


SQL Server Database Connection in C# Using ADO.NET


LAB 1

I. Create Database

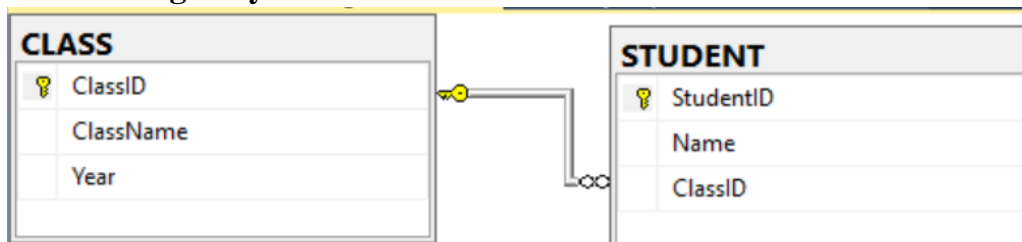
1. Create Database STUDENT_MANAGEMENT that contains table **CLASS** and **STUDENT**
 - Table **CLASS**

	Column Name	Data Type	Allow Nulls
	ClassID	char(10)	<input type="checkbox"/>
	ClassName	nvarchar(50)	<input checked="" type="checkbox"/>
	Year	int	<input checked="" type="checkbox"/>

- Table **STUDENT**

	Column Name	Data Type	Allow Nulls
	StudentID	char(10)	<input type="checkbox"/>
	Name	nvarchar(40)	<input checked="" type="checkbox"/>
	ClassID	char(10)	<input checked="" type="checkbox"/>

2. Create a **foreign key** for column **ClassID** in table **Student**.



3. Enter data for the tables.
 - Table **CLASS**

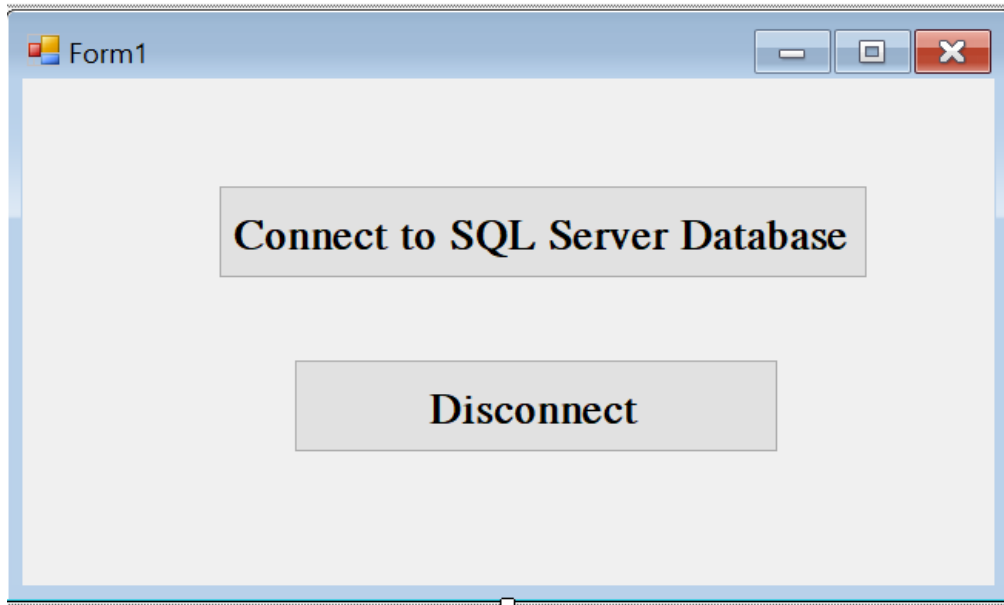
ClassID	ClassName	Year
C01	Programming 01	2020
C02	Programming 02	2020
C03	Information System 01	2020
C04	Information System 01	2021
C05	Programming 03	2021

- Table **STUDENT**

StudentID	Name	ClassID
S01	Daniel Harris	C01
S02	Linda Scott	C01
S03	Kevin Nelson	C02
S04	Justin Morgan	C02
S05	Kevin Walker	C03
S06	David Thomas	C04

II. Connect to SQL Server Database

Design Form



C# code

```
SqlConnection conn=null;
string strconn = "database=STUDENT_MANAGEMENT;Server=vanloi;User id=sa; password=loi@123";
//string strconn = "Data Source=VANLOI;Initial Catalog=QLDIEM;Integrated Security=True";
1 reference
private void btnConnect_Click(object sender, EventArgs e)
{
    try
    {
        conn = new SqlConnection(strconn);
        conn.Open();
        MessageBox.Show("Successful connection!");
    }
    catch (Exception ex)
    {
        MessageBox.Show("Failed to connect to server \n" + ex.Message);
    }
}

private void btnDisconnect_Click(object sender, EventArgs e)
{
    if(conn!=null && conn.State==ConnectionState.Open)
    {
        conn.Close();
        MessageBox.Show("Successful Disconnection!!!");
    }
}
```

III. Query Data

Design Form

Form1

Enter ClassID

Number of Students

Calculate Number of Students

C# code

```
InitializeComponent();
}
string stringconn = "Server=Vanloi;database=STUDENT_MANAGEMENT;user
id=sa;password=loi@123";
//string stringconn = "Data Source=Vanloi;Initial
Catalog=STUDENT_MANAGEMENT;Integrated Security=True";
SqlConnection conn = null;
1 reference
private void btnCalculate_Click(object sender, EventArgs e)
{
    if (conn==null)
        conn = new SqlConnection(stringconn);
    if(conn.State==ConnectionState.Closed)
        conn.Open();

    SqlCommand command = new SqlCommand($"Select count(*) from STUDENT Where
ClassID='{txtClassID.Text}'",conn);

    //Execute the sql command to return a value
    int result=(int) command.ExecuteScalar();
    txtNumber.Text= result.ToString();
    conn.Close();
}
```

Design Form

Form2

Enter Class ID

View in detail

View List of Students

Class ID

Class Name

Year

Student ID	Name	Class ID
S03	Kevin Nelson	C02
S04	Justin Morgan	C02

C# Code

```

    InitializeComponent();
}
string stringconn = "Server=Vanloi;Database=STUDENT_MANAGEMENT;user id=sa;password=loi@123";
SqlConnection conn = null;
1 reference
private void btnViewClass_Click(object sender, EventArgs e)
{
    txtClassID.Text = "";
    txtClassName.Text = "";
    txtYear.Text = "";
    if (conn == null)
        conn = new SqlConnection(stringconn);
    if (conn.State == ConnectionState.Closed)
        conn.Open();
    SqlCommand command = new SqlCommand();
    command.CommandType = CommandType.Text;
    command.CommandText = $"select * from Class where ClassID='{txtEnterClassID.Text}'";
    command.Connection = conn;
    SqlDataReader reader= command.ExecuteReader();
    if (reader.Read())
    {
        txtClassID.Text= reader.GetString(0);
        txtClassName.Text = reader.GetString(1);
        txtYear.Text = reader.GetInt32(2).ToString();
    }
    conn.Close();
}

```

```

1 reference
private void btnViewStudent_Click(object sender, EventArgs e)
{
    lsvStudents.Items.Clear();
    if (conn == null) conn = new SqlConnection(stringconn);
    if (conn.State == ConnectionState.Closed) conn.Open();
    SqlCommand command = new SqlCommand($"select * from Student where ClassID='{txtEnterClassID.Text}'", conn);

    SqlDataReader reader = command.ExecuteReader();
    while (reader.Read())
    {
        string studentID = reader.GetString(0);
        string name = reader.GetString(1);
        string classID = reader.GetString(2);
        ListViewItem item = new ListViewItem(studentID);

        item.SubItems.Add(name);
        item.SubItems.Add(classID);
        lsvStudents.Items.Add(item);
    }
    conn.Close();
}

```

Design Form

The screenshot shows a Windows Form titled 'Form3'. It contains two main sections: 'List of Classes' and 'List of Students'. The 'List of Classes' section is a list box containing five items: C01 -Programming 01-2020, C02 -Programming 02-2020 (selected), C03 -Information System 01-2020, C04 -Information System 01-2021, and C05 -Programming 03-2021. The 'List of Students' section is a table with three columns: Student ID, Name, and Class ID. The table contains two rows of data: S03 Kevin Nelson C02 and S04 Justin Morgan C02. A callout box labeled 'ListBox' points to the 'List of Classes' list box.

Student ID	Name	Class ID
S03	Kevin Nelson	C02
S04	Justin Morgan	C02

C# Code

```

private void Form3_Load(object sender, EventArgs e)
{
    if (conn == null) conn = new SqlConnection(stringconn);
    if (conn.State == ConnectionState.Closed) conn.Open();
    SqlCommand command = new SqlCommand("Select * from Class",conn);

    // Execute SQL Command

    lsbClass.ClearSelected();
    SqlDataReader reader= command.ExecuteReader(); // Execute SQL Command
    while (reader.Read())
    {
        string classID=reader.GetString(0);
        string className= reader.GetString(1);
        int year= reader.GetInt32(2);
        string line = classID + "-" + className + "-" + year.ToString();
        lsbClass.Items.Add(line);
    }
    conn.Close();
}

private void lsbClass_SelectedIndexChanged(object sender, EventArgs e)
{
    lsvStudent.Items.Clear();
    if (lsbClass.SelectedIndex == -1) return;
    string line = lsbClass.SelectedItem.ToString();
    string[] array = line.Split('-');
    string classID= array[0];

    if (conn == null) conn = new SqlConnection(stringconn);
    if (conn.State == ConnectionState.Closed) conn.Open();
    SqlCommand command = new SqlCommand($"Select * from Student where
        ClassID='{classID}'",conn);

    SqlDataReader reader= command.ExecuteReader();
    while (reader.Read())
    {
        string studentID=reader.GetString(0);
        string name= reader.GetString(1);
        string classIDRow= reader.GetString(2);
        ListViewItem item= lsvStudent.Items.Add(studentID);
        item.SubItems.Add(name);
        item.SubItems.Add(classIDRow);
    }
    conn.Close();
}

```

Design Form

The screenshot shows a Windows Form titled 'Form1'. On the left, there is a **ListView** control displaying a table of student data. A callout box labeled 'ListView' points to the control. The table has three columns: 'Student ID', 'Full Name', and 'Class ID'. The data rows are as follows:

Student ID	Full Name	Class ID
S01	Daniel Harris	C01
S02	Linda Scott	C01
S03	Kevin Nelson	C02
S04	Justin Morgan	C02
S05	Kevin Walker	C03
S06	David Thomas	C04
S07	Nguyen Van Nghia	C01

On the right, there is a panel titled 'Student Information' containing three text boxes for 'Student ID', 'Full Name', and 'Class ID'. The values entered are 'S07', 'Nguyen Van Nghia', and 'C01' respectively. Below these text boxes are three buttons: 'Insert' (highlighted with a blue border), 'Update', and 'Delete'.

C# Code

```
public Form1()
{
    InitializeComponent();
}
SqlConnection conn;
string stringconn = "Server=VanLoi; Database=STUDENT_MANAGEMENT; User Id = sa; password=loi@123";
1 reference
private void Form1_Load(object sender, EventArgs e)
{
    ViewListofStudents();
}
```



```
-  
// Display table Student on the ListView
```

4 references

```
private void ViewListofStudents()  
{  
    lvwStudent.Items.Clear();  
    if (conn == null) conn = new SqlConnection(stringconn);  
    if (conn.State == ConnectionState.Closed) conn.Open();  
    SqlCommand command = new SqlCommand("Select * from Student",conn);  
  
    SqlDataReader reader = command.ExecuteReader();  
    while (reader.Read())  
    {  
        string masv = reader.GetString(0);  
        string hoten = reader.GetString(1);  
        string malop = reader.GetString(2);  
        ListViewItem item = lvwStudent.Items.Add(masv);  
        item.SubItems.Add(hoten);  
        item.SubItems.Add(malop);  
    }  
    conn.Close();  
}
```

```

int result=-1;
1 reference
private void btnInsert_Click(object sender, EventArgs e)
{
    if (conn == null) conn = new SqlConnection(stringconn);
    if (conn.State == ConnectionState.Closed) conn.Open();
    SqlCommand command = new SqlCommand();
    command.CommandType = CommandType.Text;
    command.Connection = conn;
    command.CommandText = "insert into Student(StudentID,Name,ClassID)" +
        "values(@StudentID,@Name,@ClassID)";
    SqlParameter parameter1 = new SqlParameter("@StudentID", txtStudentID.Text);
    command.Parameters.Add(parameter1);
    SqlParameter parameter2 = new SqlParameter("@Name", txtName.Text);
    command.Parameters.Add(parameter2);
    SqlParameter parameter3 = new SqlParameter("ClassID", txtClassID.Text);
    command.Parameters.Add(parameter3);

    try
    {
        result = command.ExecuteNonQuery();
        //using ExecuteNonQuery if SQL command=insert, update or delete
    }
    catch (Exception ex)
    {
        MessageBox.Show(ex.Message+ "\nInsert a record failed!!!!!!");
    }

    if (result > 0)
    {
        ViewListofStudents();
    }
}

```

```

// Display a selected row of ListView on TextBoxes
1 reference
private void lvwSinhVien_SelectedIndexChanged(object sender, EventArgs e)
{
    if (lvwStudent.SelectedItems.Count > 0)
    {
        txtStudentID.Text = lvwStudent.SelectedItems[0].SubItems[0].Text;
        txtName.Text = lvwStudent.SelectedItems[0].SubItems[1].Text;
        txtClassID.Text = lvwStudent.SelectedItems[0].SubItems[2].Text;
    }
}

1 reference
private void btnUpdate_Click(object sender, EventArgs e)
{
    if (conn == null) conn = new SqlConnection(stringconn);
    if (conn.State == ConnectionState.Closed) conn.Open();
    SqlCommand command = new SqlCommand($"update Student set Name='{txtName.Text}', ClassID='{txtClassID.Text}'
        where StudentID='{txtStudentID.Text}'", conn);

    try
    {
        result = command.ExecuteNonQuery();
    }
    catch (Exception ex)
    {
        MessageBox.Show(ex.Message + "\n Update failed!!!!");
    }

    if (result > 0)
    {
        ViewListofStudents();
    }
}

private void btnDelete_Click(object sender, EventArgs e)
{
    if (conn == null) conn = new SqlConnection(stringconn);
    if (conn.State == ConnectionState.Closed) conn.Open();
    SqlCommand command = new SqlCommand($"delete from Student where StudentID='{txtStudentID.Text}'", conn);

    try
    {
        result = command.ExecuteNonQuery();
    }
    catch (Exception ex)
    {
        MessageBox.Show(ex.Message + "\n Delete failed");
    }

    if (result > 0)
    {
        ViewListofStudents();
        txtStudentID.Text = "";
        txtName.Text = "";
        txtClassID.Text = "";
    }
}

```

LAB 2: Using SqlDataAdapter

Design Form

Load table Student on DataGridView

DataGridView

	StudentID	Name	ClassID
	ff	bbb	c01
▶	S01	Daniel Harris	C01
	S02	Linda Scott	C01
	S03	Kevin Nelson	C02
	S04	Justin Morgan	C02
	S05	Kevin Walker	C03
	S06	David Thomas	C04
*			

Student Information

Student ID:

Student Name:

Class ID:

Insert Update Delete

C# Code

```
public Form1()
{
    InitializeComponent();
}

string connectionString= "Server=VanLoi; Database=STUDENT_MANAGEMENT; User Id = sa; password=loi@123";
SqlDataAdapter adapter=null;
DataSet ds = null;
1 reference
private void Form1_Load(object sender, EventArgs e)
{
    adapter = new SqlDataAdapter("Select * from Student", connectionString);
    SqlCommandBuilder builder = new SqlCommandBuilder(adapter);
    ds = new DataSet();
    //fill data from adapter to dataset
    adapter.Fill(ds,"Student");
    //dtgStudent.DataSource = ds.Tables[0];
}

1 reference
private void btnLoad_Click(object sender, EventArgs e)
{
    dtgStudent.DataSource = ds.Tables[0];
}
```

```

private void btnInsert_Click(object sender, EventArgs e)
{
    int result = 0;
    //Create a new row
    DataRow row = ds.Tables[0].NewRow();
    row[0] = txtStudentID.Text;
    row["Name"] = txtStudentName.Text;
    row[2] = txtClassID.Text;
    //add the row to DataSet
    ds.Tables[0].Rows.Add(row);
    //Update Adapter
    try
    {
        adapter.Update(ds, "Student");
    }
    catch (Exception ex)
    {
        MessageBox.Show("Insert failed \n" + ex.Message);
    }
    if (result > 0) MessageBox.Show("Insert Successfully");
}

//Display a selected row on textboxes
int position = -1; // there is no selected row.
1 reference
private void dtgStudent_CellContentClick(object sender, DataGridViewCellEventArgs e)
{
    position = e.RowIndex;
    if (position == -1)
    {
        MessageBox.Show("No row is selected");
        return;
    }
    //get selected row
    DataRow row = ds.Tables[0].Rows[position];
    txtStudentID.Text = row[0].ToString();
    txtStudentName.Text = row["Name"].ToString();
    txtClassID.Text = row[2].ToString();
}

```

```

private void btnUpdate_Click(object sender, EventArgs e)
{
    if (position == -1)
    {
        MessageBox.Show("No row is selected");
        return;
    }
    //get a selected row in dataset
    DataRow row = ds.Tables[0].Rows[position];
    //edit the row
    row.BeginEdit();
    row[0] = txtStudentID.Text;
    row[1] = txtStudentName.Text;
    row[2] = txtClassID.Text;
    row.EndEdit();
    //update adapter
    int result = adapter.Update(ds.Tables[0]);
    if(result>0)
    {
        MessageBox.Show("Update successfully!!!");
    }
    else
    {
        MessageBox.Show("Update failed!!!");
    }
}

```

```

private void btnDelete_Click(object sender, EventArgs e)
{
    if (position == -1) return;
    //get a selected row
    DataRow row = ds.Tables[0].Rows[position];
    row.Delete();
    int result = adapter.Update(ds.Tables[0]);
    if (result>0)
    {
        MessageBox.Show("Delete successfully!!!");
    }
    else
    {
        MessageBox.Show("Delete failed!!!");
    }
}

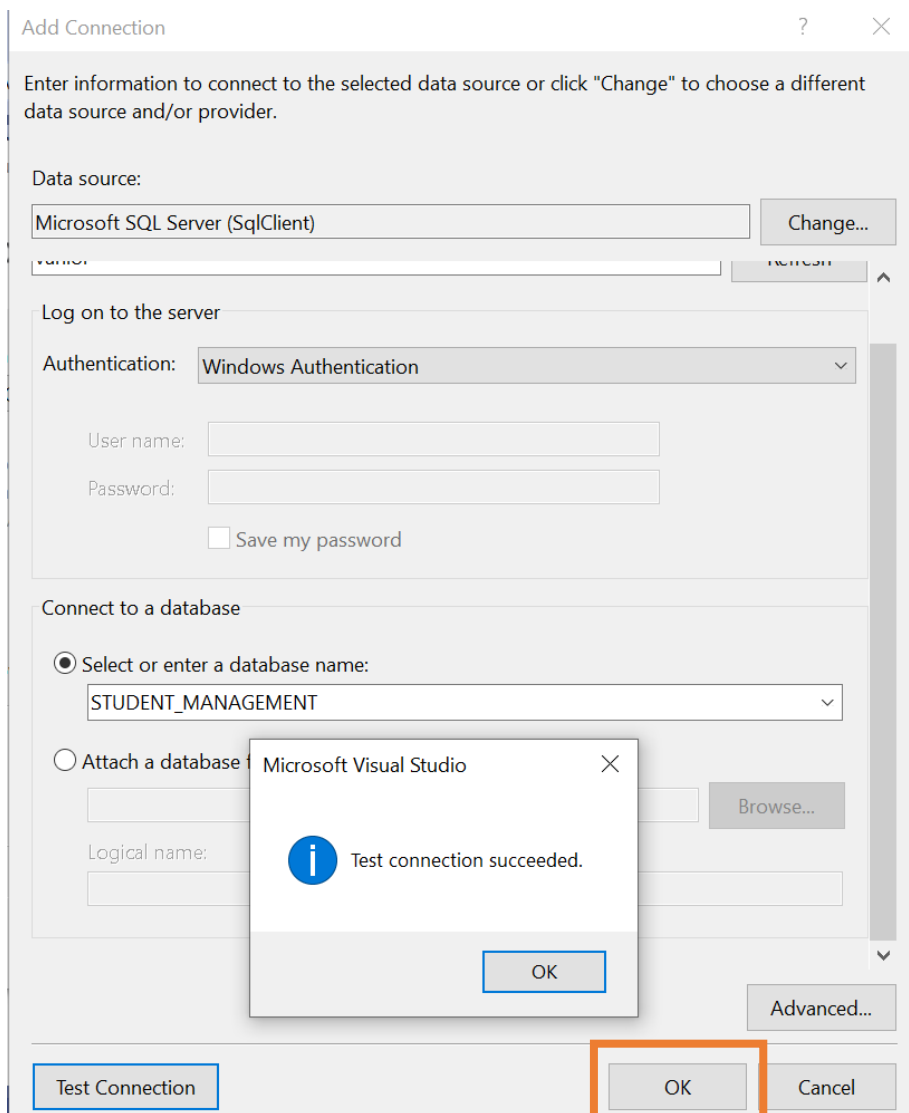
```

Lab 3: Windows Forms Data Binding

I. Data Binding with wizard (only using for Windows Forms App(.NET Framework))

1. Create Data Source: using Data Source Configuration Wizard

- Menu Project | Add New Data Source... or open window **Data Source** (Shift+Alt+D), click **Add New Data Source...**
- On the **Choose a Data Source** page, select **Database**.
- On the **Choose a Database Model** page, select **Dataset**
- On the **Choose Your Data Connection** page, select a data connection from the list of available connections. If your desired data connection is not available select **New Connection** to create a new data connection.



Data Source Configuration Wizard

Choose Your Data Connection

Which data connection should your application use to connect to the database?

vanloi.STUDENT_MANAGEMENT.dbo New Connection...

This connection string appears to contain sensitive data (for example, a password), which is required to connect to the database. However, storing sensitive data in the connection string can be a security risk. Do you want to include this sensitive data in the connection string?

☐ No, exclude sensitive data from the connection string. I will set this information in my application code.

☐ Yes, include sensitive data in the connection string.

☒ Show the connection string that you will save in the application

Data Source=vanloi;Initial Catalog=STUDENT_MANAGEMENT;Integrated Security=True

< Previous **Next >** Finish Cancel

- On the **Save the Connection String to the Application Configuration File** page, click **Next**.
- On the **Choose Your Database Objects** page, click **Next**.

Data Source Configuration Wizard

Choose Your Database Objects

Which database objects do you want in your dataset?

☒ Tables

☒ CLASS

☒ ClassID

☒ ClassName

☒ Year

☒ STUDENT

☒ StudentID

☒ Name

☒ ClassID

☐ Views

☐ Stored Procedures

☐ Functions

DataSet name:

STUDENT_MANAGEMENTDataSet

< Previous Next > **Finish** Cancel

**Choose Your Database Objects**

Which database objects do you want in your dataset?

☒ Tables

- ☒ CLASS
 - ☒ ClassID
 - ☒ ClassName
 - ☒ Year
- ☒ STUDENT
 - ☒ StudentID
 - ☒ Name
 - ☒ ClassID
- ☐ Views
- ☐ Stored Procedures
- ☐ Functions

DataSet name:

STUDENT_MANAGEMENTDataSet

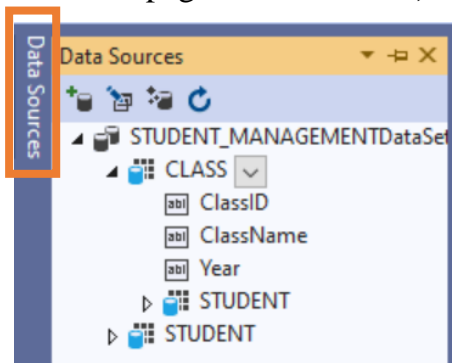
< Previous

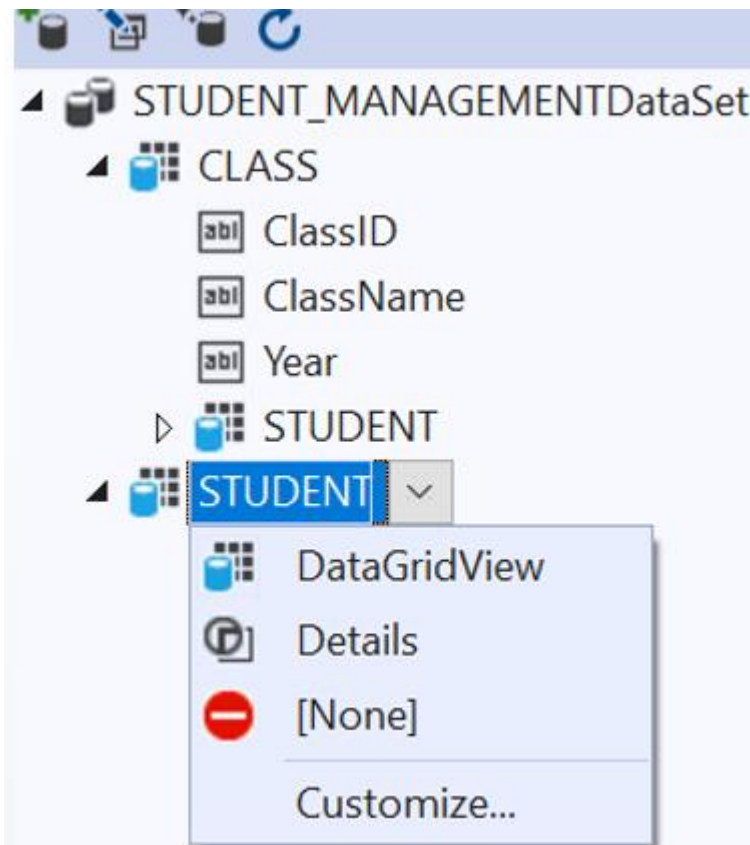
Next >

Finish

Cancel

- Click **Finish**
- Click page **Data Sources**, the window looks like this:

**2. Create form Student**



- Choose **DataGridView** for the **STUDENT** table, drag and drop the STUDENT table to the form.
- Choose **Details** for the **STUDENT** table, drag and drop the STUDENT table to the form.

	StudentID	Name	ClassID
*			

Student ID:

Name:

Class ID:

sSTUDENT_MANAGEMENTDataSet sSTUDENTBindingSource sSTUDENTTableAdapter tableAdapterManager sSTUDENTBindingNavigator

II. Data Binding with Controls in C#

Create a form to Show list of students by class

Class ID: C01

Class Name: Programming 01

Year: 2020

View

	StudentID	Name	ClassID
▶	S01	Daniel Harris	C01
	S02	Linda Scott	C01
*			

1. How to: Bind a Windows Forms ComboBox Control to Data

- Create Data Source: using **Data Source Configuration Wizard**
- Select the **cboClassID** ComboBox and follow the instructions below:

Class ID: [ComboBox]

Class Name: [ComboBox]

Year: [Text Box]

ComboBox Tasks

☒ Use Data Bound Items

Data Binding Mode

Data Source: cLASSBindin

Display Member: ClassID

Value Member: [Empty]

Selected Value: (none)

[Add Query...](#)

[Preview Data...](#)

sTUDENT_MANAGEMENTDataSet cLASSBindingSource cLASSTableAdapter

- Do the same with the **cboClassName** ComboBox
- Write code for the **VIEW** button

```

//get Connection String
string conn = global::ListofStudentsbyClass.Properties.Settings.Default.STUDENT_MANAGEMENTConnectionString;
DataSet ds = null;
SqlDataAdapter adapter = null;
string str;
1 reference
private void btnView_Click(object sender, EventArgs e)
{
    str = $"Select * from Student where ClassID='{cboClassID.Text}'";
    adapter = new SqlDataAdapter(str, conn);
    ds = new DataSet();
    adapter.Fill(ds);
    dataGridView1.DataSource = ds.Tables[0];
}

```

III. Search Form

Form Search by student Name

Search by Student Name

	StudentID	Name	ClassID
▶	S04	Justin Mor...	C02
*			

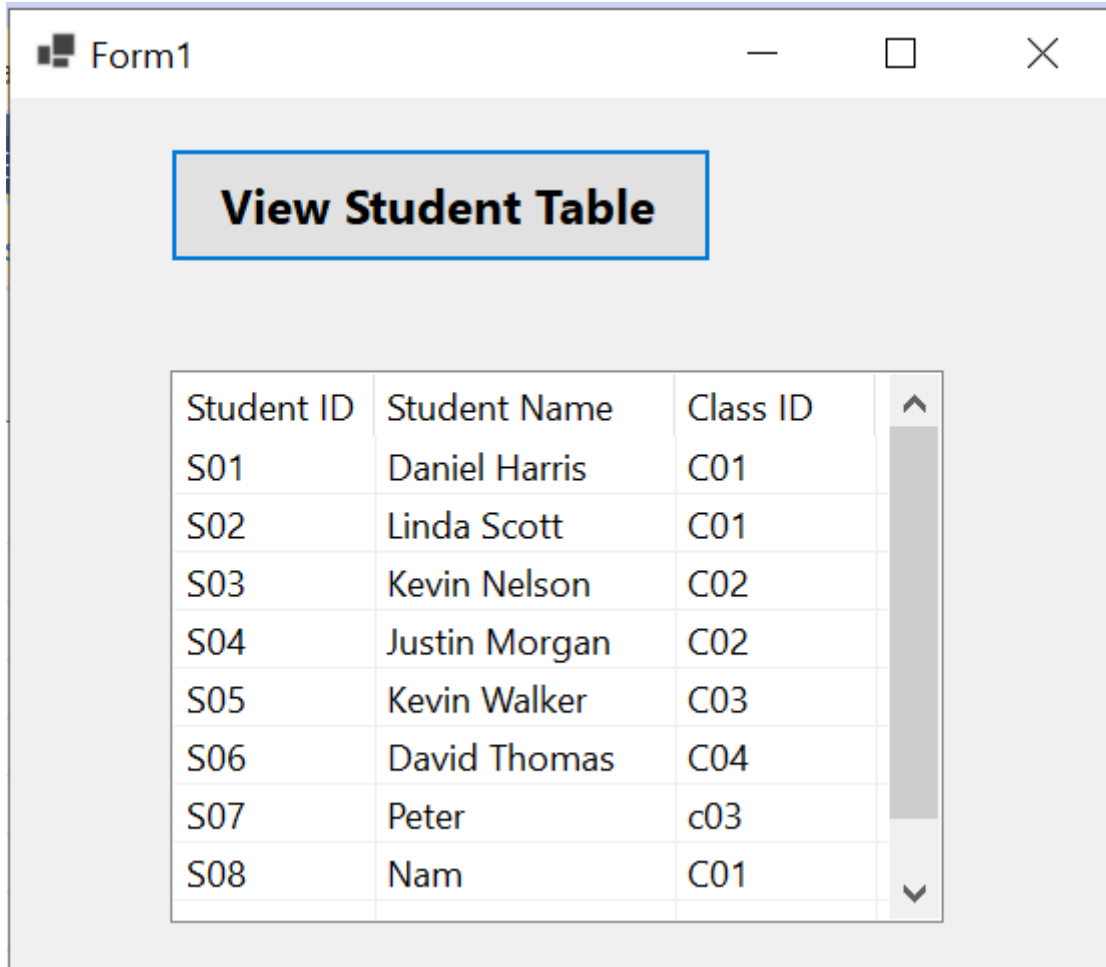
```

string ConnString = "server=vanloi; database=student_management; user id=sa; password=loi@123";
SqlDataAdapter adapter = null;
DataSet ds = null;
1 reference
private void txtStudentName_TextChanged(object sender, EventArgs e)
{
    adapter = new SqlDataAdapter($"select * from student where name like'{txtStudentName.Text}%',ConnString);
    ds = new DataSet();
    adapter.Fill(ds);
    dataGridView1.DataSource = ds.Tables[0];
}

```

LAB 4: HOW TO BUILD AND DEPLOY A THREE-LAYER ARCHITECTURE APPLICATION WITH C#

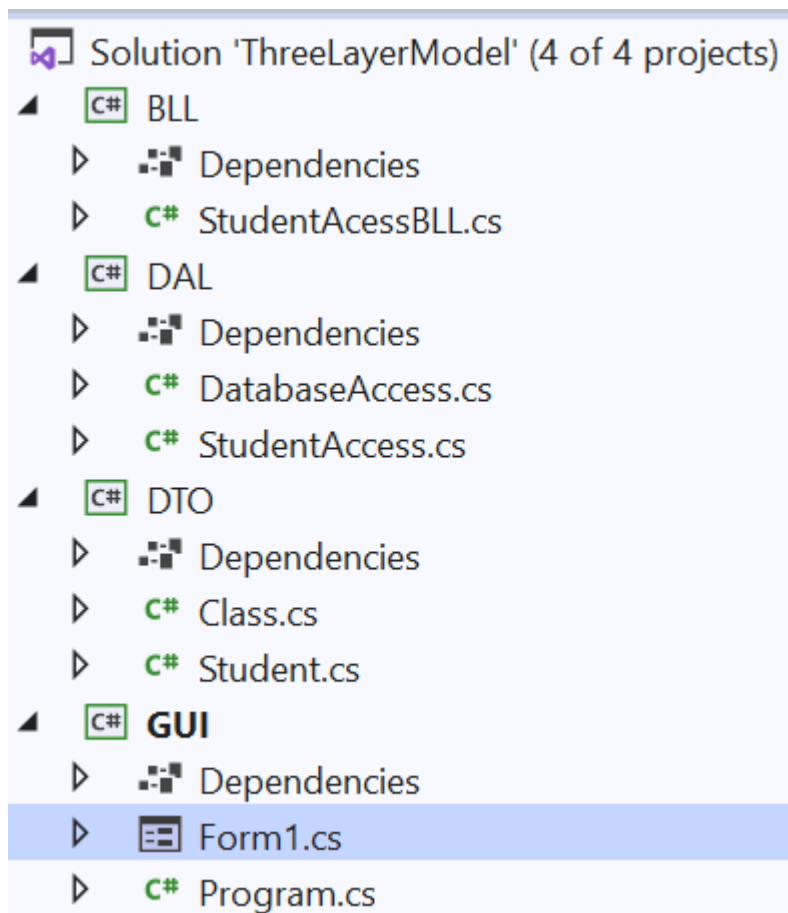
1. Create the following form in a three-layer architecture application



The screenshot shows a Windows Form titled "Form1" with a standard Windows title bar (minimize, maximize, close buttons). Inside the form, there is a button labeled "View Student Table" with a blue border. Below the button is a table with three columns: "Student ID", "Student Name", and "Class ID". The table contains eight rows of data. A vertical scrollbar is visible on the right side of the table, indicating that the table can be scrolled.

Student ID	Student Name	Class ID
S01	Daniel Harris	C01
S02	Linda Scott	C01
S03	Kevin Nelson	C02
S04	Justin Morgan	C02
S05	Kevin Walker	C03
S06	David Thomas	C04
S07	Peter	c03
S08	Nam	C01

- When the user clicks the “View Student Table” button, the “Student” Table will be displayed on the ListView.
- The solution of the application should be following:



2. Create the following form in a three-layer architecture application

Form1

Student Information

Student ID: S11

Full Name: An

Class ID: C01

Buttons: Insert, Update, Delete

	StudentID	Full Name	ClassID
▶	S01	Daniel Harris	C01
	S02	Linda Scott	C01
	S03	Kevin Nelson	C02
	S04	Justin Morgan	C02
	S05	Kevin Walker	C03
	S06	David Thomas	C04
	S07	Peter	c03