Course Outline

Module 1: SQL Server Overview

The following topics are covered in this module:

- What Is SQL Server?
- SQL Server Integration
- SQL Server Databases
- SQL Server Security
- Working with SQL Server

The following lab is covered in this module:

- SQL Server Overview

At the end of this module, you will be able to:

- Describe SQL Server 2000 and its supported operating system platforms.
- Describe SQL Server integration with Microsoft Windows 2000 and other server applications.
- Describe SQL Server databases.
- Describe SQL Server security.
- Describe SQL Server administration and implementation activities, as well as SQL Server application design options.

Module 2: Overview of Programming SQL Server

The following topics are covered in this module:

- Designing Enterprise Application Architecture
- SQL Server Programming Tools
- The Transact-SQL Programming Language
- Elements of Transact-SQL
- Additional Language Elements
- Ways to Execute Transact-SQL Statement

The following lab is covered in this module:

- Overview of Transact-SQL

At the end of this module, you will be able to:
• Describe the concepts of enterprise-level application architecture.
• Describe the primary SQL Server programming tools.
• Explain the difference between the two primary programming tools in SQL Server.
• Describe the basic elements of Transact-SQL.
• Describe the use of local variables, operators, functions, control of flow statements, and comments.
• Describe the various ways to execute Transact-SQL statements.

Module 3: Creating and Managing Databases

The following topics are covered in this module:

• Creating Databases
• Creating Filegroups
• Managing Databases
• Introduction to Data Structures

The following lab is covered in this module:

• Creating and Managing Databases

At the end of this module, you will be able to:

• Create a database.
• Create a filegroup.
• Manage a database.
• Describe data structures.

Module 4: Creating Data Types and Tables

The following topics are covered in this module:

• Creating Data Types
• Creating Tables
• Generating Column Values
• Generating Scripts

The following lab is covered in this module:

• Creating Data Types and Tables

At the end of this module, you will be able to:

• Create and drop user-defined data types.
• Create and drop user tables.
• Generate column values.
• Generate a script.

Module 5: Implementing Data Integrity

The following topics are covered in this module:

• Types of Data Integrity
• Enforcing Data Integrity
• Defining Constraints
• Types of Constraints
• Disabling Constraints
• Using Defaults and Rules
• Deciding Which Enforcement Method to Use

The following lab is covered in this module:

• Implementing Data Integrity

At the end of this module, you will be able to:

• Describe the types of data integrity.
• Describe the methods to enforce data integrity.
• Determine which constraint to use and create constraints.
• Define and use DEFAULT, CHECK, PRIMARY KEY, UNIQUE, and FOREIGN
  KEY constraints.
• Disable constraints.
• Describe and use defaults and rules.
• Determine which data integrity enforcement methods to use.

Module 6: Planning Indexes

The following topics are covered in this module:

• Introduction to Indexes
• Index Architecture
• How SQL Server Retrieves Stored Data
• How SQL Server Maintains Index and Heap Structures
• Deciding Which Columns to Index

The following lab is covered in this module:

• Determining the Indexes of a Table
At the end of this module, you will be able to:

- Describe why and when to use an index.
- Describe how SQL Server uses clustered and nonclustered indexes.
- Describe how SQL Server index architecture facilitates the retrieval of data.
- Describe how SQL Server maintains indexes and heaps.
- Describe the importance of selectivity, density, and distribution of data when deciding which columns to index.

**Module 7: Creating and Maintaining Indexes**

The following topics are covered in this module:

- Creating Indexes
- Creating Index Options
- Maintaining Indexes
- Introduction to Statistics
- Querying the `sysindexes` Table
- Setting Up Indexes Using the Index Tuning Wizard
- Performance Considerations

The following labs are covered in this module:

- Creating and Maintaining Indexes
- Viewing Index Statistics

At the end of this module, you will be able to:

- Create indexes and indexed views with unique or composite characteristics.
- Use the CREATE INDEX options.
- Describe how to maintain indexes over time.
- Describe how the query optimizer creates, stores, maintains, and uses statistics to optimize queries.
- Query the `sysindexes` table.
- Describe how the Index Tuning Wizard works and when to use it.
- Describe performance considerations that affect creating and maintaining indexes.

**Module 8: Implementing Views**

The following topics are covered in this module:

- Introduction to Views
- Advantages of Views
- Defining Views
- Modifying Data Through Views
- Optimizing Performance by Using Views
- Performance Considerations

The following lab is covered in this module:

- Implementing Views

At the end of this module, you will be able to:

- Describe the concept of a view.
- List the advantages of views.
- Define a view with the CREATE VIEW statement.
- Modify data through views.
- Optimize performance by using views.

**Module 9: Implementing Stored Procedures**

The following topics are covered in this module:

- Introduction to Stored Procedures
- Creating, Executing, Modifying, and Dropping Stored Procedures
- Using Parameters in Stored Procedures
- Executing Extended Stored Procedures
- Handling Error Messages
- Performance Considerations

The following labs are covered in this module:

- Creating Stored Procedures
- Creating Stored Procedures Using Parameters

At the end of this module, you will be able to:

- Describe how a stored procedure is processed.
- Create, execute, modify, and drop a stored procedure.
- Create stored procedures that accept parameters.
- Execute extended stored procedures.
- Create custom error messages.

**Module 10: Implementing User-defined Functions**

The following topics are covered in this module:

- What Is a User-defined Function?
• Defining User-defined Functions
• Examples of User-defined Functions

The following lab is covered in this module:

• Creating User-defined Functions

At the end of this module, you will be able to:

• Describe the three types of user-defined functions.
• Create and alter user-defined functions.
• Create each of the three types of user-defined functions.

**Module 11: Implementing Triggers**

The following topics are covered in this module:

• Introduction to Triggers
• Defining Triggers
• How Triggers Work
• Examples of Triggers
• Performance Considerations

The following lab is covered in this module:

• Creating Triggers

At the end of this module, you will be able to:

• Create a trigger.
• Drop a trigger.
• Alter a trigger.
• Describe how various triggers work.
• Evaluate the performance considerations that affect using triggers.

**Module 12: Programming Across Multiple Servers**

The following topics are covered in this module:

• Introduction to Distributed Queries
• Executing an Ad Hoc Query on a Remote Data Source
• Setting Up a Linked Server Environment
• Executing a Query on a Linked Server
• Managing Distributed Transactions
• Modifying Data on a Linked Server
• Using Partitioned Views

The following lab is covered in this module:

• Using Distributed Data

At the end of this module, you will be able to:

• Describe distributed queries.
• Write ad hoc queries that access data that is stored in a remote SQL Server 2000 or in an OLE DB data source.
• Set up a linked server environment to access data that is stored in a remote SQL Server 2000 or in an OLE DB data source.
• Write queries that access data from a linked server.
• Execute stored procedures on a remote server or linked server.

**Module 13: Optimizing Query Performance**

The following topics are covered in this module:

• Introduction to the Query Optimizer
• Obtaining Execution Plan Information
• Using an Index to Cover a Query
• Indexing Strategies
• Overriding the Query Optimizer

The following lab is covered in this module:

• Optimizing Query Performance

At the end of this module, you will be able to:

• Explain the role of the query optimizer and how it works to ensure that queries are optimized.
• Use various methods for obtaining execution plan information so that they can determine how the query optimizer processed a query and validate that the most efficient query plan was generated.
• Create indexes that cover queries
• Identify indexing strategies that reduce page reads.
• Evaluate when to override the query optimizer.

**Module 14: Analyzing Queries**

The following topics are covered in this module:
• Queries That Use the AND Operator
• Queries That Use the OR Operator
• Queries That Use Join Operations

The following labs are covered in this module:

• Analyzing Queries That Use the AND and OR Operators
• Analyzing Queries That Use Different Join Strategies

At the end of this module, you will be able to:

• Analyze the performance gain of writing efficient queries and creating useful indexes for queries that contain the AND logical operator.
• Analyze the performance gain of writing efficient queries and creating useful indexes for queries that contain the OR logical operator.
• Evaluate how the query optimizer uses different join strategies for query optimization.

Module 15: Managing Transactions and Locks

The following topics are covered in this module:

• Introduction to Transactions and Locks
• Managing Transactions
• SQL Server Locking
• Managing Locks

The following lab is covered in this module:

• Managing Transactions and Locks

At the end of this module, you will be able to:

• Describe transaction processing.
• Execute, cancel, or roll back a transaction.
• Identify locking concurrency issues.
• Identify resource items that can be locked and the types of locks.
• Describe lock compatibility.
• Describe how SQL Server 2000 uses dynamic locking.
• Set locking options and display locking information.