

# Module 3: Leveraging Server Programmability

Retrieving and modifying data with T-SQL, stored  
procedures, functions and triggers

## Module 3 Objectives

- Retrieve and modify data using Transact-SQL (T-SQL) statements
- Use SQL Server Management Studio to write and test queries
- Understand when and why to use stored procedures and functions
- Recognise basic use cases for triggers in SQL Server

## Retrieving and Modifying Data with T-SQL

- SELECT retrieves data from one or more tables or views
- INSERT adds new rows into a table
- UPDATE changes existing data in one or more rows
- DELETE removes rows that match a given condition

## Writing Queries in Management Studio

- Use query windows in SSMS to write and execute T-SQL
- Highlight and run selected statements or entire scripts
- View results in grid or text format and inspect execution messages
- Save useful queries as .sql files for reuse and documentation

## Using Variables and Parameters

- DECLARE variables to hold values inside a T-SQL batch
- SET or SELECT assigns values to variables
- Parameters allow stored procedures to accept input values
- Using parameters makes code reusable and safer than string concatenation

## Introduction to Stored Procedures

- Stored procedures are named T-SQL programs stored in the database
- Encapsulate business logic close to the data
- Reduce network traffic by sending parameters instead of long queries
- Simplify security by granting execute rights instead of table access

## Creating and Executing Stored Procedures

- CREATE PROCEDURE defines a new stored procedure
- Procedures can accept input and output parameters
- EXEC or EXECUTE runs a stored procedure with parameter values
- Procedures can return status codes to indicate success or failure

## User-Defined Functions (UDFs)

- Functions return a single value or a table as a result
- Scalar functions return one value such as a number or string
- Table-valued functions return a result set that can be queried
- Useful for reusable calculations and table expressions in queries



## Triggers in SQL Server

- Triggers are special procedures that fire automatically on data changes
- AFTER triggers run after INSERT, UPDATE or DELETE operations
- INSTEAD OF triggers override the default data modification behaviour
- Common uses include auditing, enforcing complex rules and logging changes

## Best Practices for Programmability

- Keep T-SQL code readable, modular and well-commented
- Avoid unnecessary cursors and row-by-row processing where possible
- Validate input parameters to protect against unexpected values
- Test programmability objects in a non-production environment before deployment