SQL Server Database Connection in C# Using ADO.NET
LAB 1

I. Create Database

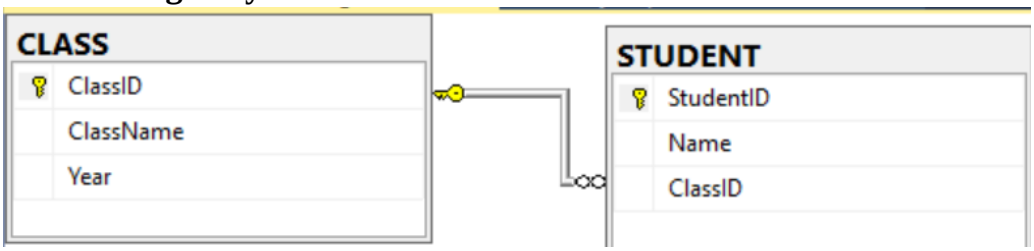
1. Create Database STUDENT_MANAGEMENT that contains table **CLASS** and **STUDENT**
   - Table **CLASS**

Column Name	Data Type	Allow Nulls
ClassID	char(10)	☐
ClassName	nvarchar(50)	☑
Year	int	☑

   - Table **STUDENT**

Column Name	Data Type	Allow Nulls
StudentID	char(10)	☐
Name	nvarchar(40)	☑
ClassID	char(10)	☑

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



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

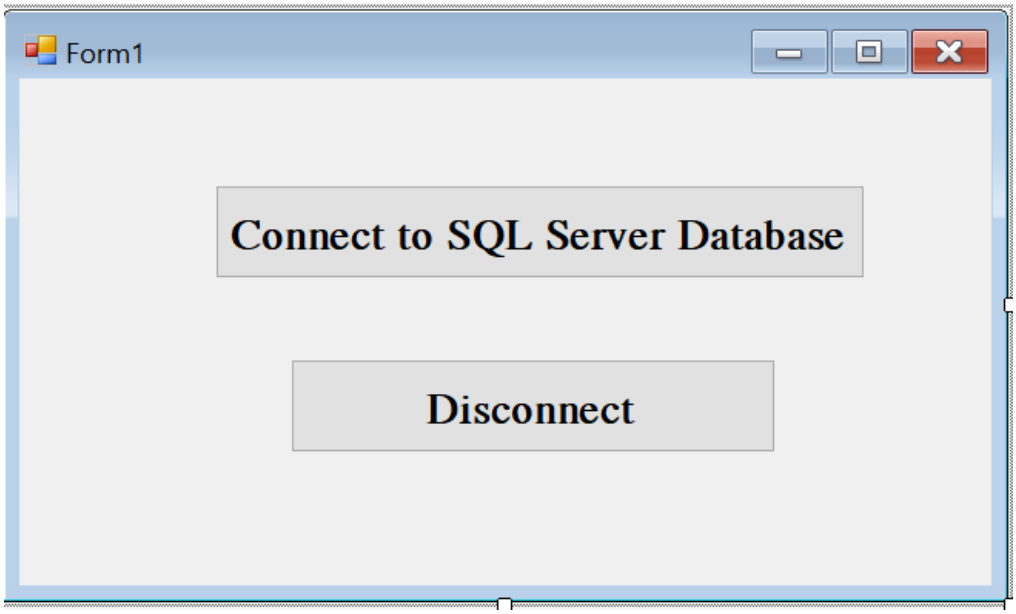
ClassID	ClassName	Year
C01	Programming 01	2020
C02	Programming 02	2020
C03	Information System 01	2020
C04	Information System 01	2021
C05	Programming 03	2021

   - 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

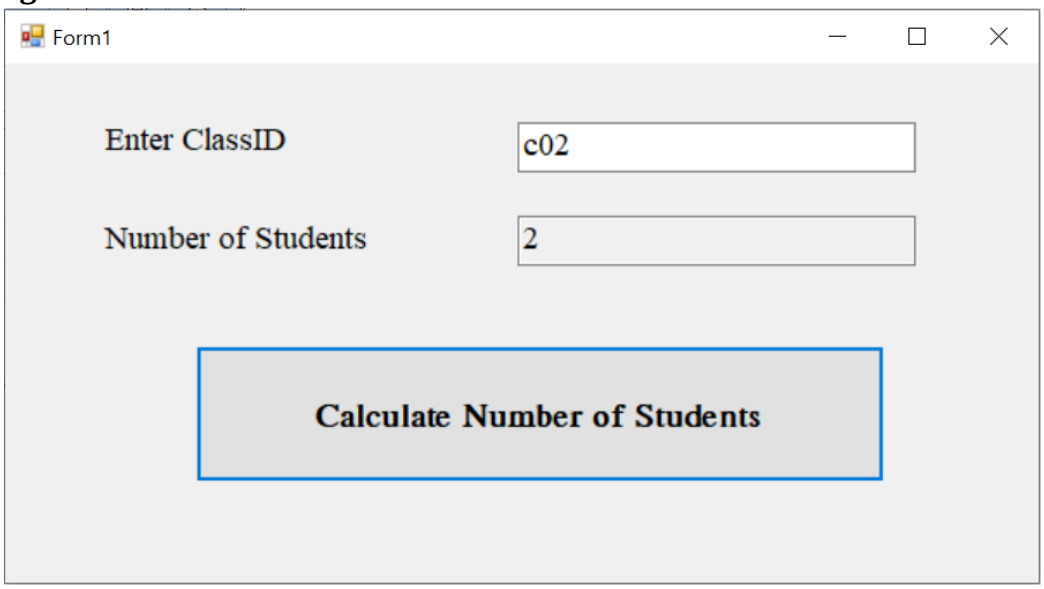


C# code

```
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

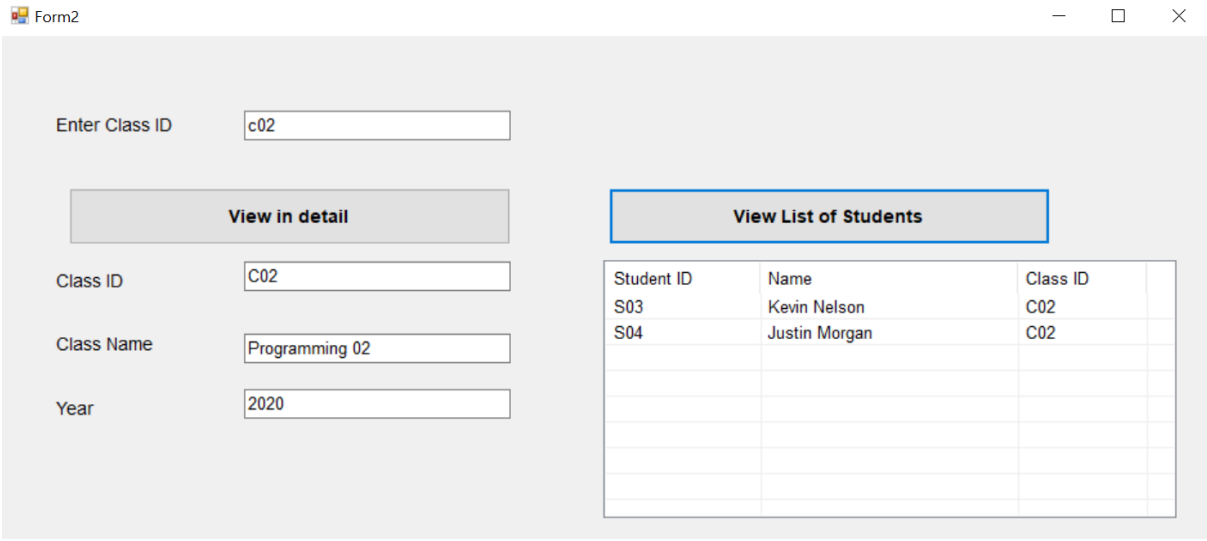
Design Form



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

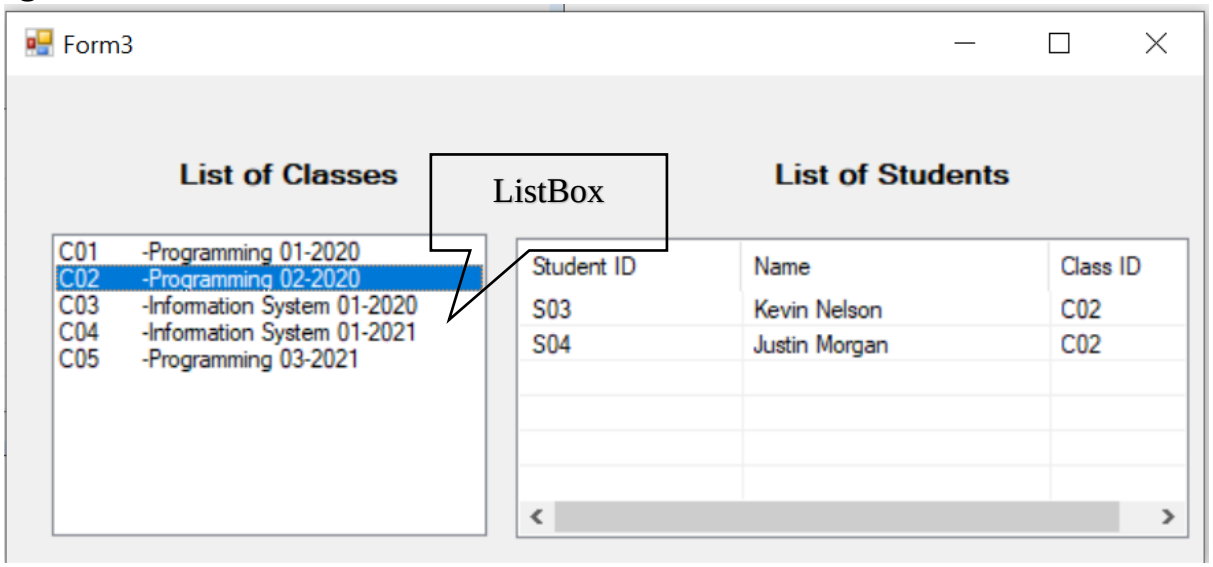


C# Code

```
        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();
}
```

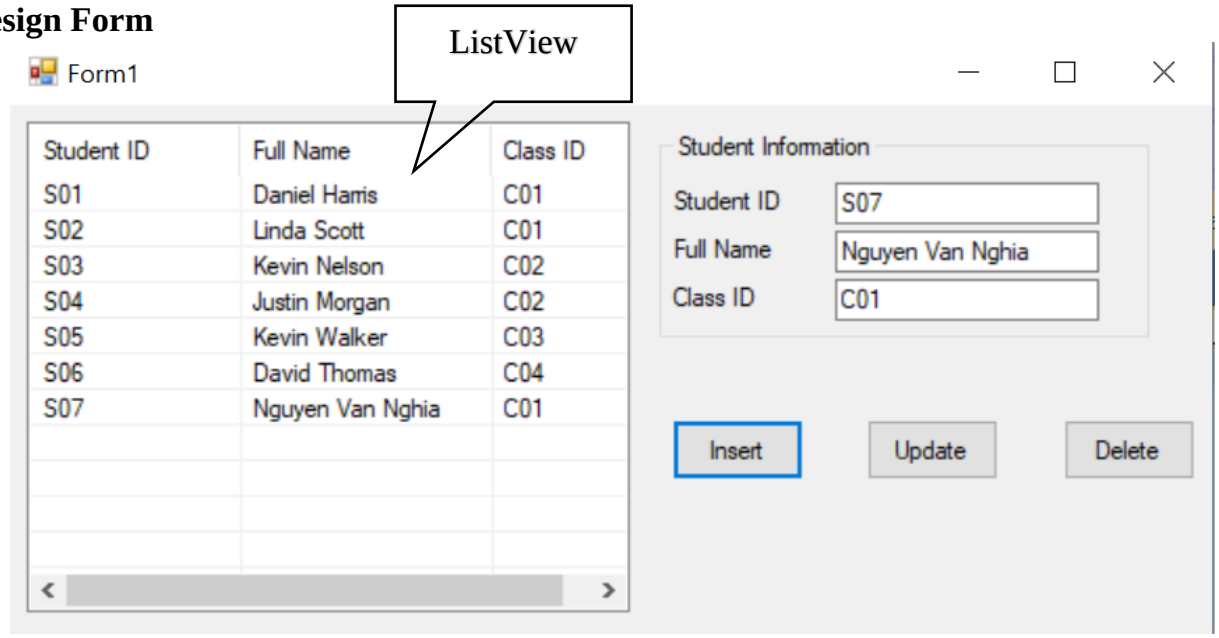
Design Form



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



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();
}
```

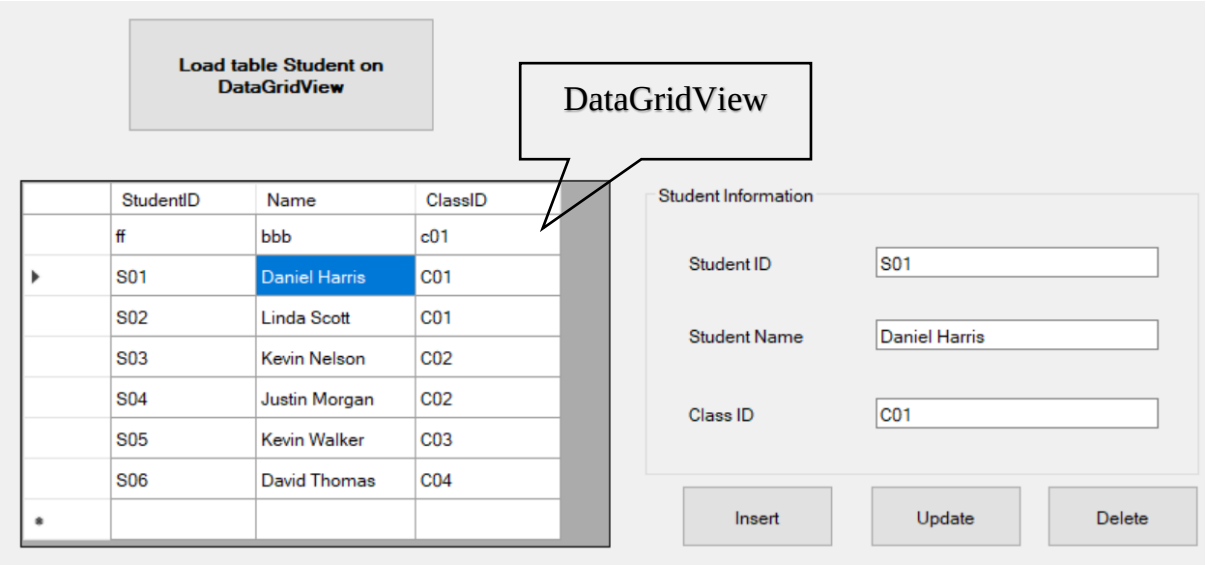
```
int result=-1;
1 reference
private void btnInsert_Click(object sender, EventArgs e)
{
    if (conn == null) conn = new SqlConnection(stringconn);
    if (conn.State == ConnectionState.Closed) conn.Open();
    SqlCommand command = new SqlCommand();
    command.CommandType = CommandType.Text;
    command.Connection = 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



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();
}
```

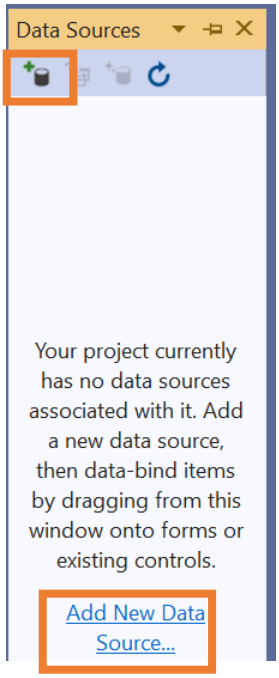
```
private void btnUpdate_Click(object sender, EventArgs e)
{
    if (position == -1)
    {
        MessageBox.Show("No row is selected");
        return;
    }
    //get a selected row in dataset
    DataRow row = ds.Tables[0].Rows[position];
    //edit the row
    row.BeginEdit();
    row[0] = txtStudentID.Text;
    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!!!");
        }
}
```

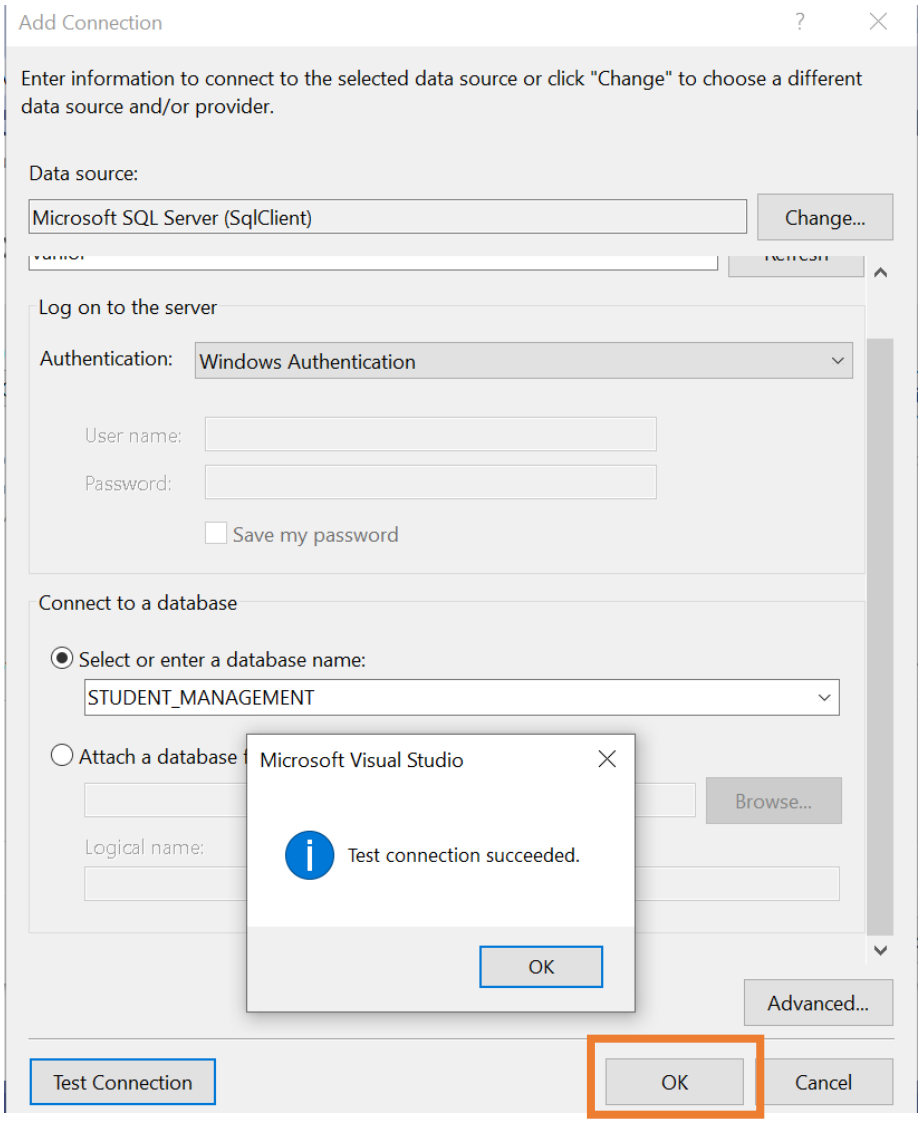
Lab 3: Windows Forms Data Binding

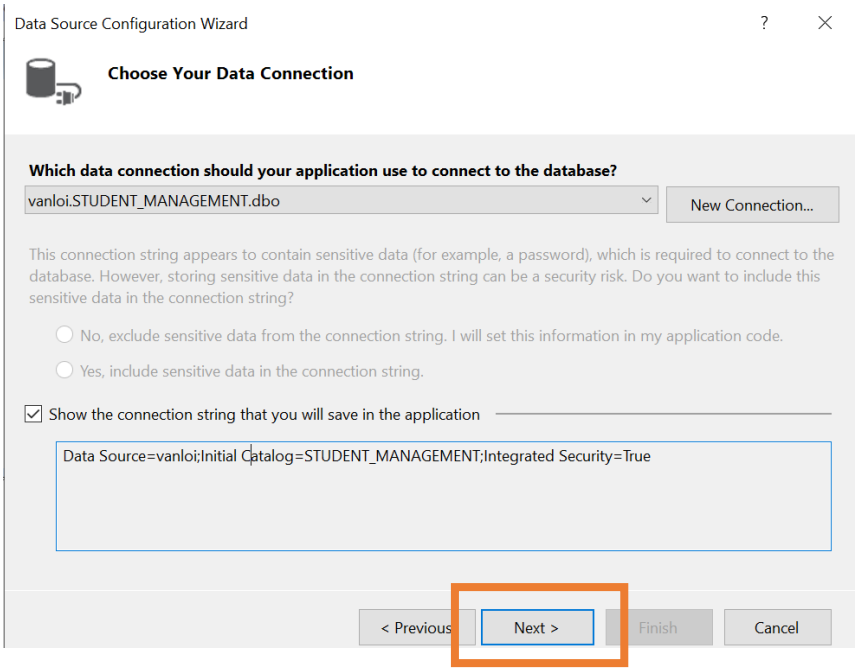
I. Data Binding with wizard (only using for Windows Forms App(.NET Framework))

1. Create Data Source: using Data Source Configuration Wizard

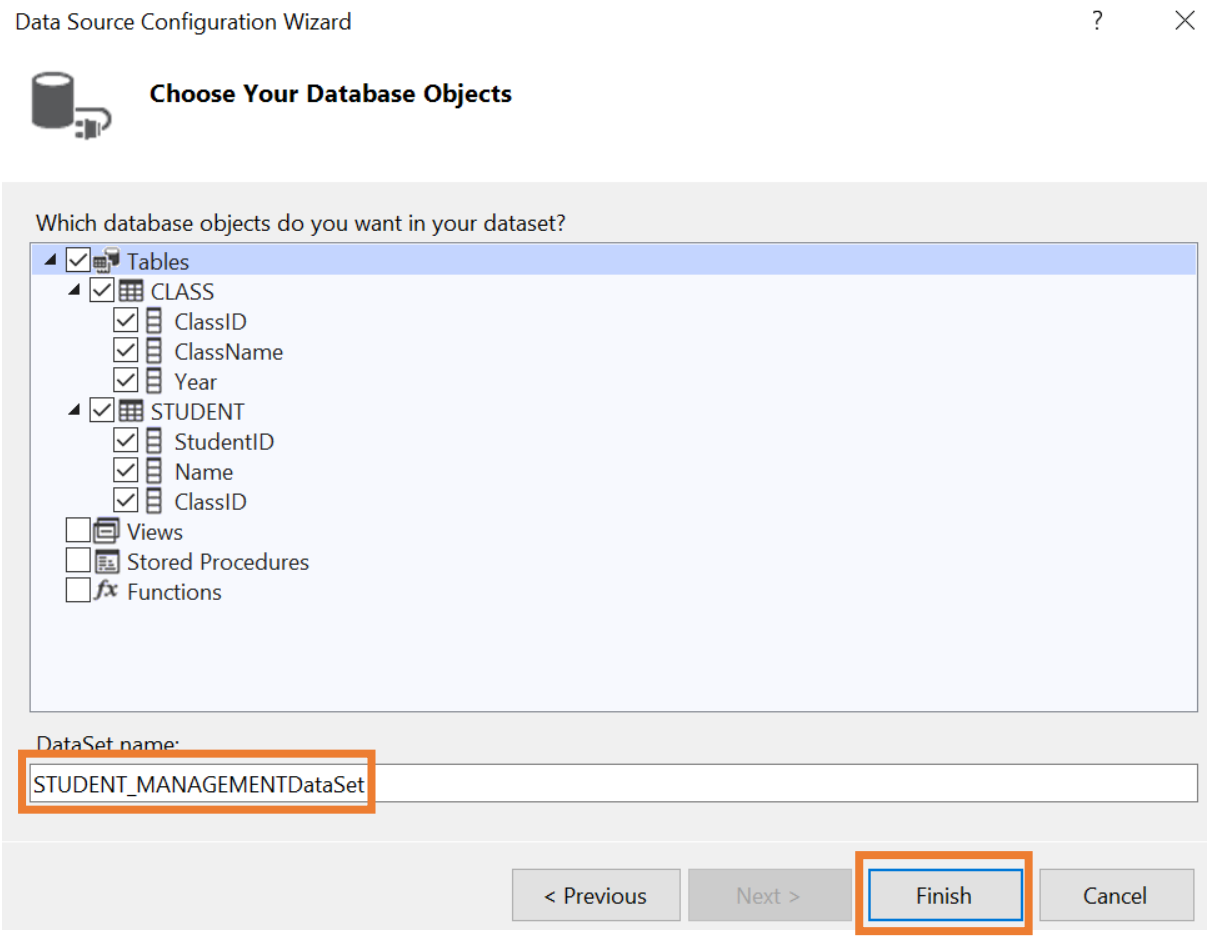


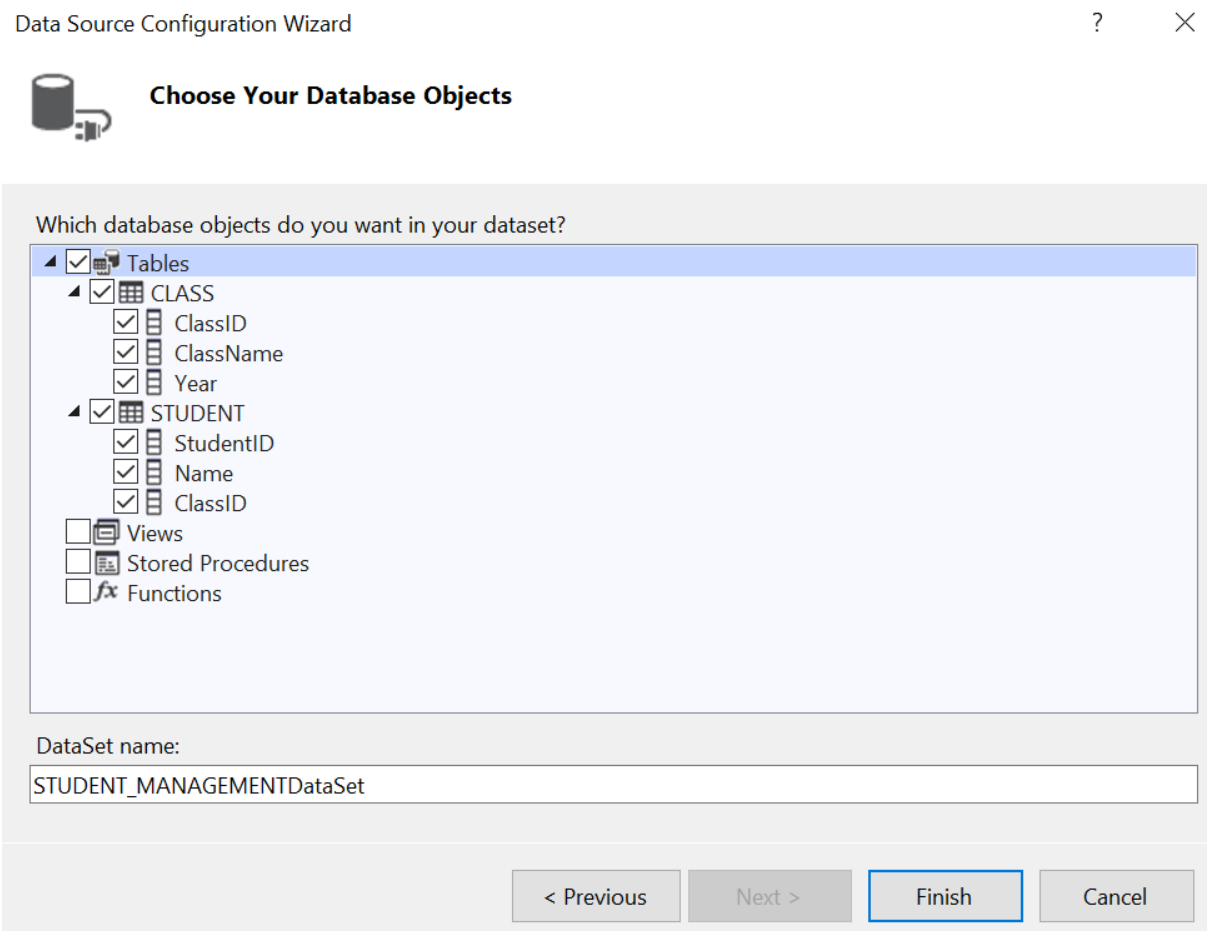
- Menu Project | Add New Data Source… or open window **Data Source** (Shift+Alt+D), click **Add New Data Source…**
- On the **Choose a Data Source** page, select **Database**.
- On the **Choose a Database Model** page, select **Dataset**
- On the **Choose Your Data Connection** page, select a data connection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



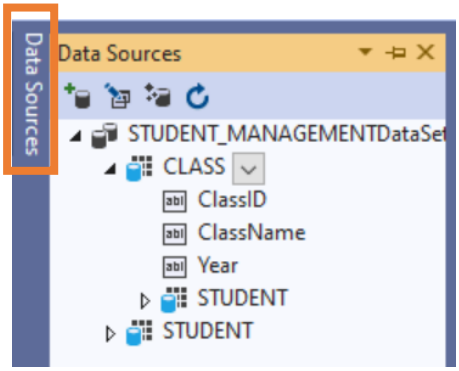


- On the **Save the Connection String to the Application Configuration File** page, click **Next**.
- On the **Choose Your Database Objects** page, click **Next**.

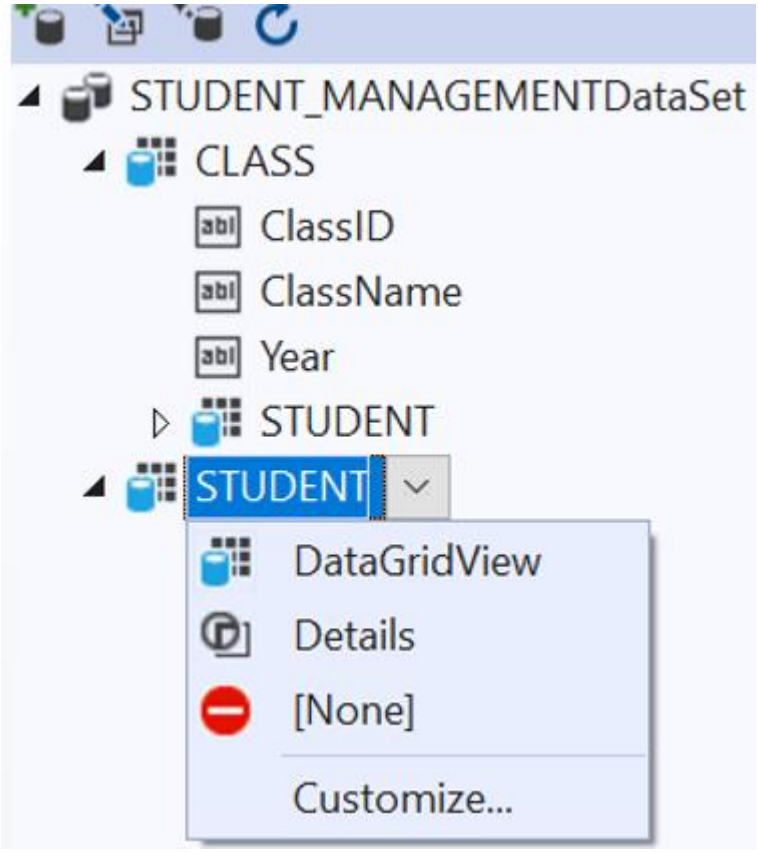




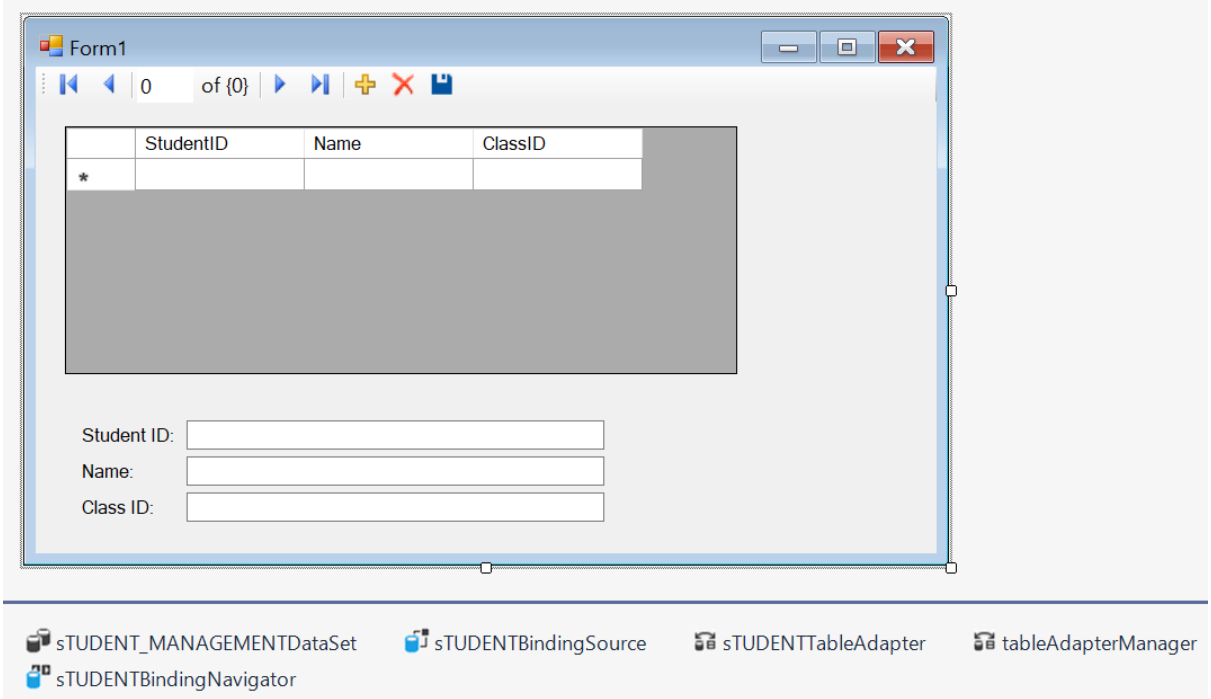
- Click **Finish**
- Click page **Data Sources,** the window looks like this:



2. Create form Student

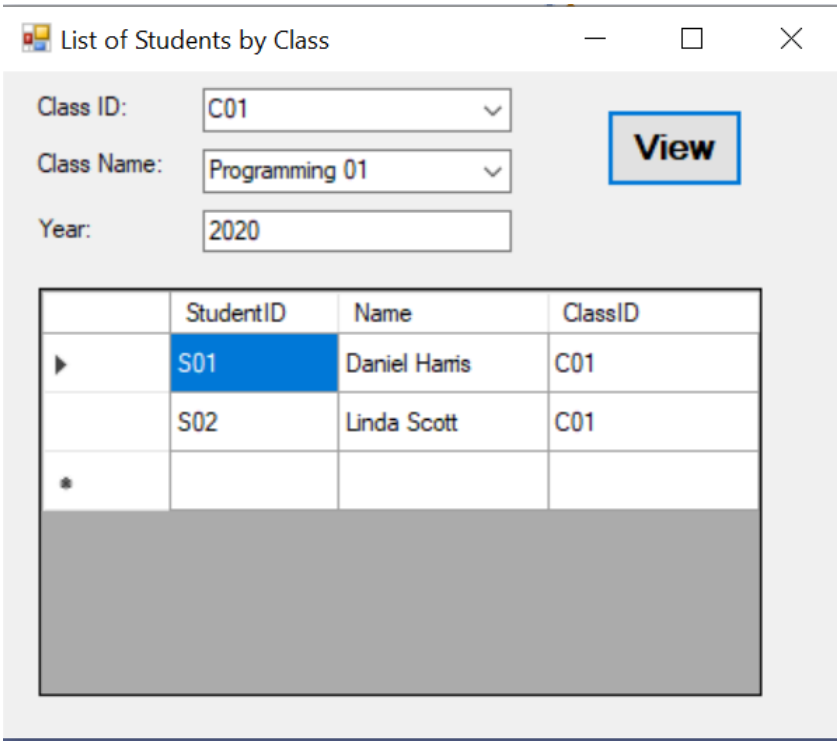


- Choose **DataGridView** for the **STUDENT** table, drag and drop the STUDENT table to the form.
- Choose **Details** for the **STUDENT** table, drag and drop the STUDENT table to the form.

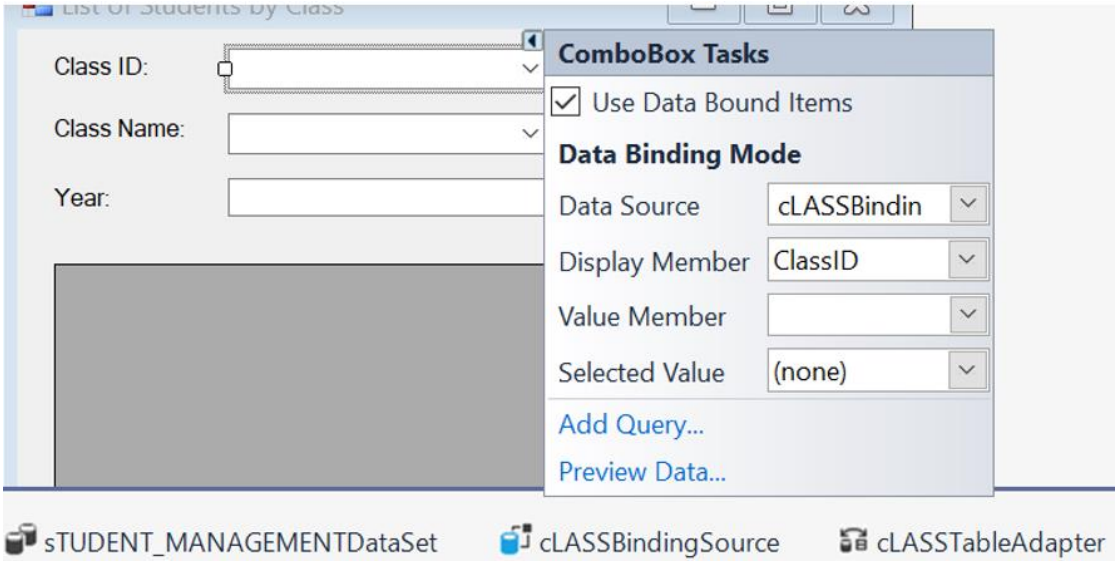


II. Data Binding with Controls in C#

Create a form to Show list of students by class



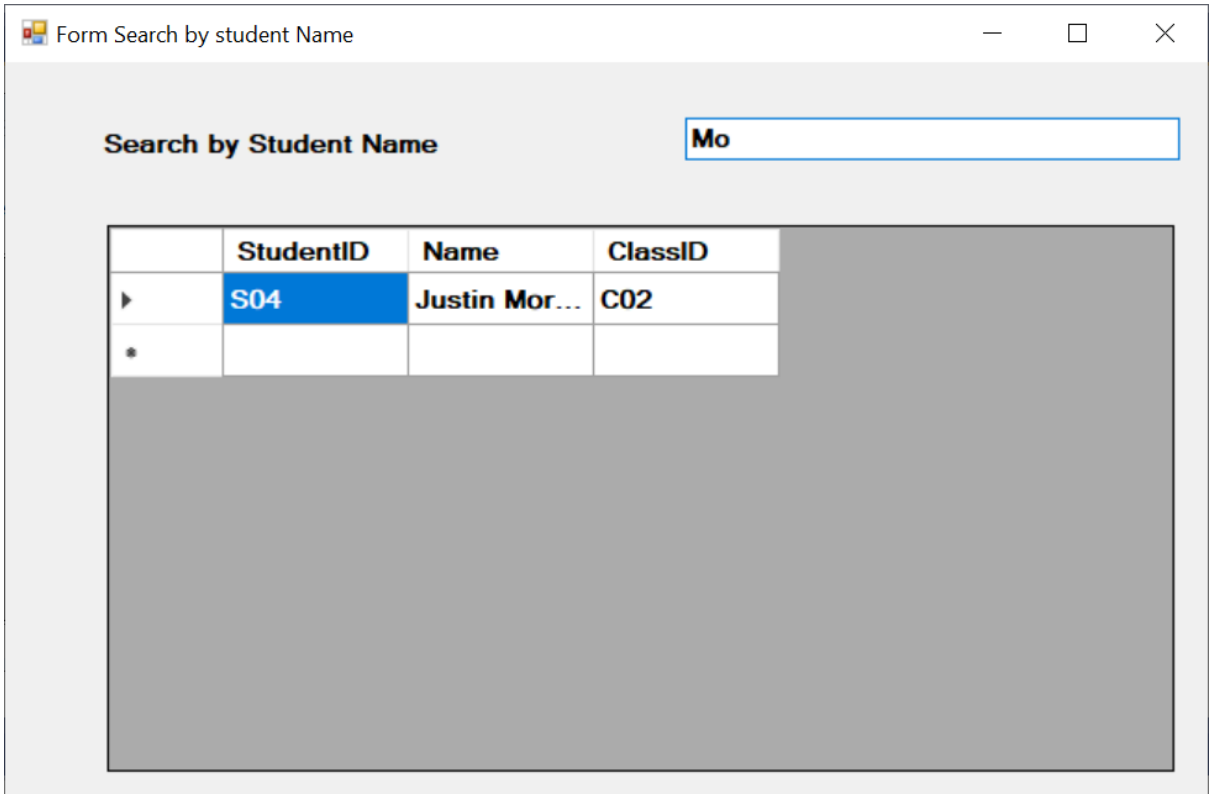
1. **How to: Bind a Windows Forms ComboBox Control to Data**
   - Create Data Source: using **Data Source Configuration Wizard**
   - Select the cboClassID ComboBox and follow the instructions below:



   - 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];
}
```

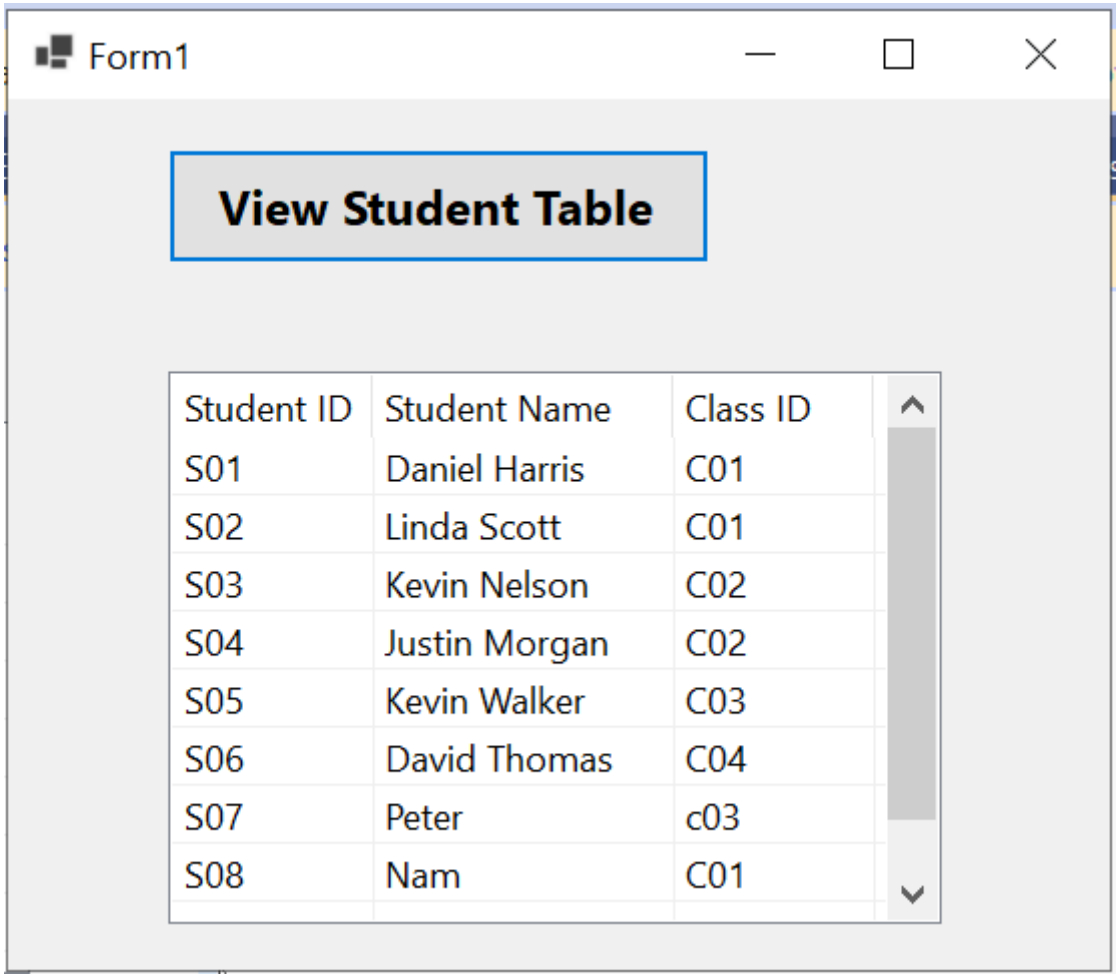
III. Search Form



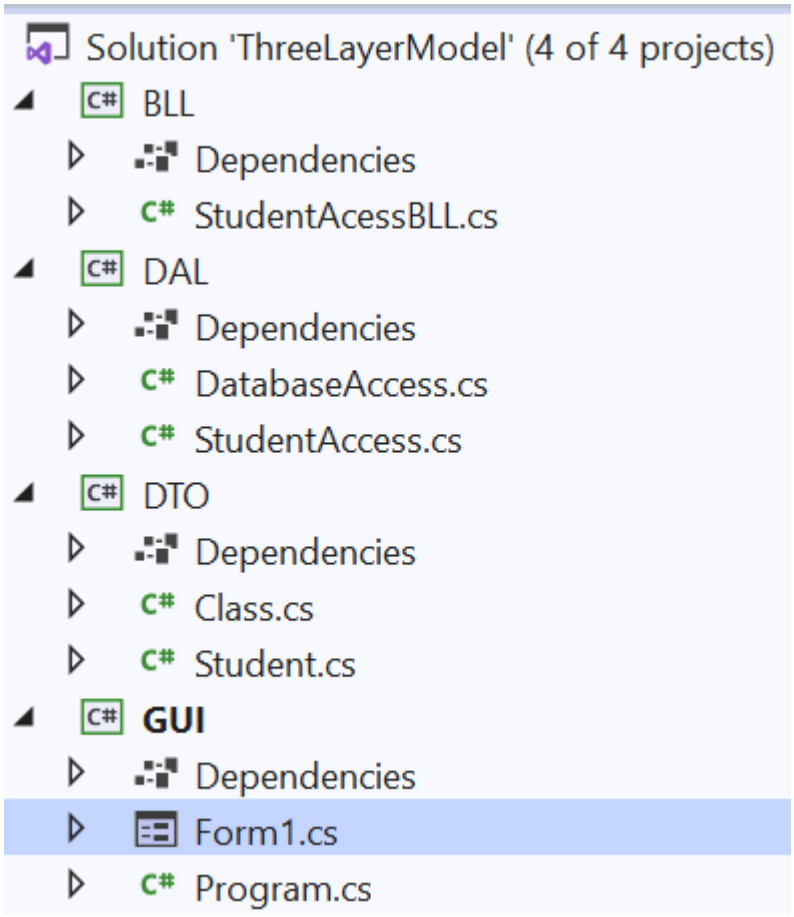

```
string ConnString = "server=vanloi; database=student_management; user id=sa; password=loi@123";
SqlDataAdapter adapter = null;
DataSet ds = null;
1 reference
private void txtStudentName_TextChanged(object sender, EventArgs e)
{
    adapter = new SqlDataAdapter($"select * from student where name like'%{txtStudentName.Text}%'",ConnString);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



- 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**