Advance Programming Techniques (APT)

Lecture # 41

Ehtisham Rasheed

Department of Computer Science
University of Gurjat, Gujrat

Introduction

- Students already know:
  - What is ADO.NET
  - How to write SQL SELECT queries
  - How to read data using DataReader
  - How to insert data
- Now we move to a very important and common requirement:
- **Showing database records inside a DataGridView** in Windows Forms

DataGridView Control

- DataGridView is the most powerful UI control for:
  - Displaying tabular data
  - Editing rows
  - Selecting rows
  - Showing reports
- In real applications (inventory systems, POS, CRMs), DataGridView is used **everywhere**

Two Ways to Bring Data into DataGridView

- ADO.NET provides two main approaches:
- 1 Connected Architecture (SqlDataReader)
  - Reads rows one by one
  - Fast but forward-only
  - Cannot bind directly to DataGridView
- 2 Disconnected Architecture (SqlDataAdapter + DataTable)
  - Loads full data table into memory
  - DataGridView can bind directly to DataTable
  - Most commonly used in real projects
- For DataGridView, we use the **second method**

What Is SqlDataAdapter?

- SqlDataAdapter acts as a **bridge** between:
- SQL Server ↔ DataTable
- It performs:
  - Executes SELECT query
  - Fetches all rows
  - Fills them inside DataTable
  - DataTable is then bound to DataGridView

What Is DataTable?

- DataTable is an **in-memory table**
- It has:
  - Columns
  - Rows
  - Data types
  - Similar to SQL table but inside C#
- DataGridView can directly display DataTable because it supports **data binding**

Why Do We Use an In-Memory Table?

- We can display large data quickly
- The database connection can be closed after loading
- You don’t keep hitting the database repeatedly
- DataGridView works perfectly with DataTable
- We can filter/sort rows without SQL
- We can pass DataTable between functions or forms easily
- It improves performance and reduces load on the database server

Syntax (Full Flow)

- Step 1: Create Connection
- Step 2: Create SqlDataAdapter with SELECT query
- Step 3: Create an empty DataTable
- Step 4: Fill DataTable
- Step 5: Bind DataTable to DataGridView
- This sequence is used in 90% of desktop applications

Explain How Binding Works (For Students)

- When we write:
  - dataGridView1.DataSource = dt;

- ✓ DataGridView automatically reads column names
- ✓ Automatically creates table structure
- ✓ Automatically fills rows
- ✓ Automatically formats the grid

- This is called **automatic data binding**