Mastering SQL Server 2019 Database Development

Course Description:

This comprehensive SQL Server course is designed to provide learners with an in-depth understanding of SQL Server 2019, covering a wide range of topics from the basics of database management to advanced querying techniques and performance optimization. Participants will learn how to create, manipulate, and retrieve data, design efficient database structures, implement views and stored procedures, and utilize built-in functions. Through practical examples and hands-on exercises, learners will gain the skills and knowledge needed to effectively manage and optimize SQL Server environments.

Duration: 40 hours

Pre-requisites:

- **Basic Computer Skills:** Ability to navigate the operating system and work with files and folders.
- **Familiarity with Databases:** Understanding of basic database concepts and terminology.
- **Prior Experience with SQL:** Basic knowledge of SQL (Structured Query Language) is recommended but not required.

Content Coverage:

Module 1: Overview of SQL Server 2019 Architecture

- What is SQL Server?
- SQL Server Editions
- Components of SQL Server
- SQL Server databases
- Tools of Microsoft SQL Server 2019
- Introduction to SQL Server Management Studio (SSMS)

Module 2: Creating Tables

- Creating a Database
- Creating a table

- System-supplied data types
- Types of Constraints
- Creating constraints
- Using Identity to generate sequential numbers
- Designing Tables for Performance
- Creating Primary and Foreign Keys
- Implementing Default Constraints

Module 3: Data Manipulation

- Inserting, Deleting, Updating data
- Copying a Table
- Truncating Data
- Using Transactions
- Error Handling with TRY...CATCH

Module 4: Data Retrieval

- Retrieving data by using the SELECT statement
- Filtering data
- Fetching distinct values
- Fetching a random sample of data in a very large database
- Auditing DML Operations with OUTPUT
- Using Common Table Expressions (CTEs)

Module 5: Grouping and Summarizing Data

- Listing the TOP n values & Enhancement to Top Clause
- Using aggregate functions
- Using the GROUP BY clause
- GROUP BY clause with the HAVING clause
- Using the COMPUTE and COMPUTE BY Clauses

Module 6: Built-in Functions

- Numeric functions
- Character functions
- Date functions
- Conversion functions
- Ranking Functions (ROW_NUMBER, RANK, DENSE_RANK, NTILE)
- Analytical Functions (LEAD, LAG, PERCENTILE_CONT)
- Implementing Window Functions

Module 7: Modifying Table Structures

- Altering, modifying and dropping a table
- Adding, modifying, and dropping a column
- Adding and dropping a constraint
- Enabling and Disabling a constraint
- Viewing the existing constraints and the structure

Module 8: Working with Sub-queries

- Introduction to sub-queries
- Using a sub-query as an expression
- Using a sub-query to correlated data
- Using the EXISTS and NOT EXISTS clauses
- Deleting rows based on other tables
- Updating rows based on other tables
- Using Sub-queries in SELECT, INSERT, UPDATE, and DELETE Statements

Module 9: Joining Multiple Tables

- Using aliases for table names
- Combining data from multiple tables

- Combining multiple result sets
- Cross Joins, Inner Joins, Outer Joins, Self Joins
- Understanding Join Performance and Optimization

Module 10: Implementing Views

- Introduction to views
- Advantages of views
- Defining views
- Indexed Views
- Encrypted Views
- Managing and Updating Views

Module 11: Planning Indexes

- Introduction to Indexes
- Deciding Which Columns to Index
- Creating indexes
- Indexing Strategies for Performance
- Index Maintenance (Rebuild, Reorganize)
- Indexed Views

Module 12: Implementing Stored Procedures

- Introduction to stored procedures
- Creating and executing stored procedures
- Parameterizing Stored Procedures
- Handling Errors in Stored Procedures
- Performance Tuning of Stored Procedures
- Nested Stored Procedures

Module 13: Introduction to User-defined Functions

- What Is a User-defined Function?
- Creating a User-defined Function
- Scalar Functions vs. Table-Valued Functions
- Inline Table-Valued Functions
- Multistatement Table-Valued Functions

Module 14: Introduction to Triggers

- Introduction to triggers
- Defining triggers
- AFTER and INSTEAD OF Triggers
- Auditing Changes with Triggers
- Using DML Triggers for Data Integrity