# Lab Activity-Ado.Net and DB
# Visual Programming


**Submitted By:**

**Muhammad Adnan Ali (233109).**

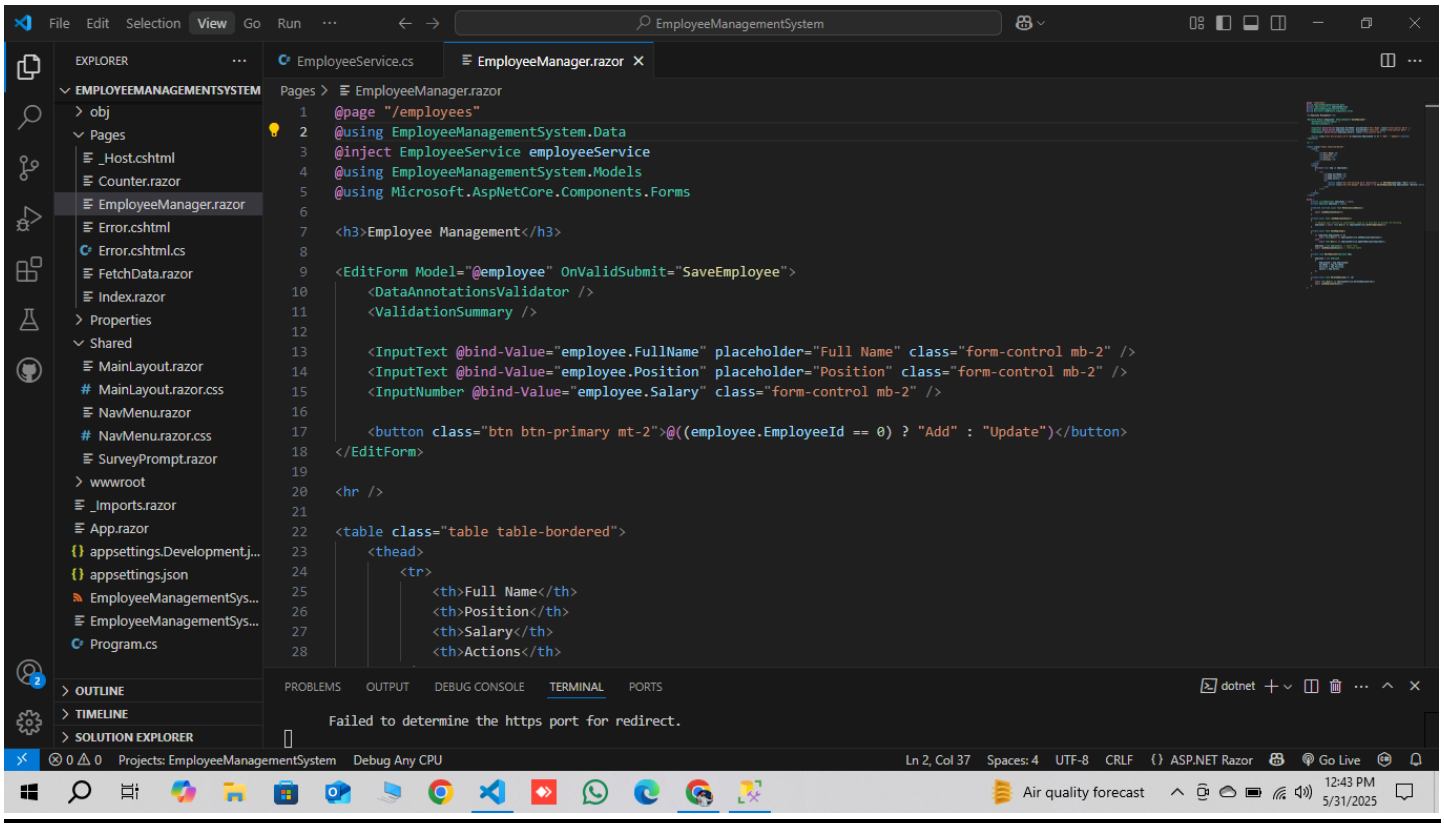
**"Section C"**

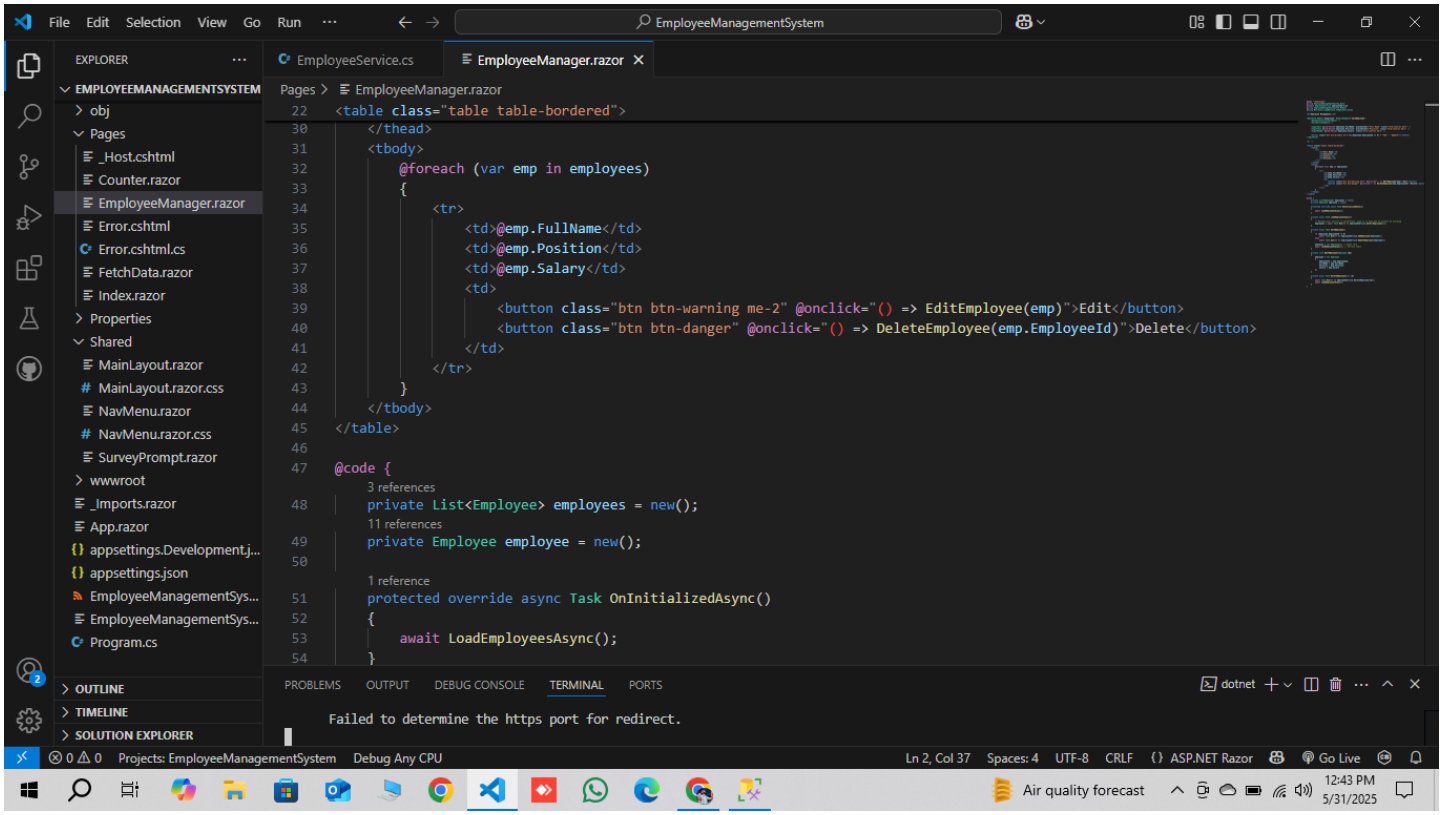
**Submitted to:**

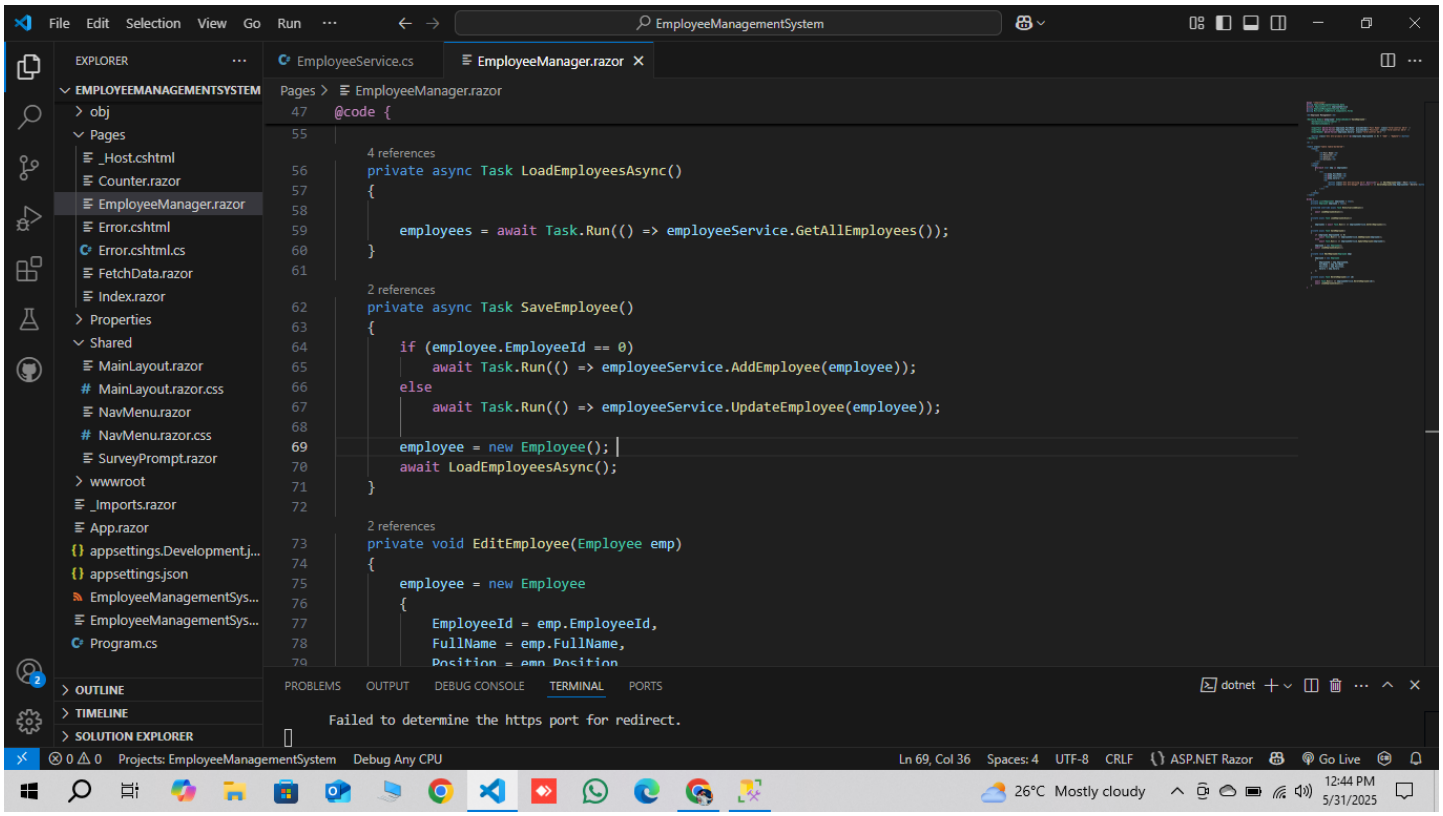
**Mam Sara Mishal.**

**Dated 31 May 2025.**

# Screenshots:




File Edit Selection View Go Run
EmployeeManagementSystem
EXPLORER
EMPLOYEEMANAGEMENTSYSTEM
obj
Pages
_Host.cshtml
Counter.razor
EmployeeManager.razor
Error.cshtml
Error.cshtml.cs
FetchData.razor
Index.razor
Properties
Shared
MainLayout.razor
MainLayout.razor.css
NavMenu.razor
NavMenu.razor.css
SurveyPrompt.razor
wwwroot
_Imports.razor
App.razor
appsettings.Development.j...
appsettings.json
EmployeeManagementSys...
EmployeeManagementSys...
Program.cs
EmployeeService.cs
EmployeeManager.razor
Pages > EmployeeManager.razor
<table class="table table-bordered">
</thead>
<tbody>
@foreach (var emp in employees)
{
<tr>
<td>@emp.FullName</td>
<td>@emp.Position</td>
<td>@emp.Salary</td>
<td>
<button class="btn btn-warning me-2" @onclick="() => EditEmployee(emp)">Edit</button>
<button class="btn btn-danger" @onclick="() => DeleteEmployee(emp.EmployeeId)">Delete</button>
</td>
</tr>
}
</tbody>
</table>
@code {
3 references
private List<Employee> employees = new();
11 references
private Employee employee = new();
1 reference
protected override async Task OnInitializedAsync()
{
await LoadEmployeesAsync();
}
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
dotnet
Failed to determine the https port for redirect.
OUTLINE
TIMELINE
SOLUTION EXPLORER
Projects: EmployeeManagementSystem
Debug Any CPU
Ln 2, Col 37 Spaces: 4 UTF-8 CRLF ASP.NET Razor
Go Live
Air quality forecast
12:43 PM
5/31/2025


File Edit Selection View Go Run
EmployeeManagementSystem
EXPLORER
EMPLOYEEMANAGEMENTSYSTEM
obj
Pages
_Host.cshtml
Counter.razor
EmployeeManager.razor
Error.cshtml
Error.cshtml.cs
FetchData.razor
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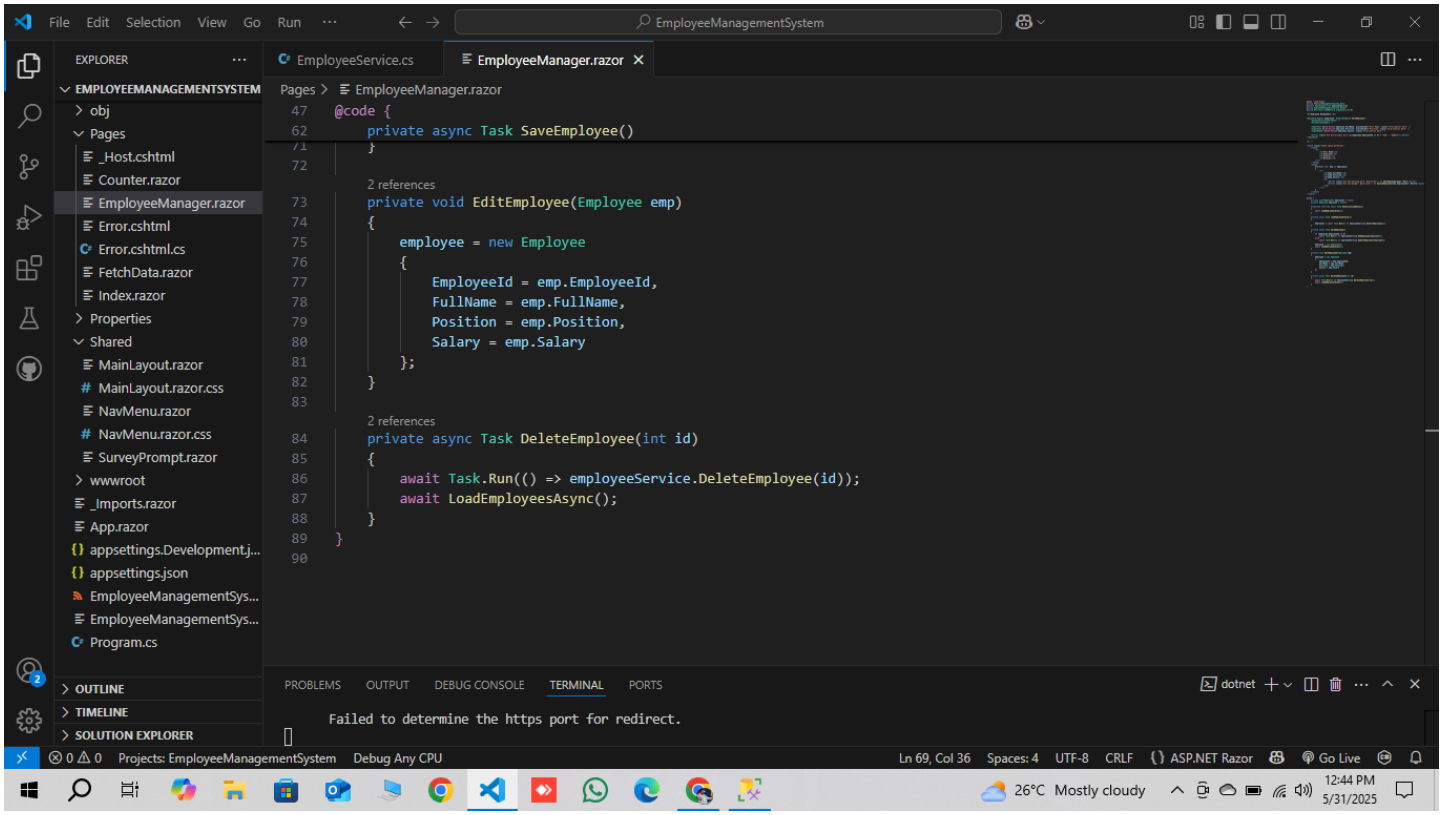
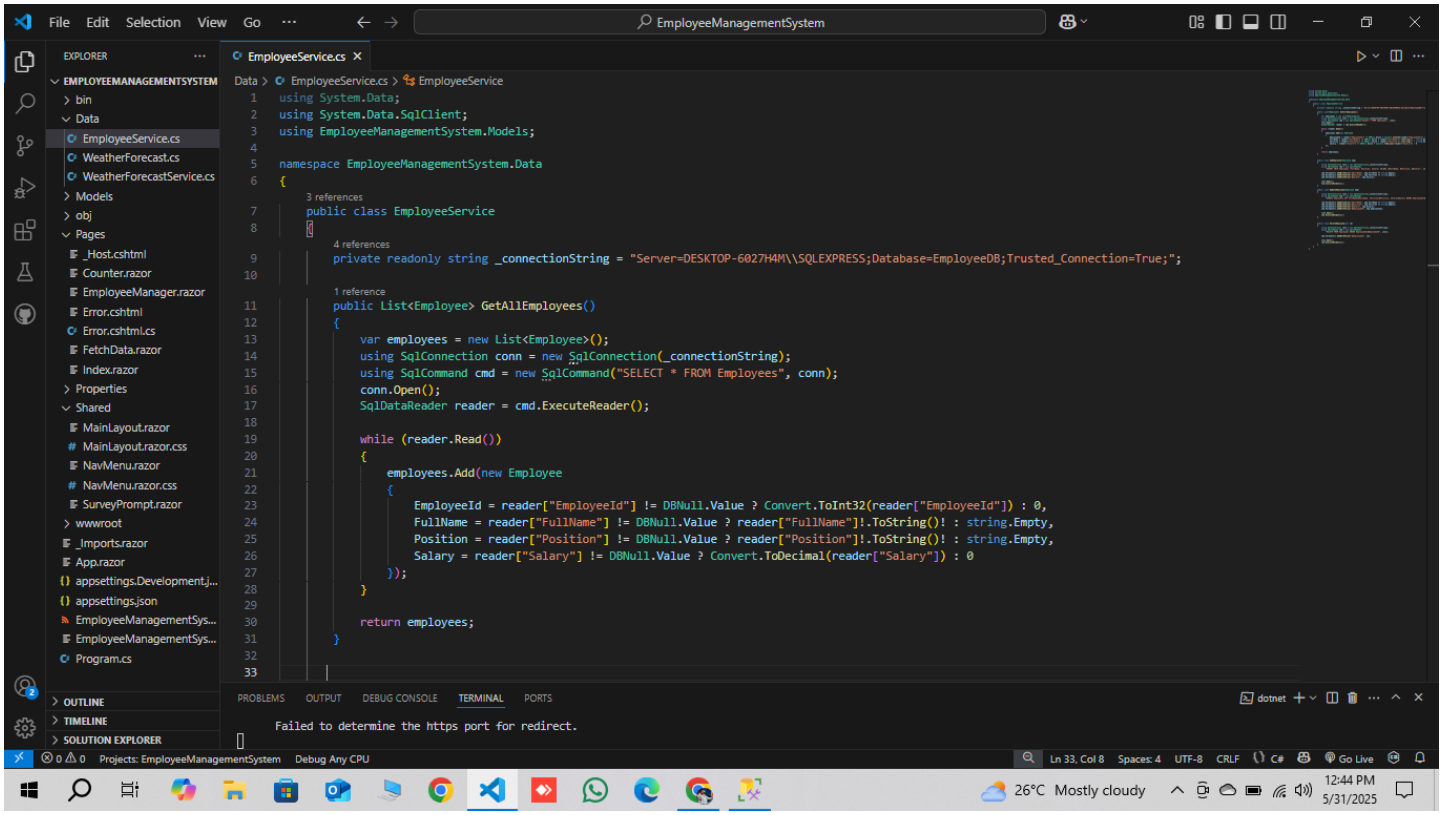
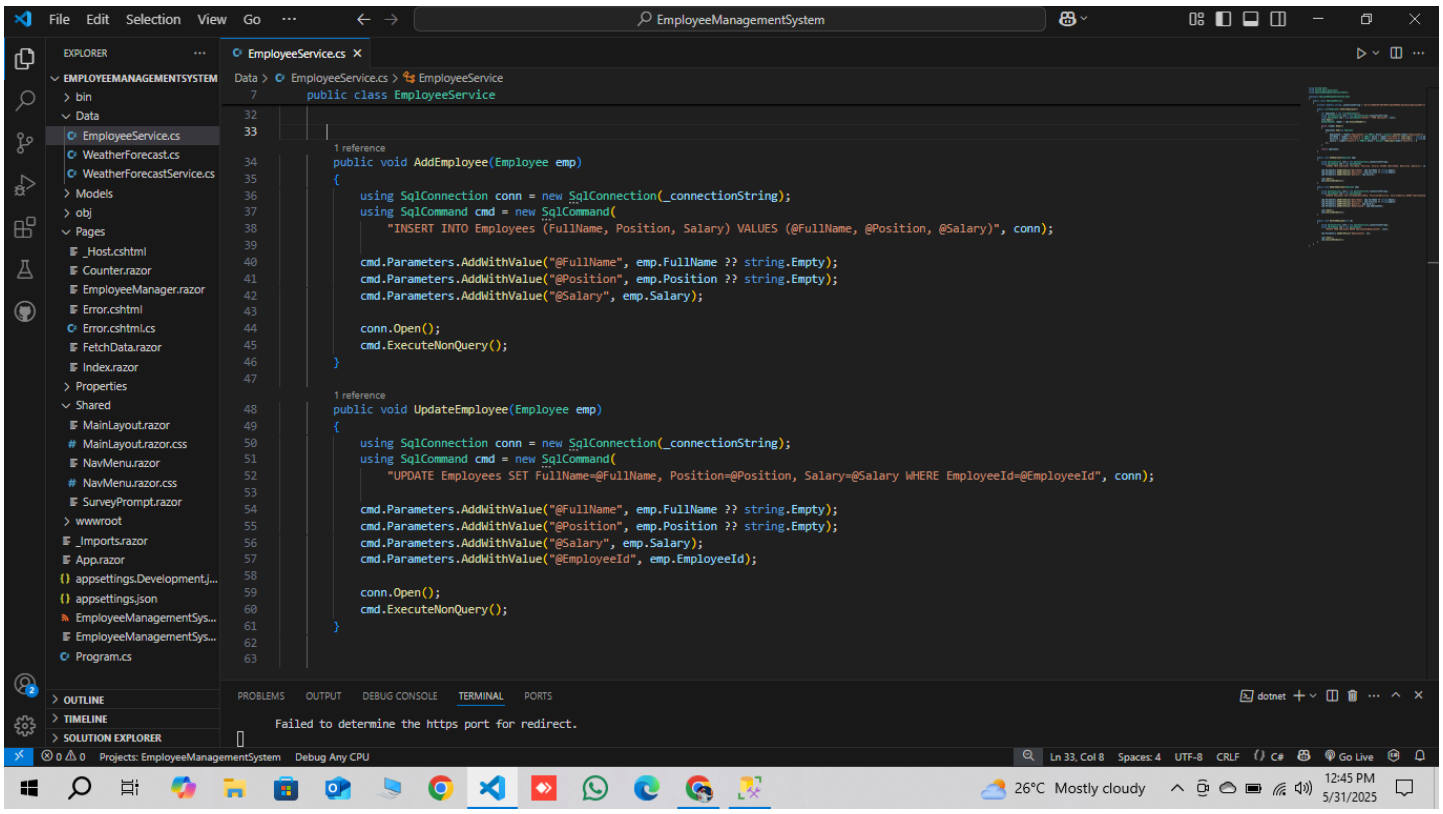
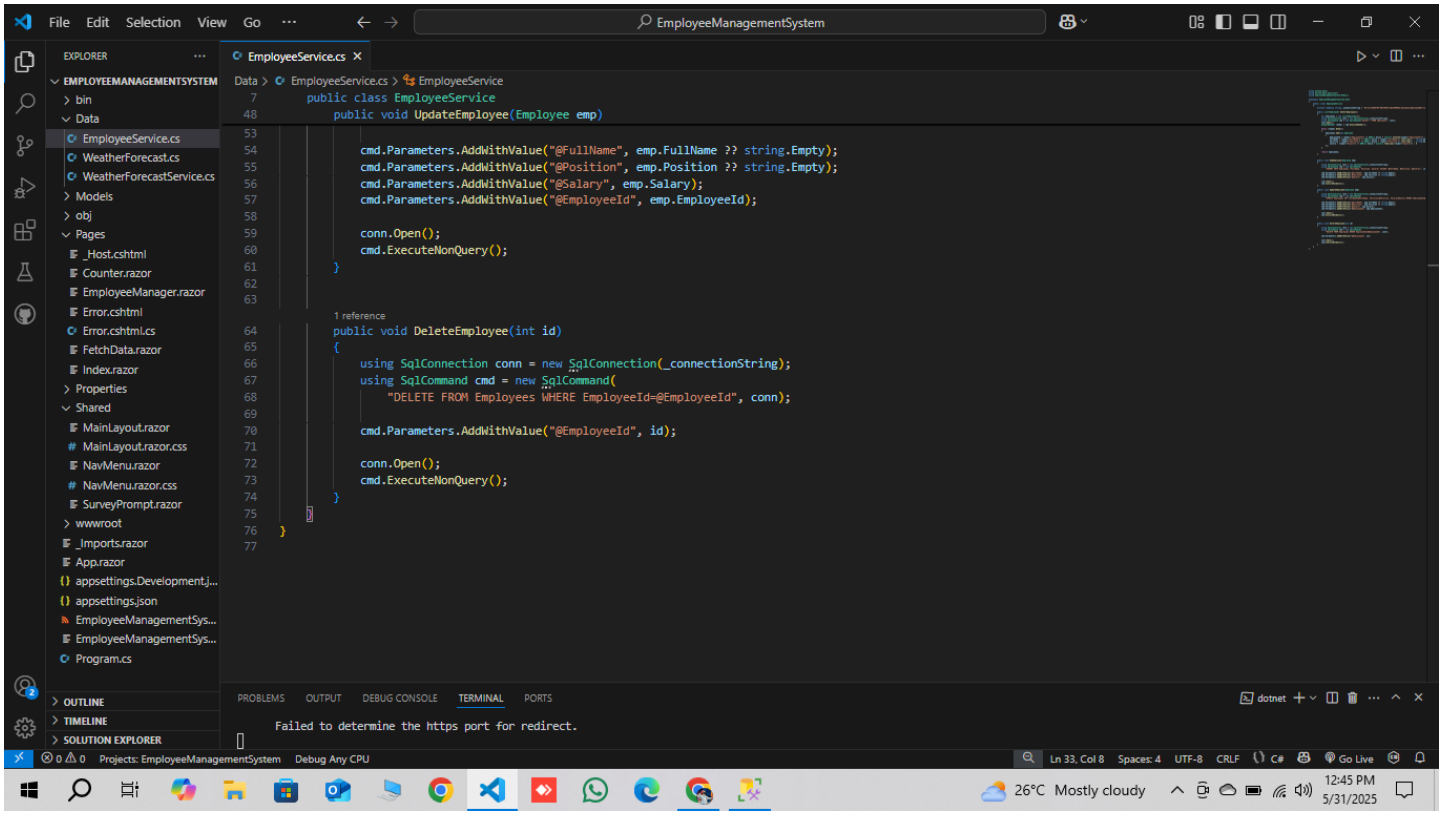
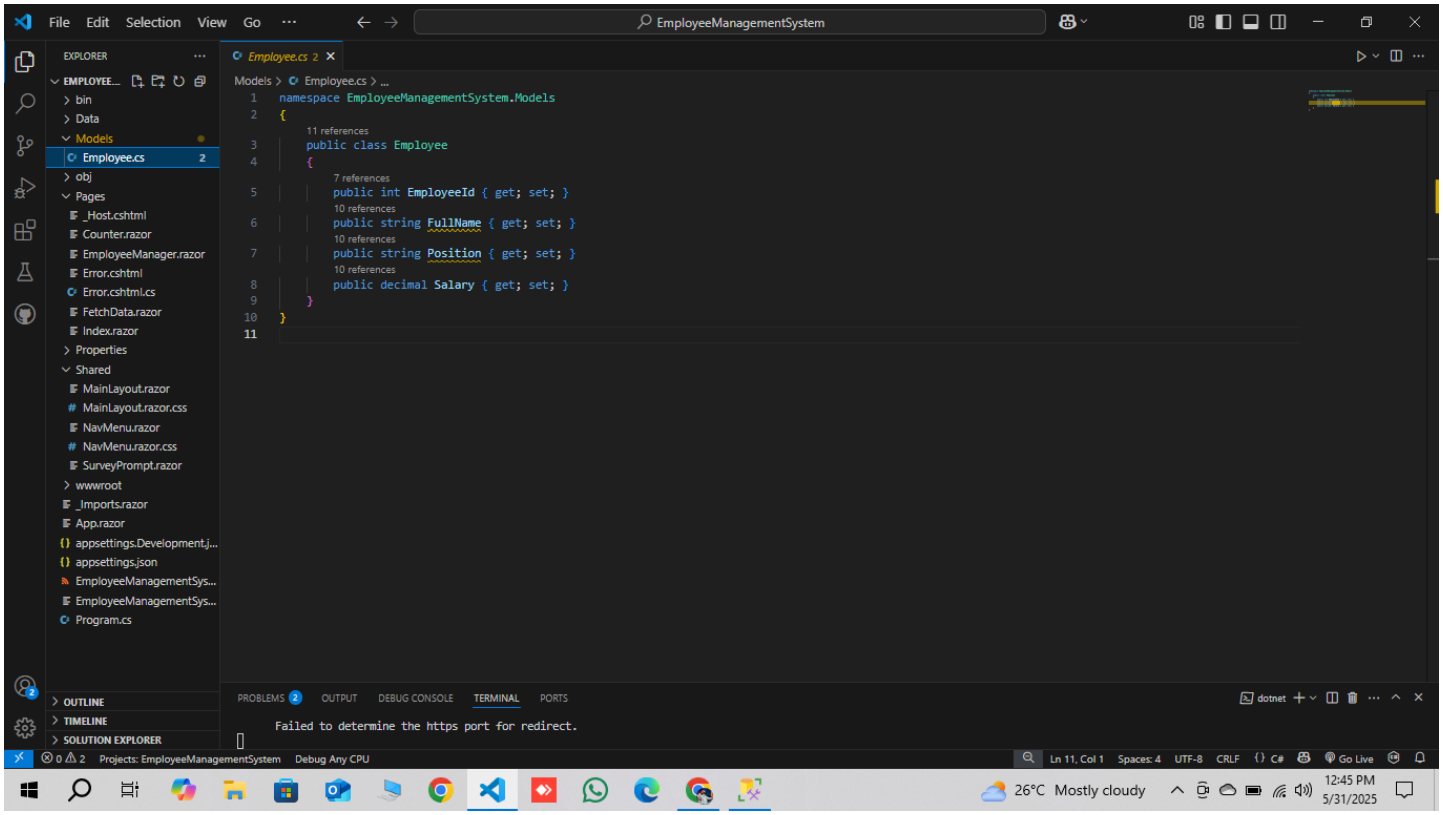
Properties
Shared
MainLayout.razor
MainLayout.razor.css
NavMenu.razor
NavMenu.razor.css
SurveyPrompt.razor
wwwroot
_Imports.razor
App.razor
appsettings.Development.j...
appsettings.json
EmployeeManagementSys...
EmployeeManagementSys...
Program.cs
EmployeeService.cs
EmployeeManager.razor
Pages > EmployeeManager.razor
@code {
4 references
private async Task LoadEmployeesAsync()
{
employees = await Task.Run(() => employeeService.GetAllEmployees());
}
2 references
private async Task SaveEmployee()
{
if (employee.EmployeeId == 0)
await Task.Run(() => employeeService.AddEmployee(employee));
else
await Task.Run(() => employeeService.UpdateEmployee(employee));
employee = new Employee();
await LoadEmployeesAsync();
}
2 references
private void EditEmployee(Employee emp)
{
employee = new Employee
{
EmployeeId = emp.EmployeeId,
FullName = emp.FullName,
Position = emp.Position
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
dotnet
Failed to determine the https port for redirect.
OUTLINE
TIMELINE
SOLUTION EXPLORER
Projects: EmployeeManagementSystem
Debug Any CPU
Ln 69, Col 36 Spaces: 4 UTF-8 CRLF ASP.NET Razor
Go Live
26°C Mostly cloudy
12:44 PM
5/31/2025

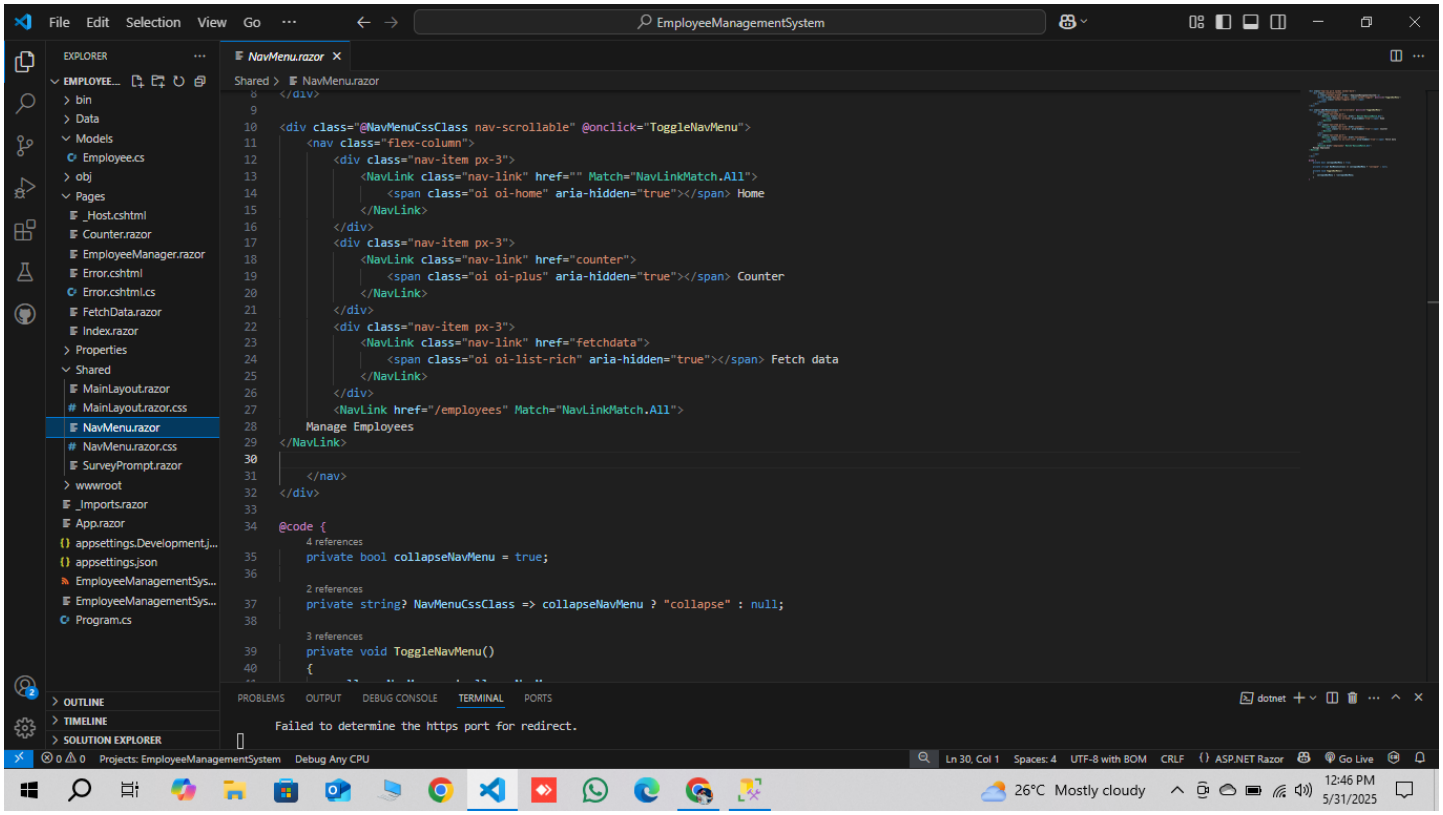

File Edit Selection View Go Run
EmployeeManagementSystem
EXPLORER
EMPLOYEEMANAGEMENTSYSTEM
obj
Pages
_Host.cshtml
Counter.razor
EmployeeManager.razor
Error.cshtml
Error.cshtml.cs
FetchData.razor
Index.razor
Properties
Shared
MainLayout.razor
MainLayout.razor.css
NavMenu.razor
NavMenu.razor.css
SurveyPrompt.razor
wwwroot
_Imports.razor
App.razor
appsettings.Development.j...
appsettings.json
EmployeeManagementSys...
EmployeeManagementSys...
Program.cs
OUTLINE
TIMELINE
SOLUTION EXPLORER
EmployeeService.cs
EmployeeManager.razor
Pages > EmployeeManager.razor
@code {
private async Task SaveEmployee()
}
2 references
private void EditEmployee(Employee emp)
{
employee = new Employee
{
EmployeeId = emp.EmployeeId,
FullName = emp.FullName,
Position = emp.Position,
Salary = emp.Salary
};
}
2 references
private async Task DeleteEmployee(int id)
{
await Task.Run(() => employeeService.DeleteEmployee(id));
await LoadEmployeesAsync();
}
}
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
dotnet
Failed to determine the https port for redirect.
Projects: EmployeeManagementSystem
Debug Any CPU
Ln 69, Col 36 Spaces: 4 UTF-8 CRLF ASP.NET Razor
Go Live
26°C Mostly cloudy
12:44 PM
5/31/2025


File Edit Selection View Go
EmployeeManagementSystem
EXPLORER
EMPLOYEEMANAGEMENTSYSTEM
EmployeeService.cs
Data > EmployeeService.cs > EmployeeService
using System.Data;
using System.Data.SqlClient;
using EmployeeManagementSystem.Models;
namespace EmployeeManagementSystem.Data
{
3 references
public class EmployeeService
{
4 references
private readonly string _connectionString = "Server=DESKTOP-6027H4M\\SQLEXPRESS;Database=EmployeeDB;Trusted_Connection=True;";
1 reference
public List<Employee> GetAllEmployees()
{
var employees = new List<Employee>();
using SqlConnection conn = new SqlConnection(_connectionString);
using SqlCommand cmd = new SqlCommand("SELECT * FROM Employees", conn);
conn.Open();
SqlDataReader reader = cmd.ExecuteReader();
while (reader.Read())
{
employees.Add(new Employee
{
EmployeeId = reader["EmployeeId"] != DBNull.Value ? Convert.ToInt32(reader["EmployeeId"]) : 0,
FullName = reader["FullName"] != DBNull.Value ? reader["FullName"]!.ToString()! : string.Empty,
Position = reader["Position"] != DBNull.Value ? reader["Position"]!.ToString()! : string.Empty,
Salary = reader["Salary"] != DBNull.Value ? Convert.ToDecimal(reader["Salary"]) : 0
});
}
return employees;
}
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
Failed to determine the https port for redirect.
OUTLINE
TIMELINE
SOLUTION EXPLORER
Projects: EmployeeManagementSystem Debug Any CPU
Ln 33, Col 8 Spaces: 4 UTF-8 CRLF C# Go Live
26°C Mostly cloudy
12:44 PM
5/31/2025

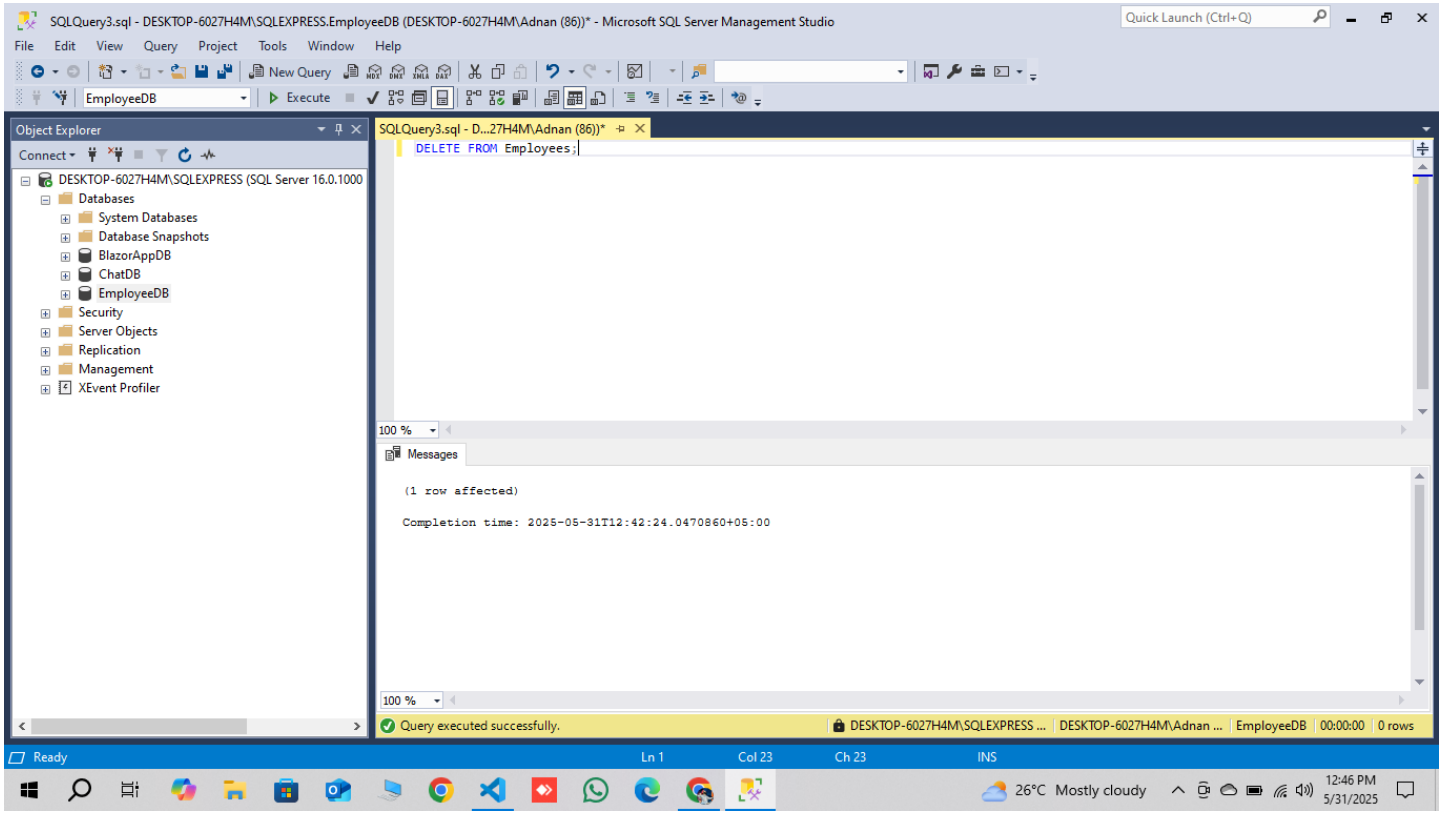

File Edit Selection View Go
EmployeeManagementSystem
EXPLORER
EMPLOYEEMANAGEMENTSYSTEM
EmployeeService.cs
Data > EmployeeService.cs > EmployeeService
public class EmployeeService
1 reference
public void AddEmployee(Employee emp)
{
using SqlConnection conn = new SqlConnection(_connectionString);
using SqlCommand cmd = new SqlCommand(
"INSERT INTO Employees (FullName, Position, Salary) VALUES (@FullName, @Position, @Salary)", conn);
cmd.Parameters.AddWithValue("@FullName", emp.FullName ?? string.Empty);
cmd.Parameters.AddWithValue("@Position", emp.Position ?? string.Empty);
cmd.Parameters.AddWithValue("@Salary", emp.Salary);
conn.Open();
cmd.ExecuteNonQuery();
}
1 reference
public void UpdateEmployee(Employee emp)
{
using SqlConnection conn = new SqlConnection(_connectionString);
using SqlCommand cmd = new SqlCommand(
"UPDATE Employees SET FullName=@FullName, Position=@Position, Salary=@Salary WHERE EmployeeId=@EmployeeId", conn);
cmd.Parameters.AddWithValue("@FullName", emp.FullName ?? string.Empty);
cmd.Parameters.AddWithValue("@Position", emp.Position ?? string.Empty);
cmd.Parameters.AddWithValue("@Salary", emp.Salary);
cmd.Parameters.AddWithValue("@EmployeeId", emp.EmployeeId);
conn.Open();
cmd.ExecuteNonQuery();
}
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
Failed to determine the https port for redirect.
OUTLINE
TIMELINE
SOLUTION EXPLORER
Projects: EmployeeManagementSystem Debug Any CPU
Ln 33, Col 8 Spaces: 4 UTF-8 CRLF C# Go Live
26°C Mostly cloudy
12:45 PM
5/31/2025

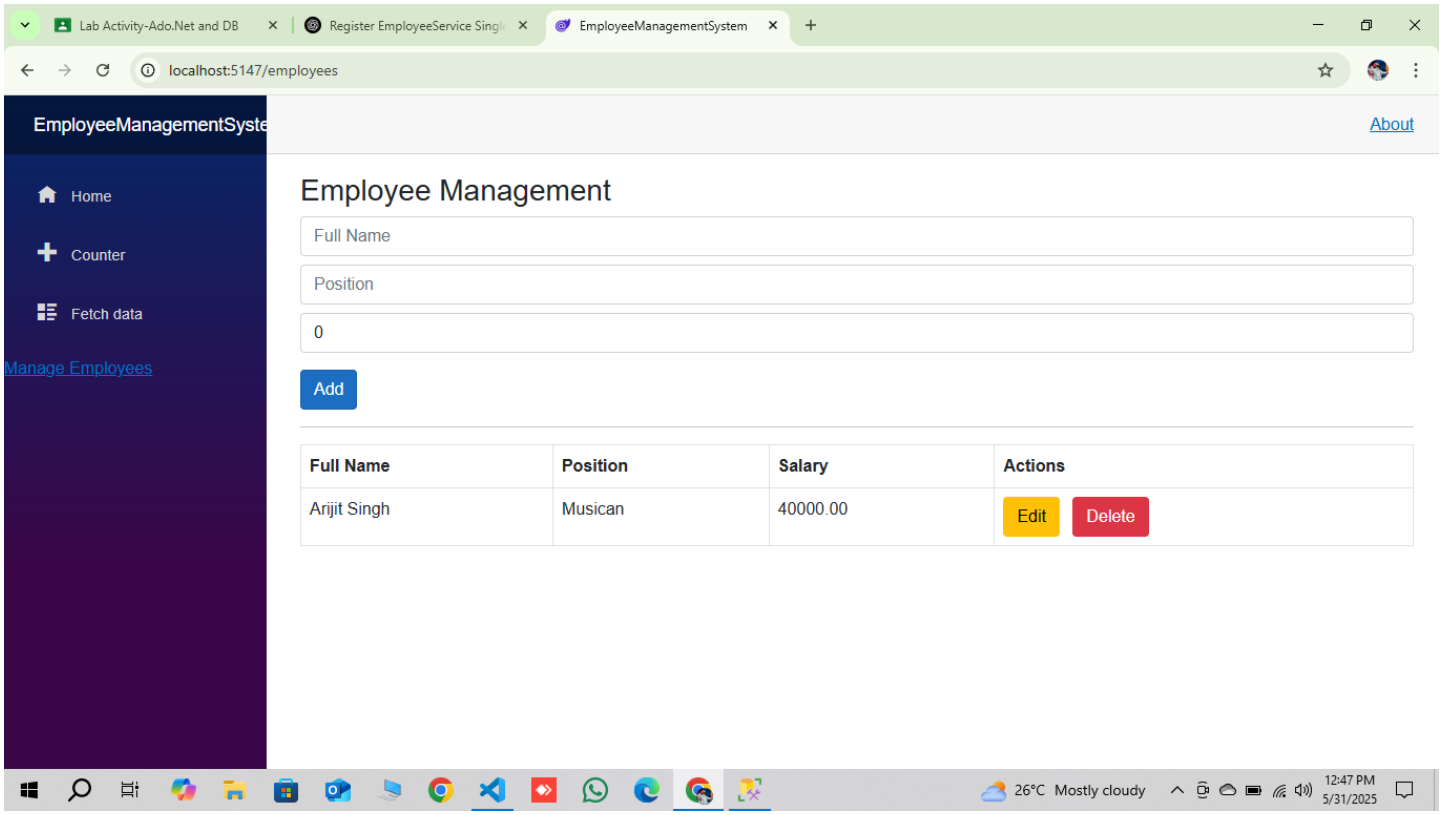

File Edit Selection View Go
EmployeeManagementSystem
EXPLORER
EMPLOYEEMANAGEMENTSYSTEM
bin
Data
EmployeeService.cs
WeatherForecast.cs
WeatherForecastService.cs
Models
obj
Pages
_Host.cshtml
Counter.razor
EmployeeManager.razor
Error.cshtml
Error.cshtml.cs
FetchData.razor
Index.razor
Properties
Shared
MainLayout.razor
MainLayout.razor.css
NavMenu.razor
NavMenu.razor.css
SurveyPrompt.razor
wwwroot
_Imports.razor
App.razor
appsettings.Development.j...
appsettings.json
EmployeeManagementSys...
EmployeeManagementSys...
Program.cs
OUTLINE
TIMELINE
SOLUTION EXPLORER
EmployeeService.cs
Data > EmployeeService.cs > EmployeeService
public class EmployeeService
public void UpdateEmployee(Employee emp)
cmd.Parameters.AddWithValue("@FullName", emp.FullName ?? string.Empty);
cmd.Parameters.AddWithValue("@Position", emp.Position ?? string.Empty);
cmd.Parameters.AddWithValue("@Salary", emp.Salary);
cmd.Parameters.AddWithValue("@EmployeeId", emp.EmployeeId);
conn.Open();
cmd.ExecuteNonQuery();
1 reference
public void DeleteEmployee(int id)
using SqlConnection conn = new SqlConnection(_connectionString);
using SqlCommand cmd = new SqlCommand(
"DELETE FROM Employees WHERE EmployeeId=@EmployeeId", conn);
cmd.Parameters.AddWithValue("@EmployeeId", id);
conn.Open();
cmd.ExecuteNonQuery();
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
dotnet
Failed to determine the https port for redirect.
Projects: EmployeeManagementSystem
Debug Any CPU
Ln 33, Col 8 Spaces: 4 UTF-8 CRLF C# Go Live
26°C Mostly cloudy
12:45 PM
5/31/2025

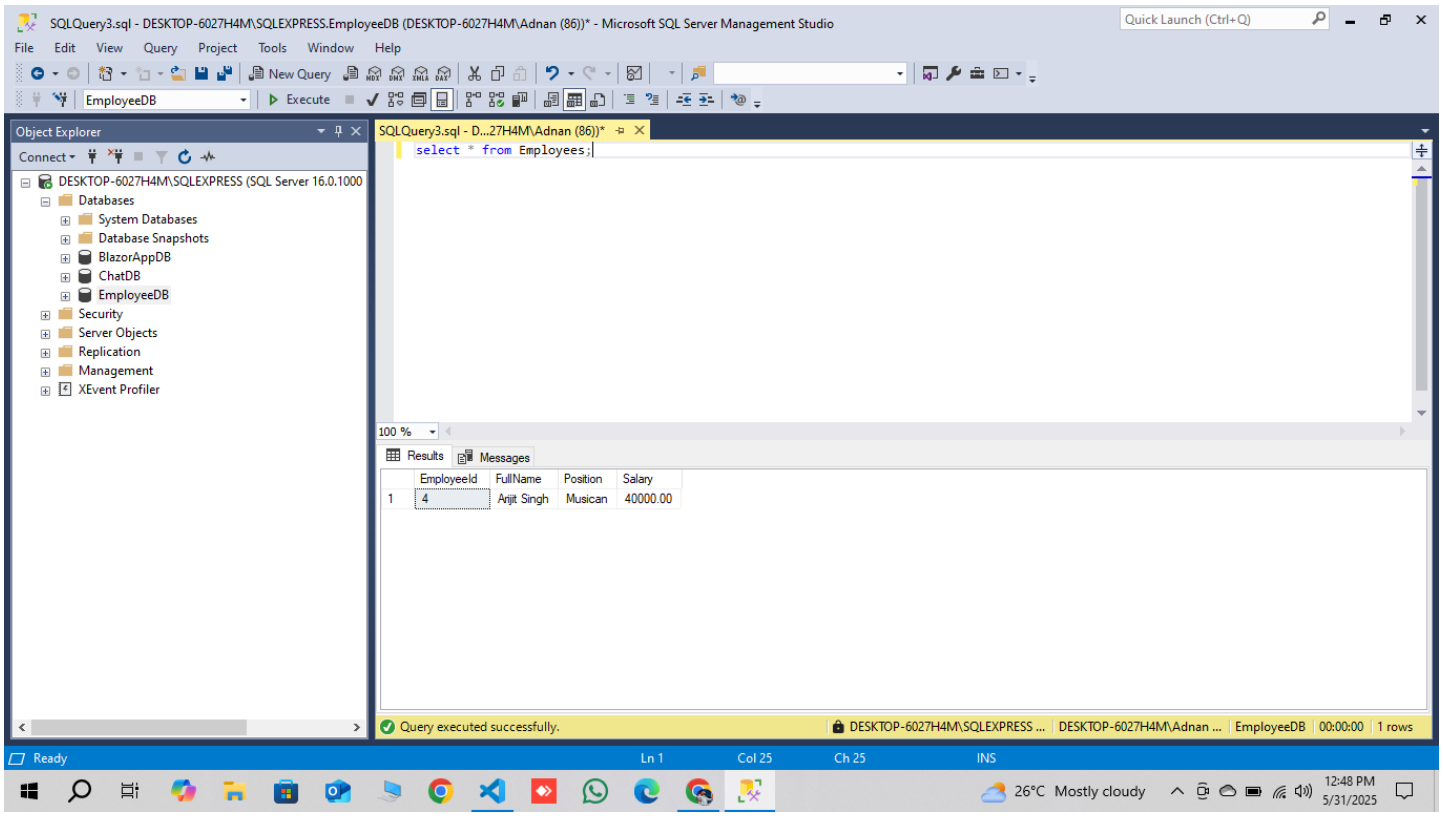

File Edit Selection View Go
EmployeeManagementSystem
EXPLORER
Employee.cs 2
Models > Employee.cs > ...
namespace EmployeeManagementSystem.Models
{
11 references
public class Employee
{
7 references
public int EmployeeId { get; set; }
10 references
public string FullName { get; set; }
10 references
public string Position { get; set; }
10 references
public decimal Salary { get; set; }
}
}
bin
Data
Models
Employee.cs
obj
Pages
_Host.cshtml
Counter.razor
EmployeeManager.razor
Error.cshtml
Error.cshtml.cs
FetchData.razor
Index.razor
Properties
Shared
MainLayout.razor
MainLayout.razor.css
NavMenu.razor
NavMenu.razor.css
SurveyPrompt.razor
wwwroot
_Imports.razor
App.razor
appsettings.Development.j...
appsettings.json
EmployeeManagementSys...
EmployeeManagementSys...
Program.cs
OUTLINE
TIMELINE
SOLUTION EXPLORER
PROBLEMS 2
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
Failed to determine the https port for redirect.
Projects: EmployeeManagementSystem
Debug Any CPU
Ln 11, Col 1
Spaces: 4
UTF-8
CRLF
C#
Go Live
26°C Mostly cloudy
12:45 PM
5/31/2025

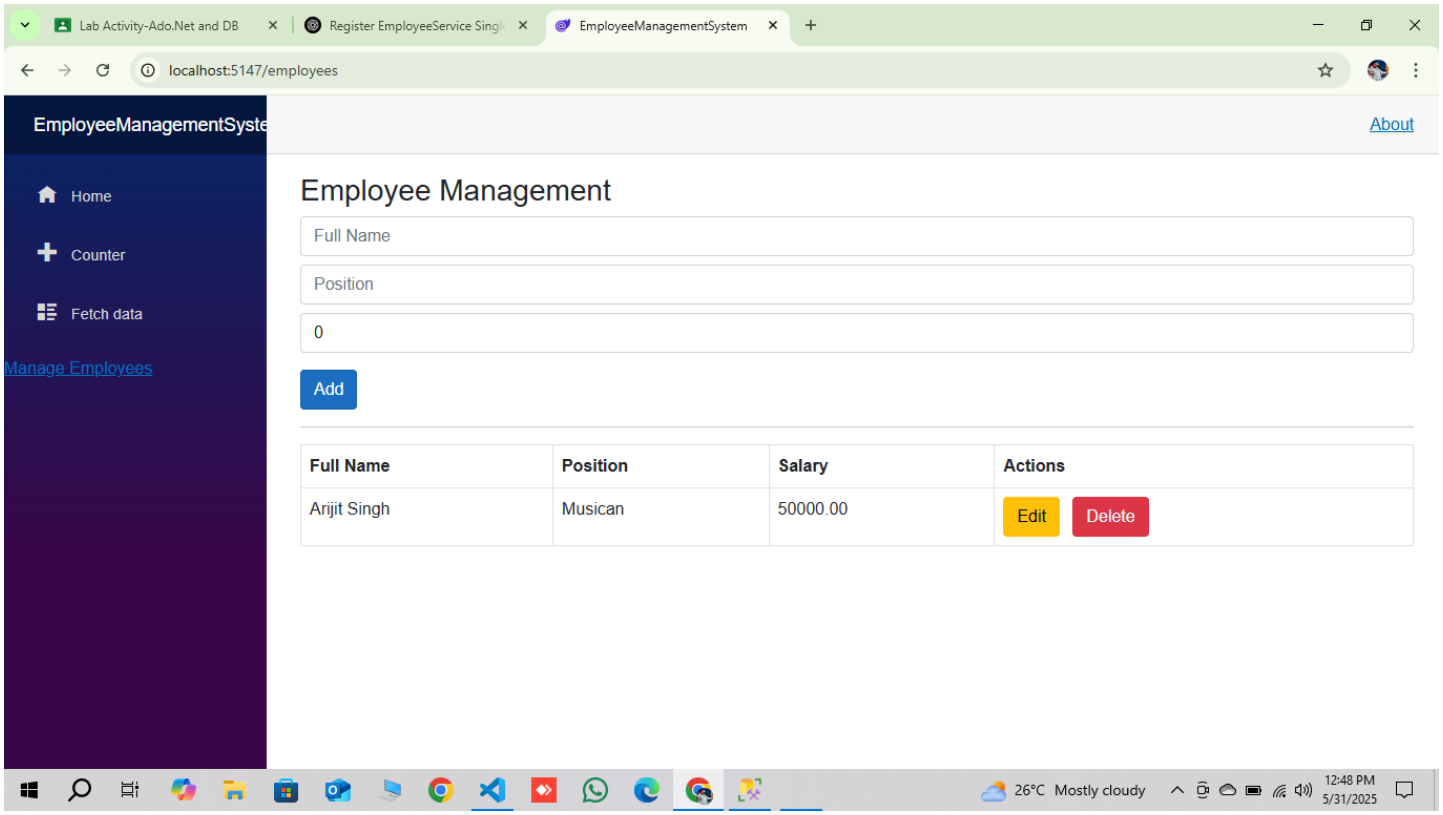

File Edit Selection View Go
EmployeeManagementSystem
EXPLORER
NavMenu.razor
Shared > NavMenu.razor
bin
Data
Models
Employee.cs
obj
Pages
_Host.cshtml
Counter.razor
EmployeeManager.razor
Error.cshtml
Error.cshtml.cs
FetchData.razor
Index.razor
Properties
Shared
MainLayout.razor
MainLayout.razor.css
NavMenu.razor
NavMenu.razor.css
SurveyPrompt.razor
wwwroot
_Imports.razor
App.razor
appsettings.Development.j...
appsettings.json
EmployeeManagementSys...
EmployeeManagementSys...
Program.cs
<div class="@NavMenuCssClass nav-scrollable" @onclick="ToggleNavMenu">
<nav class="flex-column">
<NavLink class="nav-link" href="" Match="NavLinkMatch.All">
Home
</NavLink>
<NavLink class="nav-link" href="counter">
Counter
</NavLink>
<NavLink class="nav-link" href="fetchdata">
Fetch data
</NavLink>
<NavLink href="/employees" Match="NavLinkMatch.All">
Manage Employees
</NavLink>
</nav>

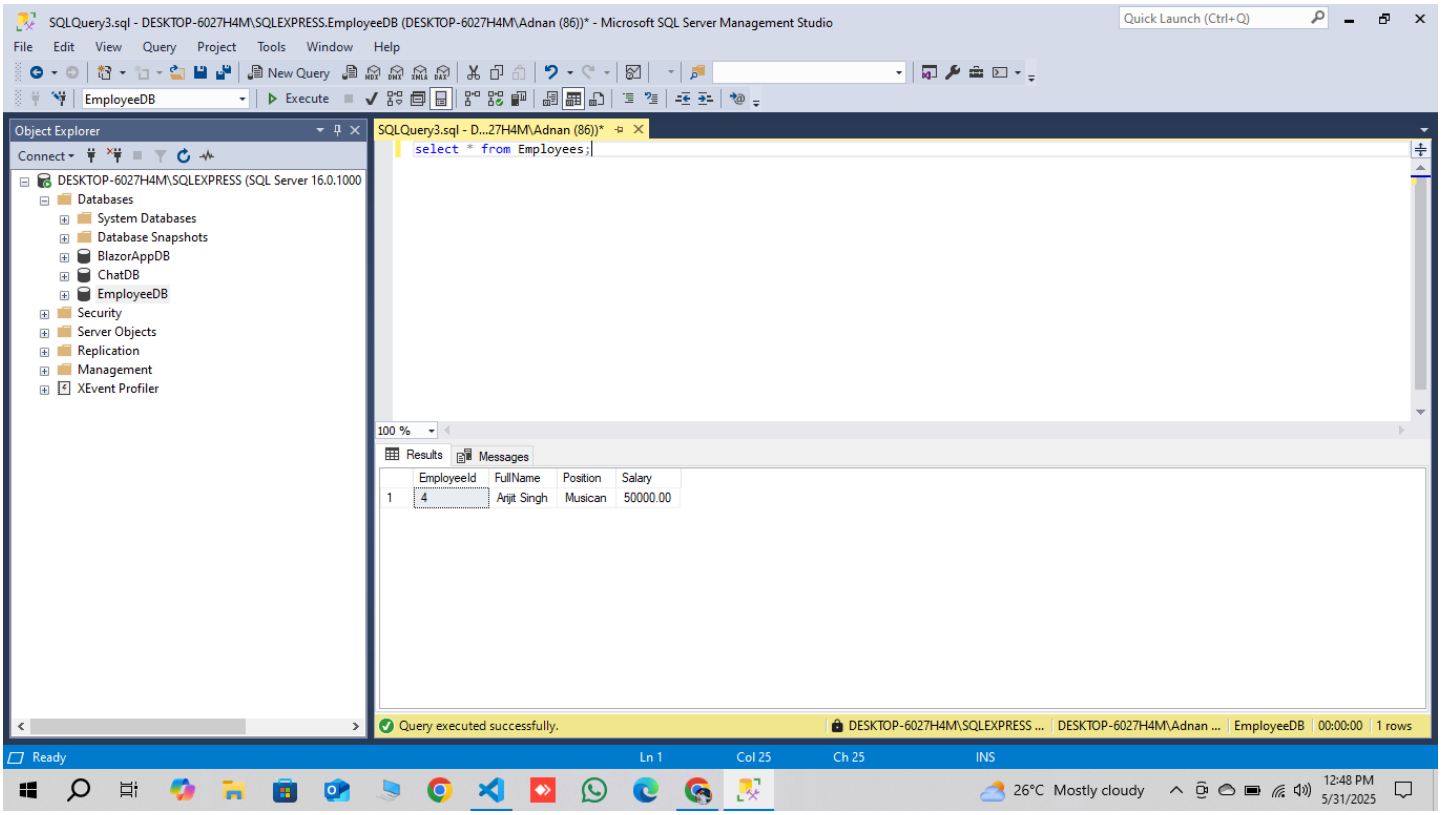
@code {
4 references
private bool collapseNavMenu = true;
2 references
private string? NavMenuCssClass => collapseNavMenu ? "collapse" : null;
3 references
private void ToggleNavMenu()
{
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
Failed to determine the https port for redirect.
OUTLINE
TIMELINE
SOLUTION EXPLORER
Projects: EmployeeManagementSystem Debug Any CPU
Ln 30, Col 1 Spaces: 4 UTF-8 with BOM CRLF ASP.NET Razor Go Live
26°C Mostly cloudy
12:46 PM
5/31/2025


SQLQuery3.sql - DESKTOP-6027H4M\SQLEXPRESS.EmployeeDB (DESKTOP-6027H4M\Adnan (86))* - Microsoft SQL Server Management Studio
Quick Launch (Ctrl+Q)
File Edit View Query Project Tools Window Help
New Query
EmployeeDB
Execute
Object Explorer
Connect
DESKTOP-6027H4M\SQLEXPRESS (SQL Server 16.0.1000
Databases
System Databases
Database Snapshots
BlazorAppDB
ChatDB
EmployeeDB
Security
Server Objects
Replication
Management
XEvent Profiler
SQLQuery3.sql - D...27H4M\Adnan (86))*
DELETE FROM Employees;
100 %
Messages
(1 row affected)
Completion time: 2025-05-31T12:42:24.0470860+05:00
100 %
Query executed successfully.
DESKTOP-6027H4M\SQLEXPRESS ...
DESKTOP-6027H4M\Adnan ...
EmployeeDB
00:00:00
0 rows
Ready
Ln 1
Col 23
Ch 23
INS
26°C Mostly cloudy
12:46 PM
5/31/2025


Lab Activity-Ado.Net and DB
Register EmployeeService Singl
EmployeeManagementSystem
localhost:5147/employees
EmployeeManagementSyste
About
Home
Counter
Fetch data
Manage Employees
Employee Management
Full Name
Position
0
Add
Full Name
Position
Salary
Actions
Arijit Singh
Musican
40000.00
Edit
Delete
26°C Mostly cloudy
12:47 PM
5/31/2025


SQLQuery3.sql - DESKTOP-6027H4M\SQLEXPRESS.EmployeeDB (DESKTOP-6027H4M\Adnan (86))* - Microsoft SQL Server Management Studio
File Edit View Query Project Tools Window Help
New Query
Execute
EmployeeDB
Object Explorer
Connect
DESKTOP-6027H4M\SQLEXPRESS (SQL Server 16.0.1000
Databases
System Databases
Database Snapshots
BlazorAppDB
ChatDB
EmployeeDB
Security
Server Objects
Replication
Management
XEvent Profiler
SQLQuery3.sql - D...27H4M\Adnan (86))*
select * from Employees;
Results
Messages
EmployeeId
FullName
Position
Salary
1
4
Arijit Singh
Musican
40000.00
Query executed successfully.
Ready
Ln 1
Col 25
Ch 25
INS
26°C Mostly cloudy
12:48 PM
5/31/2025


Lab Activity-Ado.Net and DB
Register EmployeeService Singl
EmployeeManagementSystem
localhost:5147/employees
EmployeeManagementSyste
About
Home
Counter
Fetch data
Manage Employees
Employee Management
Full Name
Position
0
Add
Full Name
Position
Salary
Actions
Arijit Singh
Musican
50000.00
Edit
Delete
26°C Mostly cloudy
12:48 PM
5/31/2025




**Part C: Explanation**

**1. How do you manage database connections effectively to avoid resource leaks?**

To manage database connections effectively and avoid resource leaks, I use the using statement in C# which ensures that the connection is properly disposed of once the operation is complete. This automatically closes the connection even if an exception occurs, releasing resources immediately. Additionally, connection pooling provided by ADO.NET helps to reuse connections efficiently rather than opening new ones repeatedly. By following these practices, the application maintains optimal performance and prevents memory or resource exhaustion.

**2. How do you implement safe and secure parameterized SQL queries?**

I implement parameterized SQL queries by using command parameters instead of concatenating user input directly into SQL statements. This prevents SQL injection attacks by treating user input as parameters rather than executable code. For example, using SqlCommand.Parameters. AddWithValue() in ADO.NET ensures that inputs are properly escaped and handled. This approach not only enhances security but also improves query parsing and execution efficiency on the database server.

**3. Explain your approach to form resetting and data binding in Blazor.**

In Blazor, I use two-way data binding with the @bind-Value directive to bind form input controls to model properties. This creates a direct link between UI and data. For form resetting, I simply assign a new instance of the model (e.g., employee = new Employee();) after the form submission. This clears the input fields automatically because the bound

properties now hold default values. This approach keeps the UI in sync with the model state and ensures a smooth user experience**.**

**4. Describe how event handling works in your component for form submission and button clicks.**

Event handling in my Blazor component uses directives like @onclick and OnValidSubmit to link UI events with C# methods. For example, the <EditForm> component's OnValidSubmit triggers the SaveEmployee method when the form passes validation. Similarly, buttons for editing or deleting employees use @onclick with lambda expressions to call methods like EditEmployee(emp) or DeleteEmployee(emp.EmployeeId). This model of event binding keeps the UI responsive and enables clear separation between UI and business logic.

**5. How do you optimize UI updates to prevent unnecessary data reloads while maintaining data integrity?**

To optimize UI updates, I avoid reloading data from the service or database unnecessarily by using state management and minimal async calls. For example, after adding, updating, or deleting an employee, I reload the employee list only once, rather than on every minor UI event. Additionally, data binding ensures the UI reflects the current state of the underlying model without redundant refreshes. This strategy balances efficient performance with accurate data representation and a seamless user experience.

**X-X-X-X**