MOC 10776A: Developing Microsoft SQL Server 2012 Databases

Course Overview

This course introduces SQL Server 2012 and describes logical table design, indexing and query plans. It also focuses on the creation of database objects including views, stored procedures, along with parameters, and functions.

Course Introduction
Course Introduction

Module 01 - Introduction to SQL Server 2012 and its Toolset
Lesson 1: Introduction to the SQL Server Platform
SQL Server Architecture
SQL Server Components
SQL Server Instances
SQL Server Editions
SQL Server Versions
Lesson 2: Working with SQL Server Tools
Connecting from Clients and Applications
Software Layers for Connections
SQL Server Management Studio
Demo - Using SQL Server Management Studio
SQL Server Data Tools
Demo - Using SQL Server Data Tools
Books Online
Lesson 3: Configuring SQL Server Services
SQL Server Configuration Manager
Demo - SQL Server Configuration Manager
SQL Server Services
Network Ports and Listeners
Creating Server Aliases
Other SQL Server Tools
Demo - Using SQL Server Profiler
Module 01 Review

Module 02 - Working with Data Types
Lesson 1: Using Data Types
Introducing Data Types
Exact Numeric Data Types
Approximate Numeric Data Types
Date and Time Data Types
Unique Identifiers
NULL or NOT NULL Columns
Demo - Working with Numeric Data Types
Lesson 2: Working with Character Data
Unicode
Character Data Types
Understanding Collations
Module 07 - Reading SQL Server 2012 Execution Plans
Lesson 1: Execution Plan Core Concepts
Why Execution Plans Matter
Query Execution Phases
What Is an Execution Plan?
Actual vs. Estimated Execution Plans
What Is an Execution Context?
Execution Plan Formats
Demo - Viewing Execution Plans in SSMS
Lesson 2: Common Execution Plan Elements
Table and Clustered Index Scans and Seeks
Nested Loops and Lookups
Merge and Hash Joins
Aggregations
Filter and Sort
Data Modification
Demo - Working with Common Execution Plan Elements
Lesson 3: Working with Execution Plans
Methods for Capturing Plans
Demo - Capturing Plans in Activity Monitor
Re-Executing Queries
Execution Plan Related DMVs
Demo - Viewing Cached Plans
Module 07 Review

Module 08 - Improving Performance through Nonclustered Indexes
Lesson 1: Designing Effective Nonclustered Indexes
What Is a Nonclustered Index?
Nonclustered Indexes Over Heaps
Nonclustered Indexes Over Clustered Indexes
Methods for Obtaining Index Information
Demo - Obtaining Index Information
Lesson 2: Implementing Nonclustered Indexes
Creating Nonclustered Indexes
Performance Impact of Lookups in Nested Loops
INCLUDE Clause
Dropping or Altering Nonclustered Indexes
Filtered Indexes
Lesson 3: Tracing and Tuning Queries
SQL Server Profiler
Demo - Using SQL Server Profiler
Database Engine Tuning Advisor
Demo - Using Database Engine Tuning Advisor
Module 08 Review

Module 09 - Designing and Implementing Views
Lesson 1: Introduction to Views
What Is a View?
Types of Views
Advantages of Views
Working with System Views
Dynamic Management Views
Demo - Querying System and Dynamic Management Views
Lesson 2: Creating and Managing Views
Creating Views
Dropping Views
Altering Views
Ownership Chains and Views
Sources of Information about Views
Updatable Views
Obfuscating View Definitions
Demo - Implementing Views
Lesson 3: Performance Considerations for Views
Views and Dynamic Resolution
Nested View Considerations
Partitioned Views
Demo - Investigating Views and Performance
Creating Indexed Views
Indexed View Considerations
Demo - Querying Indexed Views
Module 09 Review

Module 10 - Designing and Implementing Stored Procedures
Lesson 1: Introduction to Stored Procedures
What Is a Stored Procedure?
Benefits of Stored Procedures
Working with System Stored Procedures
Statements Not Permitted in Stored Procedures
Demo - Working with System Stored Procedures and Extended Stored Procedures
Lesson 2: Working with Stored Procedures
Creating a Stored Procedure
Executing Stored Procedures
Altering a Stored Procedure
Dropping a Stored Procedure
Stored Procedure Dependencies
Guidelines for Creating Stored Procedures
Obfuscating Stored Procedure Definitions
Lesson 3: Implementing Parameterized Stored Procedures
Working with Parameterized Stored Procedures
Using Input Parameters
Using Output Parameters
Parameter Sniffing and Performance
Demo - Passing Parameters to Stored Procedures
Lesson 4: Controlling Execution Context
Controlling Execution Context
The EXECUTE AS Clause
Viewing Execution Context
Demo - Viewing Execution Context
Module 10 Review
Module 11 - Merging Data and Passing Tables
Lesson 1: Using the MERGE Statement
MERGE Statement
WHEN MATCHED
WHEN NOT MATCHED BY TARGET
WHEN NOT MATCHED BY SOURCE
OUTPUT Clause and $action
MERGE Determinism and Performance
Demo - Updating Data by Using the MERGE Statement
Lesson 2: Implementing TABLE Types
Reducing Round-Trip Overhead
Options for Passing Lists as Parameters
Demo - Passing Delimited Lists
Introduction to the TABLE Type
Populating TABLE Types with Row Constructors
Demo - Using TABLE Types and Row Constructors
Lesson 3: Using TABLE Types As Parameters
TABLE Input Parameters for Stored Procedures
Using Row Constructors to Populate Parameters
Demo - Passing Tables to Stored Procedures
Module 11 Review

Module 12 - Designing and Implementing User-Defined Functions
Lesson 1: Overview of Functions
Types of Functions
System Functions
Lesson 2: Designing and Implementing Scalar Functions
What Is a Scalar Function?
Creating Scalar Functions
Deterministic and Non-deterministic Functions
Demo - Working with Scalar Functions
Lesson 3: Designing and Implementing Table-valued Functions
What are Table-valued Functions?
Inline Table-valued Functions
Multi-statement Table-valued Functions
Demo - Implementing Table-valued Functions
Lesson 4: Considerations for Implementing Functions
Performance Impact of Scalar Functions
Performance Impact of Table-valued Functions
Controlling Execution Context
The EXECUTE AS Clause
Guidelines for Creating Functions
Demo - Controlling Execution Context
Lesson 5: Alternatives to Functions
Comparing Table-valued Functions and Stored Procedures
Comparing Table-valued Functions and Views
Module 12 Review
Module 13 - Creating Highly Concurrent SQL Server 2012 Applications
Lesson 1: Introduction to Transactions
What Are Transactions?
Auto Commit Transactions
Explicit Transactions
Implicit Transactions
Transaction Recovery
Considerations for Using Transactions
Demo - Working with Transactions
Lesson 2: Introduction to Locks
Methods of Concurrency Control
What Are Locks?
Blocking vs. Locking
What Concurrency Problems Are Prevented by Locking?
Lockable Resources
Types of Locks
Lock Compatibility
Lesson 3: Management of Locking
Locking Timeout
Lock Escalation
What Are Deadlocks?
Locking-related Table Hints
Methods to View Locking Information
Demo - Viewing Locking Information
Lesson 4: Transaction Isolation Levels
SQL Server Transaction Isolation Levels
Read Committed Snapshot
Isolation-related Table Hints
Module 13 Review

Module 14 - Handling Errors in T-SQL Code
Lesson 1: Understanding T-SQL Error Handling
Where T-SQL Errors Occur
Types of Errors
What’s in an Error?
Error Severity
Demo - Working with Error Types and Severity
Lesson 2: Implementing T-SQL Error Handling
Errors and Transactions
Raising Errors Using RAISERROR
Raising Errors using THROW
Using @@ERROR
Transaction Nesting Errors
Raising Custom Errors
Creating Alerts When Errors Occur
Demo - Handling Errors Using T-SQL
Lesson 3: Implementing Structured Exception Handling
TRY/CATCH Block Programming
Error Handling Functions
Catchable vs. Non-catchable Errors
Rethrowing Errors Using THROW
TRY/CATCH and Transactions
Module 15 - Responding to Data Manipulation via Triggers
Lesson 1: Designing DML Triggers
What Are DML Triggers?
AFTER Triggers vs. INSTEAD OF Triggers
Inserted and Deleted Virtual Tables
SET NOCOUNT ON
Trigger Considerations
Lesson 2: Implementing DML Triggers
AFTER INSERT Triggers
Demo - Working with AFTER INSERT Triggers
AFTER DELETE Triggers
Demo - Working with AFTER DELETE Triggers
AFTER UPDATE Triggers
Lesson 3: Advanced Trigger Concepts
INSTEAD OF Triggers
Demo - Working with INSTEAD OF Triggers
How Nested Triggers Work
Considerations for Recursive Triggers
UPDATE Function
Trigger Firing Order
Alternatives to Using Triggers
Module 15 Review

Module 16 - Implementing Managed Code in SQL Server 2012
Lesson 1: Introduction to SQL CLR Integration
Options for Extending SQL Server
Introduction to the .NET Framework
.NET Common Language Runtime
Why Use Managed Code in SQL Server?
T-SQL vs. Managed Code
Appropriate Database Object Use in Managed Code
Discussion: Choosing Appropriate Use Cases for Managed Code and T-SQL
Lesson 2: Importing and Cataloging Assemblies
What Is an Assembly?
Assembly Permission Sets
Importing an Assembly
Lesson 3: Implementing SQL CLR Integration
Attribute Usage
Scalar User-defined Functions
Table-valued User-defined Functions
Demo - Creating User-defined Functions
Stored Procedures – T-SQL Replacement
Stored Procedures – External Access
Triggers
User-defined Aggregates
User-defined Data Types
Considerations for User-defined Data Types
Module 16 Review
Module 17 - Storing XML Data in SQL Server 2012
Lesson 1: Introduction to XML and XML Schemas
Discussion: XML Usage in SQL Server
Core XML Concepts
Fragments vs. Documents
XML Namespaces
XML Schemas
Appropriate Usage of XML Data Storage in SQL Server
Demo - Using XML and XML Schemas
Lesson 2: Storing XML Data and Schemas in SQL Server
XML Data Type
XML Schema Collections
Untyped vs. Typed XML
CONTENT vs. DOCUMENT
Demo - Working with Typed vs. Untyped XML
Lesson 3: Implementing XML Indexes
What Are XML Indexes?
Types of XML Indexes
Demo - Implementing XML Indexes
Module 17 Review

Module 18 - Querying XML Data in SQL Server 2012
Lesson 1: Using the T-SQL FOR XML Statement
Introducing the FOR XML Clause
Using RAW Mode Queries
Using AUTO Mode Queries
Using EXPLICIT Mode Queries
Using PATH Mode Queries
Retrieving Nested XML
Demo - Using FOR XML Queries
Lesson 2: Getting Started with XQuery
What Is XQuery?
query() Method
value() Method
exist() Method
modify() Method
Lesson 3: Shredding XML
Overview of Shredding XML Data
Stored Procedures for Managing In-Memory Node Trees
OPENXML
Working with XML Namespaces
nodes() Method
Demo - Shredding XML
Module 18 Review

Module 19 - Working with SQL Server 2012 Spatial Data
Lesson 1: Introduction to Spatial Data
Target Applications
Types of Spatial Data
Planar vs. Geodetic
OGC Object Hierarchy
Spatial Reference Identifiers
Demo - Viewing Available Spatial Reference Systems
Lesson 2: Working with SQL Server Spatial Data Types
SQL Server Spatial Data
System vs. User SQL CLR Types
geometry Data Type
gеогrарhу Data Type
Spatial Data Formats
OGC Methods and Properties
Microsoft Extensions
Demo - Working with Spatial Data Types
Lesson 3: Using Spatial Data in Applications
Performance Issues in Spatial Queries
Tessellation Process
Spatial Indexes
Implementing Spatial Indexes
gеоmеt ry Mеthods Supported by Spatial Indexes
gеогrарhу Methods Supported by Spatial Indexes
Extending SQL Server Spatial
Module 19 Review

Module 20 - Working with Full-Text Indexes and Queries 38m
Lesson 1: Introduction to Full-Text Indexing
Discussion: The Need for More Flexible User Interaction
Why LIKE Isn't Enough
Fuzziness in Queries
Demo - Using Full-Text Queries
Lesson 2: Implementing Full-Text Indexes in SQL Server
Discussion: Search-related Options
Full-Text Search in SQL Server
Core Components of Full-Text Search
Language Support and Supported Word Breakers
Implementing Full-Text Indexes
Demo - Implementing Full-Text Indexes
Lesson 3: Working with Full-Text Queries
CONTAINS Queries
FREETEXT Queries
Customizable Nearness
Table Functions and Ranking Results
Thesaurus
Stopwords and Stoplists
SQL Server Management of Full-Text
Module 20 Review
Course Closure

Total Duration: 16h 57m