In this module, you will also learn about the planned and unplanned events that can affect a cluster environment.

### **Lessons**

- Designing the Platform for Clustering
- Designing the SQL Server Cluster Implementation
- Designing Recovery Strategies and Test Plans for Database Clustering
- Migrating and Upgrading SQL Server Clusters
- Designing an Operations Plan for Clustering

### **Lab 2: Designing a Database Clustering Solution**

- Designing a Cluster Topology
- Designing an Operations Plan
- Verifying a SQL Server Cluster Configuration
- Monitoring a SQL Server Cluster

After completing this module, students will be able to:

- Design the platform for clustering.
- Design the SQL Server cluster implementation.
- Design recovery strategies and test plan for database clustering.
- Migrate and upgrade SQL Server clusters.
- Design an operations plan for clustering to maximize availability.

### **Module 3: Designing a Highly Available Database Storage Solution**

This module provides the guidelines and considerations to determine the storage requirements for SQL Server databases, components, and external files that are a part of the database system. This module also explains the guidelines for designing storage solutions for these resources.

In this module, you will also learn about designing restore strategies to maximize availability. Finally, this module explains the guidelines for recovering damaged and partially damaged system and user databases.

### **Lessons**

- Determining Storage Requirements for SQL Server Databases
- Determining Storage Requirements for SQL Server Components and Files

- Designing Storage Solutions for SQL Server Databases
- Designing a Backup and Restore Strategy

### **Lab 3: Designing a Highly Available Database Storage Solution**

- Determining Storage Needs
- Selecting the Storage Solution
- Designing a RAID Solution
- Designing a SAN Solution
- Designing a Backup and Restore Strategy

After completing this module, students will be able to:

- Determine storage requirements for SQL Server databases.
- Determine storage requirements for SQL Server components and files.
- Design a highly-available storage solution for each database resource.
- Design a backup and restore strategy for the database.

### **Module 4: Designing a Log Shipping Solution**

In this module, you will learn about the guidelines and considerations for designing a log shipping solution. This module provides the guidelines for determining log shipping server roles and topology. This module also explains the guidelines for upgrading log shipping.

Finally, this module explains the process of designing an operations plan for log shipping. In this module, you will also learn about the planned and unplanned events that can affect a log shipping environment.

#### **Lessons**

- Introduction to Designing a Log Shipping Solution
- Designing Log Shipping Server Roles and Topology
- Designing a Log Shipping Upgrade Strategy
- Designing an Operations Plan for Log Shipping

### **Lab 4: Designing a Log Shipping Solution**

- Selecting the Appropriate Log Shipping Architecture
- Designing Log Shipping Database Roles and Topology
- Designing an Operations Plan
- Verifying and Testing a Log Shipping Solution

After completing this module, students will be able to:

- Explain the different considerations for designing a log shipping solution.

- Design log shipping server roles and topology.
- Design a strategy for upgrading log shipping.
- Design an operations plan for log shipping to maximize availability.

## **Module 5: Designing a Database Mirroring Solution**

In this module, you will learn about the guidelines and considerations for designing a database mirroring solution. This module provides the guidelines for determining the database roles and topology for mirroring. This module also explains the guidelines for migrating from an existing high-availability technology in SQL Server 2000 to database mirroring in SQL Server 2005.

Finally, this module explains the process of designing an operations plan for database mirroring. In this module, you will also learn about the planned and unplanned events that can affect a mirroring environment.

### **Lessons**

- Introduction to Designing a Database Mirroring Solution
- Designing Database Roles and Topology for Database Mirroring
- Converting High-availability Solutions to Database Mirroring
- Designing an Operations Plan for Database Mirroring

### **Lab 5: Designing a Database Mirroring Solution**

- Selecting the Appropriate Mirroring Architecture
- Designing Database Roles and Topology for Database Mirroring
- Designing an Operations Plan
- Evaluating Migration Options from Clustering to Mirroring
- Evaluating Migration Options from Log Shipping to Mirroring
- Comparing Mirroring with Clustering and Log Shipping

After completing this module, students will be able to:

- Explain the different considerations for designing a database mirroring solution.
- Design the database roles and topology for database mirroring.
- Convert existing high-availability solutions to database mirroring.
- Design an operations plan for database mirroring to maximize availability.

## **Module 6: Designing a Highly Available Solution Based on Replication**

In this module, you will learn about the guidelines and considerations for designing a highly-available solution based on replication. This module provides the guidelines for determining replication server roles and topology. This module also explains the guidelines for upgrading replication.

Finally, this module explains the process of designing an operations plan for replication. In this module, you will also learn about the planned and unplanned events that can affect a replication environment.

### **Lessons**

- Introduction to Designing a Replication Solution
- Designing a Replication Solution
- Designing a Replication Upgrade Strategy
- Designing an Operations Plan for Replication

### **Lab 6: Designing a Highly-availability Solution Based on Replication**

- Selecting the Appropriate Replication Architecture
- Designing a Replication Solution
- Designing an Operations Plan
- Designing a Disaster Recovery Strategy By Using MERGE Replication
- Designing a Disaster Recovery Strategy By Using TRANSACTIONAL Replication

After completing this module, students will be able to:

- Explain the different considerations for designing a replication solution.
- Design a replication solution.
- Design a strategy for upgrading replication.
- Design an operations plan for replication to maximize availability.

### **Module 7: Combining High-availability Technologies**

This module provides guidelines for designing high-availability solutions by combining existing high-availability technologies. This module enables you to evaluate the weaknesses in each high-availability technology. In this module, you will determine technologies that complement each other to minimize these weaknesses.

### **Lessons**

- Evaluating Weaknesses in Each High-availability Technology
- Maximizing Availability by Combining High-availability Technologies

### **Lab 7: Combining High-availability Technologies**

- Evaluating Weaknesses in High-availability Technologies
- Maximizing Availability by Combining Technologies

After completing this module, students will be able to:

- Evaluate the weaknesses in each high-availability technology.

- Maximize availability by combining high-availability technologies.

## **Module 8: Documenting and Testing a High-availability Strategy**

This module provides guidelines for documenting and testing high-availability solutions. This module explains the structure of a high-availability solution document and also explains the need for documenting the solution. In this module, you will also discuss the process of creating a test plan for high-availability solutions.

### **Lessons**

- Documenting High-availability Solutions
- Creating a Test Plan for High-availability Solutions

### **Lab 8: Documenting and Testing a High-availability Strategy**

- Documenting the High-availability Solution
- Creating a Test Plan

After completing this module, students will be able to:

- Document high-availability solutions.
- Create a test plan for high-availability solutions.