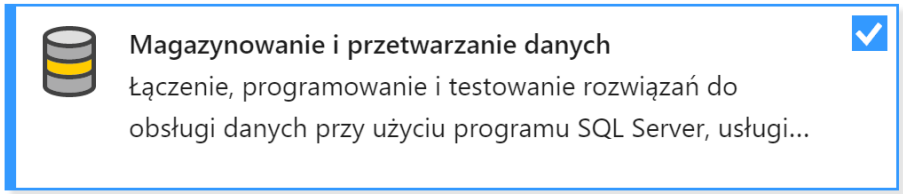
Advanced Programming C#

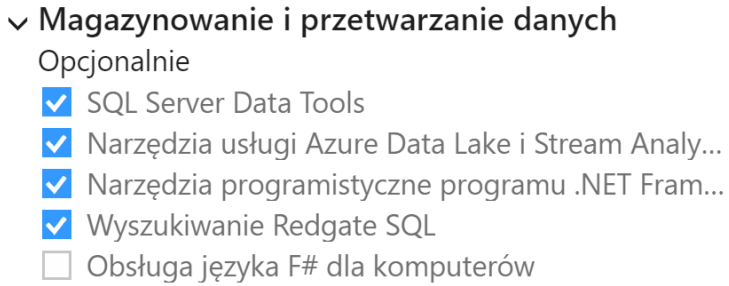
Lecture 5

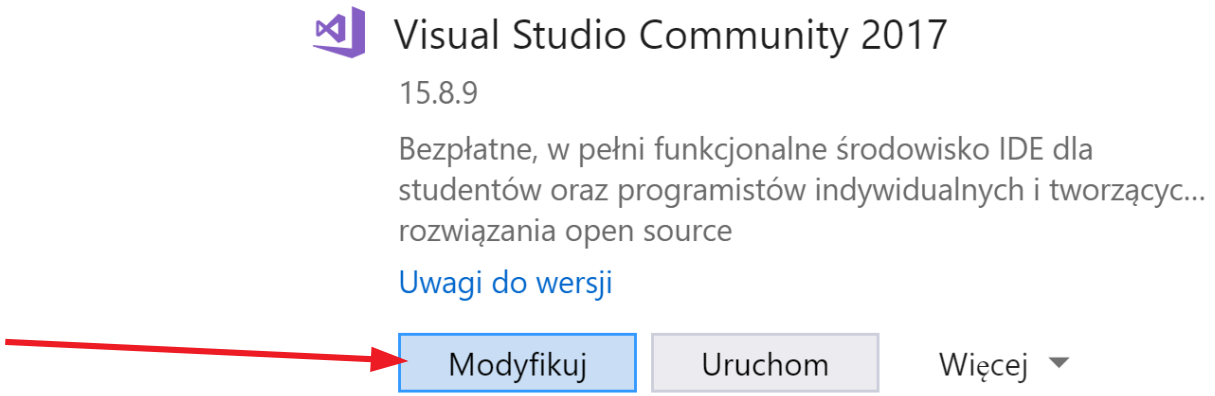
dr inż. Małgorzata Janik

malgorzata.janik@pw.edu.pl

Today you will need:







Classes #6: Project I

- 10 min presentation / project
- Presentation must include:
  - Idea, description & specification of the project
    - used technologies
  - Screenshots of the prototype of the application
  - Interesting knowledge /skills obtained during the realization of the project (at least 1 example)
    - Should be presented in such a way that it would be interesting for other students
- Presentation must be sent to Teams / malgorzata.janik@pw.edu.pl latest next Monday, 10:00
- Prototype of the project should available for further checks and discussion

Classes #6: Project I

- The Final Mark is based on:
  - PRESENTATION
    + clarity of the presentation and the project (3p)
    + interesting skills obtained - description (2p)
  - CODE
    + clarity of the code (comments, naming convention, etc..) (1p)
    + advancement of the project (3p)
    + working prototype (1p)

= TOTAL 10 points

Classes #6: Project I

- Useful skill for other students:

Dźwięk

```
System.Media.SoundPlayer sound = new System.Media.SoundPlayer
(@"D:\Karolka\studia\Semestr_7\Csharp\projekt\MarioGame\MarioGame\bin\Debug\level1.wav");
```

```
public Form1()
{
    InitializeComponent();
    block.Top = screen.Height - block.Height;
    player.Top = screen.Height - player.Height;
    sound.Play();
}
```

ADO .NET (Databases)

Relational databases
SQL
(**reminder**)

Databases (REMINDER)

- Relational databases
  - Data is grouped in tables

Id	name	surname	birth date
1	Małgorzata	Janik	1887
2	Helena	Nowak	1984

- SQL - **Structured Query Language** is a programming language used to manage data in relational databases.

Databases (REMINDER)

- Basic SQL queries:
  - **SELECT - used to read (or select) your data**
    - SELECT* from TableName
    - SELECT Column1, Column2 from TableName
  - **INSERT INTO – used when you want to add (or insert) new data**
    - INSERT INTO TableName VALUES (Value1, Value2);
    - INSERT INTO TableName(Column2,Column3) VALUES (Value1, Value2);
  - **DELETE - used to remove row(s)**
    - DELETE FROM table_name WHERE *condition* ;
    - DELETE FROM OSOBY WHERE imie = 'Malgorzata';

Databases (REMINDER)

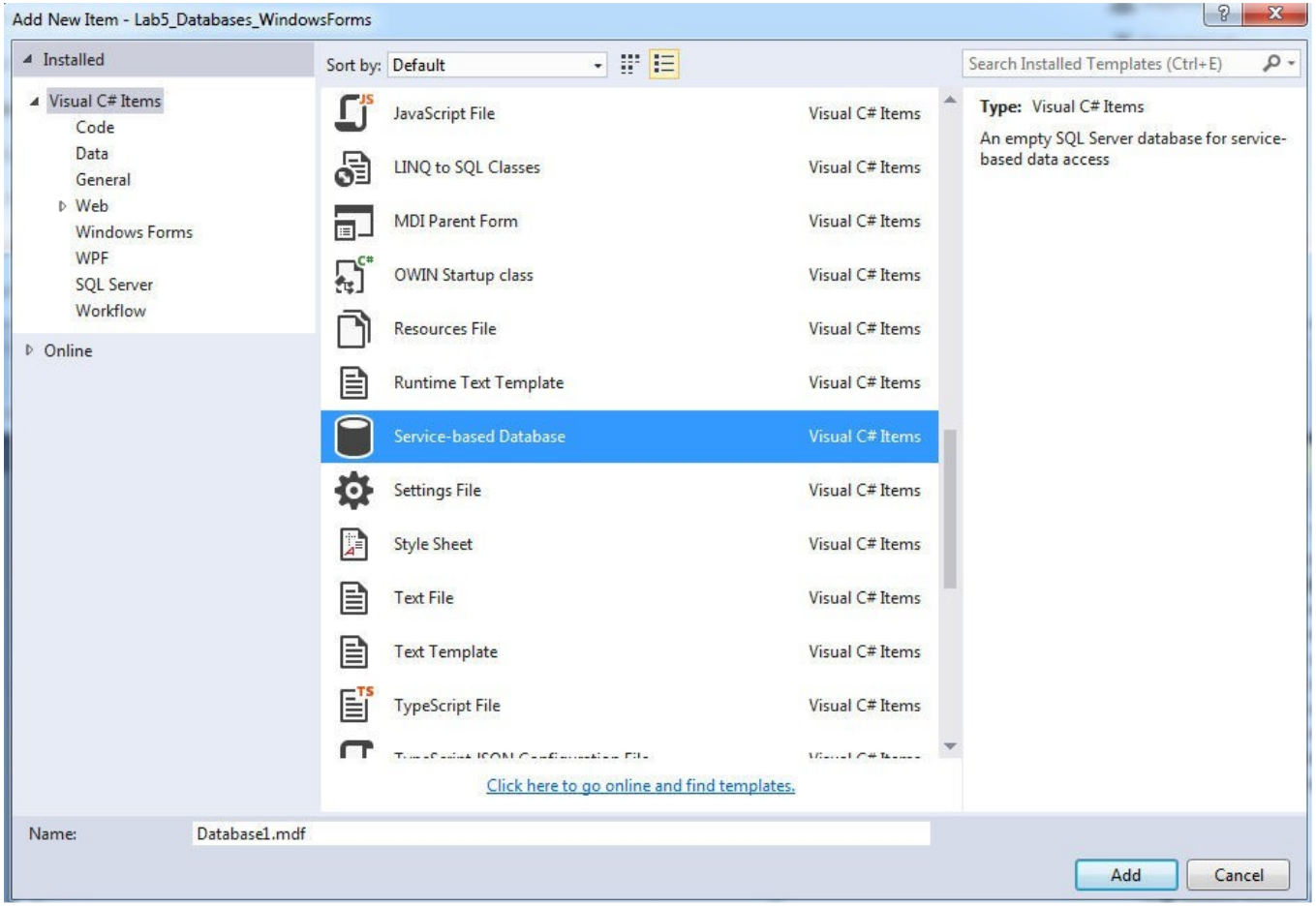
Example script

Remove table (if exists)	DROP TABLE IF EXISTS TEST;
Create table with columns ID and NAME	CREATE TABLE TEST(ID INT PRIMARY KEY, NAME VARCHAR(255));
Add new row	INSERT INTO TEST VALUES(1, 'Hello');
Add new row	INSERT INTO TEST VALUES(2, 'World');
Print table	SELECT * FROM TEST ORDER BY ID;
Change content of the row	UPDATE TEST SET NAME='Hi' WHERE ID=1;
Delete row	DELETE FROM TEST WHERE ID=2;

Create Database
Create Table
Add data

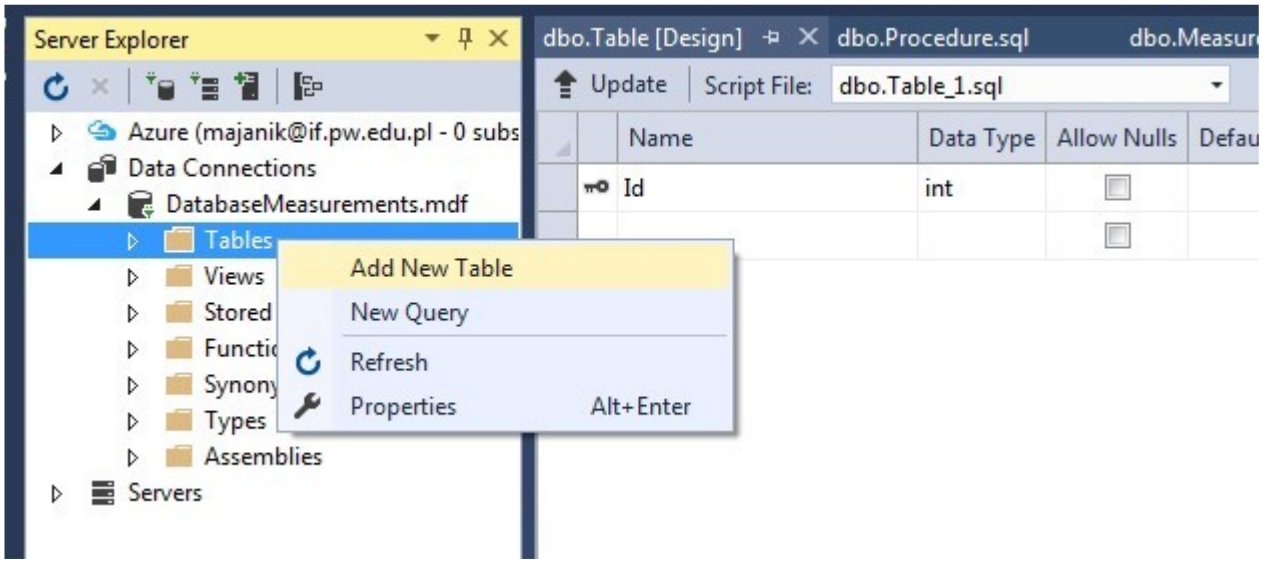
Create database

- New Console Application project
  Click on the Project → New Item →
  Service- based database (*.mdf file)



Create table

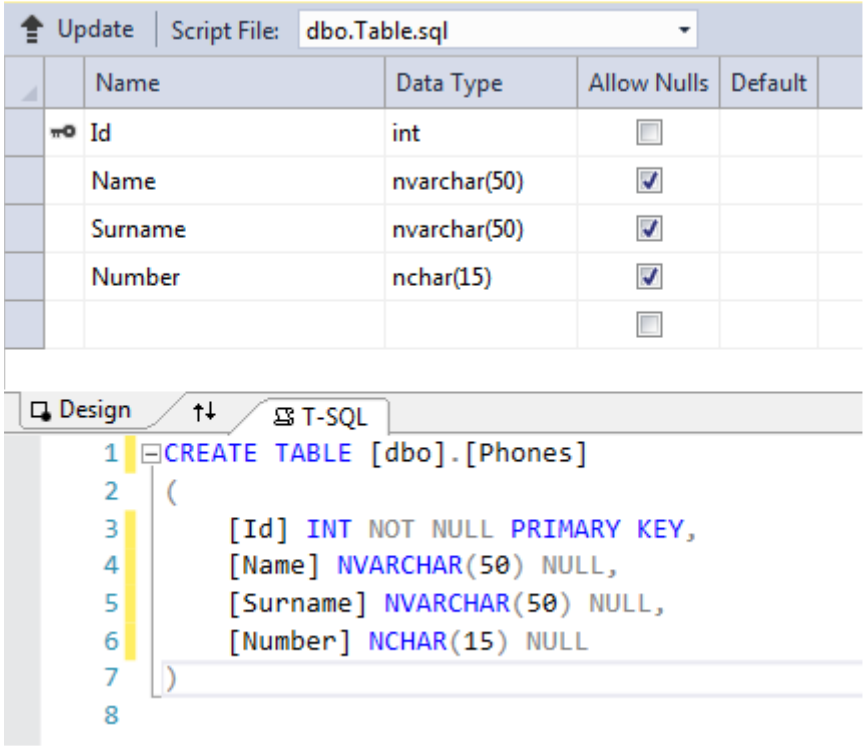
- Server Explorer (click two times on the database .mdf file in Solution Explorer) → Tables → Add New Table...

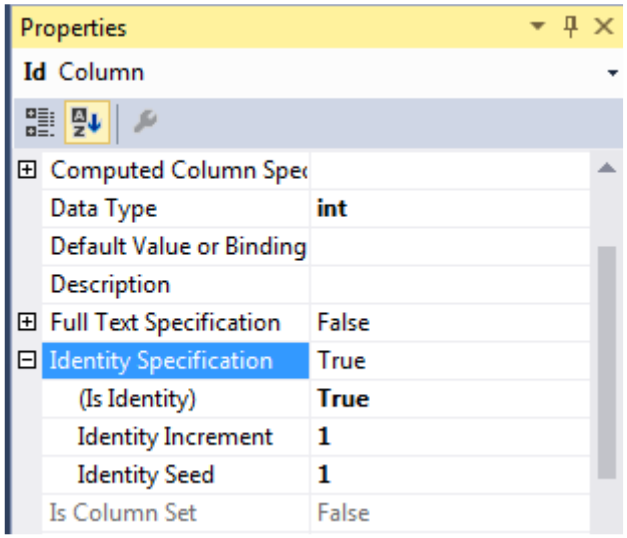


Create table

Create Table Phones with 4 columns:
- id (int)
- Name (nvarchar(50))
- Surname (nvarchar(50))
- Number (nchar(15))

Id is the Primary Key, should also be **identity** (check Column Properties)

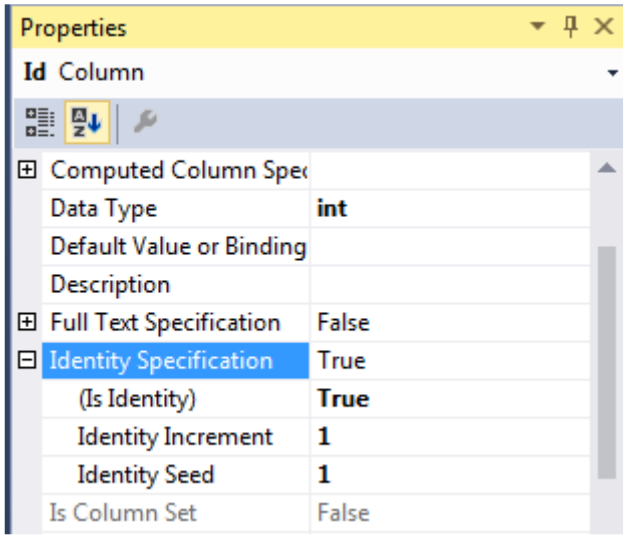


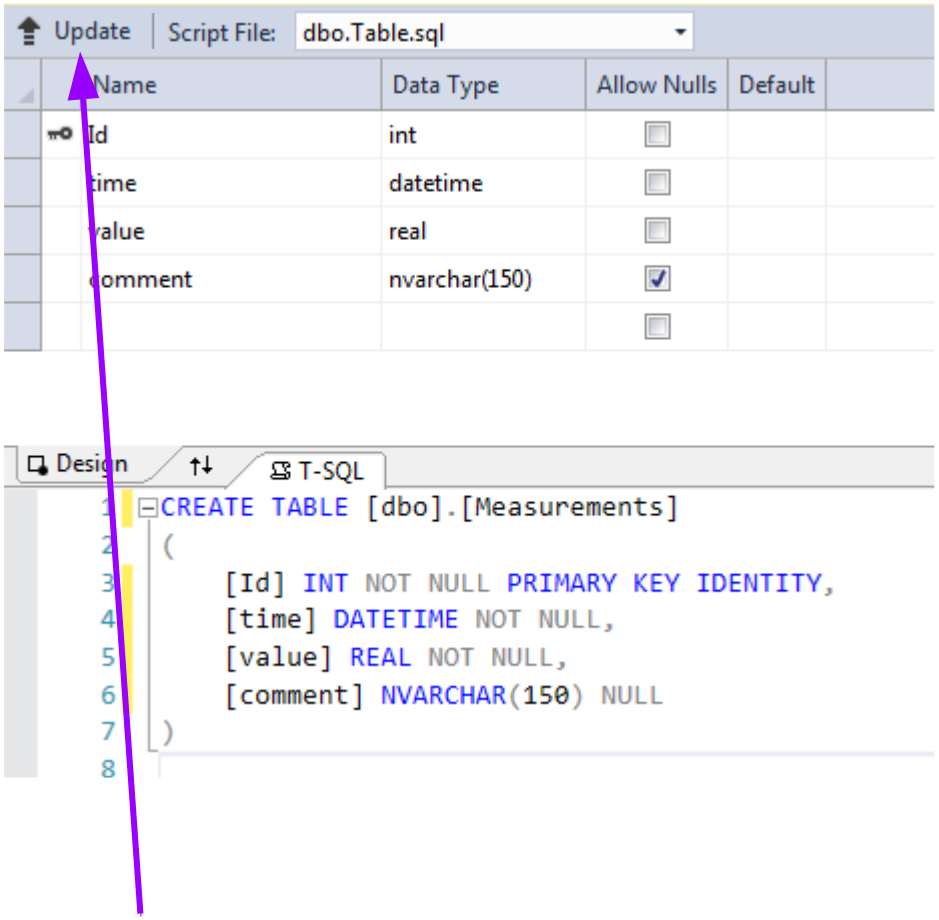


Create table

Create Table Phones with 4 columns:
- id (int)
- Name (nvarchar(50))
- Surname (nvarchar(50))
- Number (nchar(15))

Id is the Primary Key, should also be **identity** (check Column Properties)



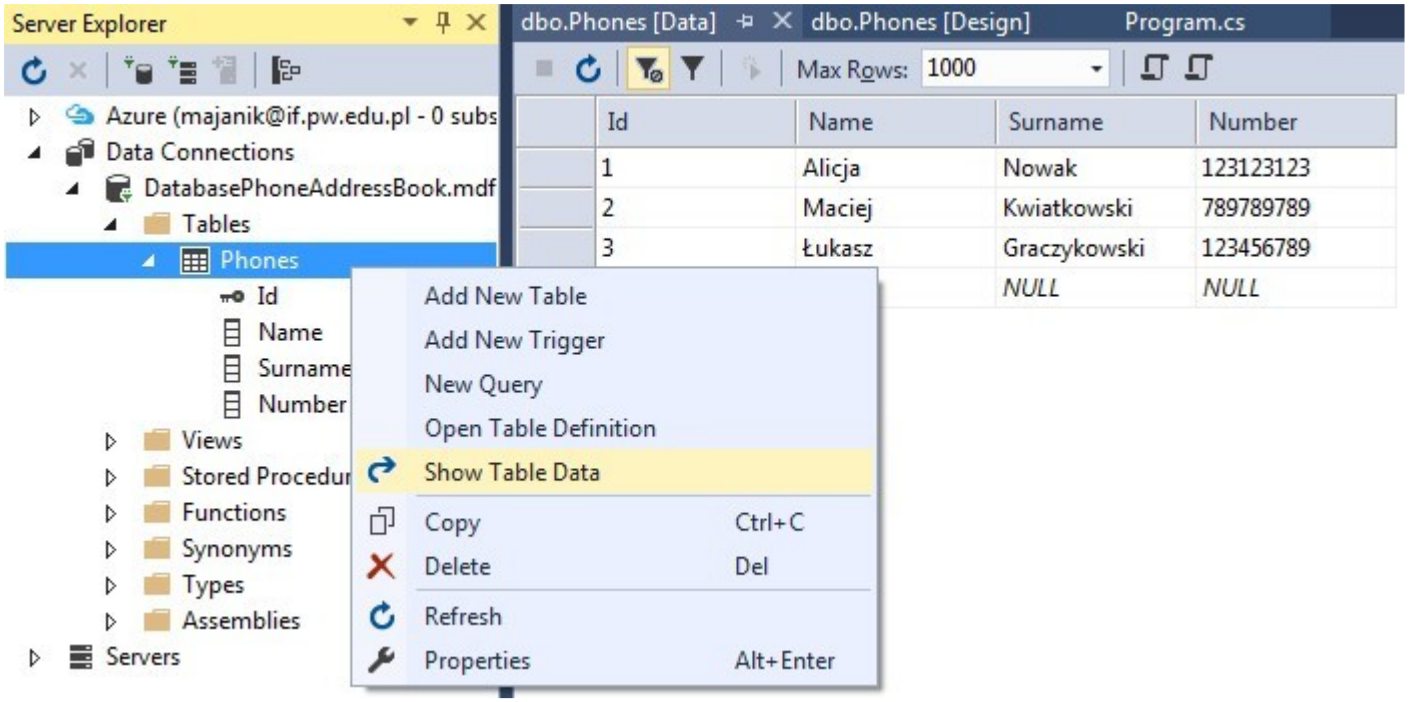


Click „Update" when finished!
→ Update database

\+ refresh the Tables folder in the Server Explorer

Add data to database

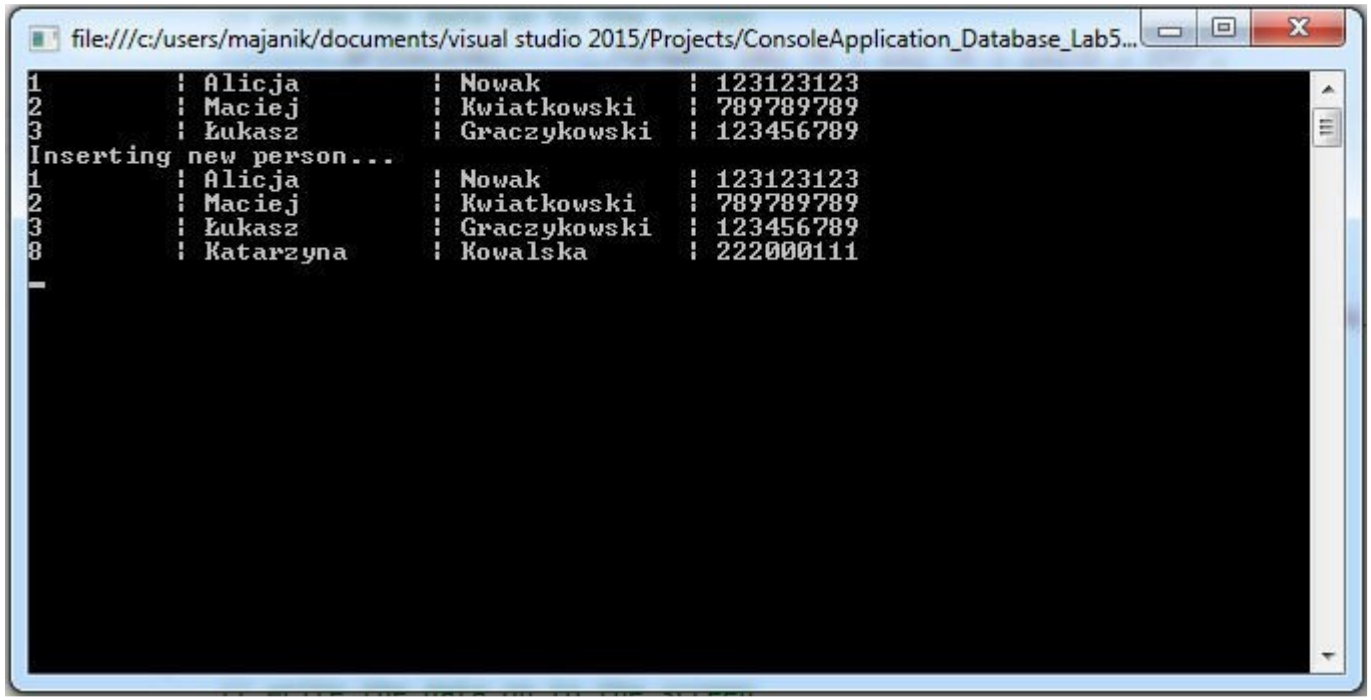
- Click on this newly create table
  - Show Table Data
    - Add three example entries



Show table
(Console Application)

Task: Console Application

- Print content of the Phones Table into the Console
- Insert one new entry
- Print Phones table again



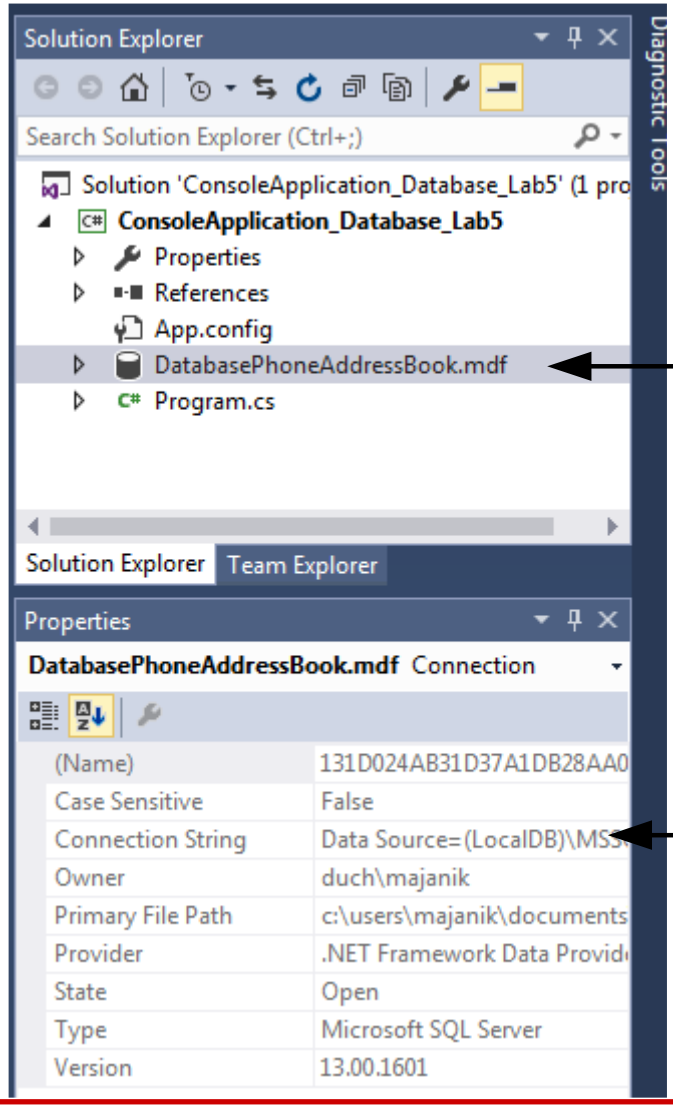
Steps to accomplish Task 1

1. Create connection string
   - Needed to connect your application to the database file
2. Establish connection
   - Create connection (using connection string)
   - Open connection
3. Prepare and execute commands (SQL statements)
4. Retrieve the data and print it on the screen
5. Remember to close connection! Or use “using” block

Connection string

Create connection string in the Main function. Copy the „Connection String” property from the database (delete all ” characters as well as duplicate \ , see example below).

```
 static void Main(string[] args)
{
      string connString = "Data
Source=(LocalDB)\\MSSQLLocalDB;AttachDbFilename=c:\\users\\maja
nik\\documents\\visual studio
2015\\Projects\\ConsoleApplication_Database_Lab5\\ConsoleApplic
ation_Database_Lab5\\DatabasePhoneAddressBook.mdf;Integrated
Security=True";
}
```



Click two times

Copy this text („Connection String” property)

Basic SQL Statements

SQL commands needed for this task:

- **SELECT** - used when you want to read (or select) your data.
  - `SELECT * from TableName`
  - `SELECT Column1, Column2 from TableName`

- **INSERT** - used when you want to add (or insert) new data.
  - `INSERT INTO TableName VALUES (Value1, Value2 );`

    ```
    INSERT INTO TableName(Column2,Column3) VALUES (
      Value1,Value2);
    ```

Connections, commands

- **Create connection:**

```
SqlConnection conn = new SqlConnection();
conn.ConnectionString = connString;
```

- **Open connection:**

```
conn.Open();
```

- **Create SQL command:**

```
SqlCommand command = new SqlCommand("SELECT * FROM Phones", conn);
```

Command *Connection*

```
SqlCommand command2 = new SqlCommand("INSERT INTO Phones(Name,Surname,Number)
VALUES ('Katarzyna','Kowalska', 222000111)", conn);
```

- **Execute command:**

```
command.ExecuteNonQuery();
```

Reading from SQL statements

- To read the data from the SQL statement we use the **SqlDataReader** avaliable for the SqlCommand which returns the Reader object for the data. You can use this to read through the data and for each of the column provide the results on the screen.

```
SqlDataReader reader =  command.ExecuteReader()
```

- **Create new SqlDataReader object and read data from the command:**

```
using (SqlDataReader reader = command.ExecuteReader())
{
// while there is another record present
    while (reader.Read())
    {
        // write the data on to the screen
         Console.WriteLine(String.Format("{0} \t | {1} \t | {2} \t | {3}",
         // call the objects from their index
        reader[0], reader[1], reader[2], reader[3]));
    }
}
```

Using block

In C# there are some objects which use the resources of the system. Which need to be removed, closed, flushed and disposed etc. In C# you can either write the code to Create a new instance to the resource, use it, close it, flush it, dispose it. **Or** you can simply just **use using statement block in which the object created is closed, flushed and disposed authomatically** and the resources are then allowed to be used again by other processes. This ensures that the framework would take the best measures for each process.

- Close & dispose

```
SqlConnection conn = new SqlConnection();
conn.ConnectionString ="connection_string";
conn.Open();
// use the connection here
conn.Close();
```

- Use „using” block

```
using(SqlConnection conn = new SqlConnection())
{
  conn.ConnectionString = "connection_string";
   conn.Open();
  // use the connection here
}
```

http://www.codeproject.com/Articles/823854/How-to-connect-SQL-Database-to-your-Csharp-program

SQL Server
+
Windows Forms

Create new Windows Forms project...

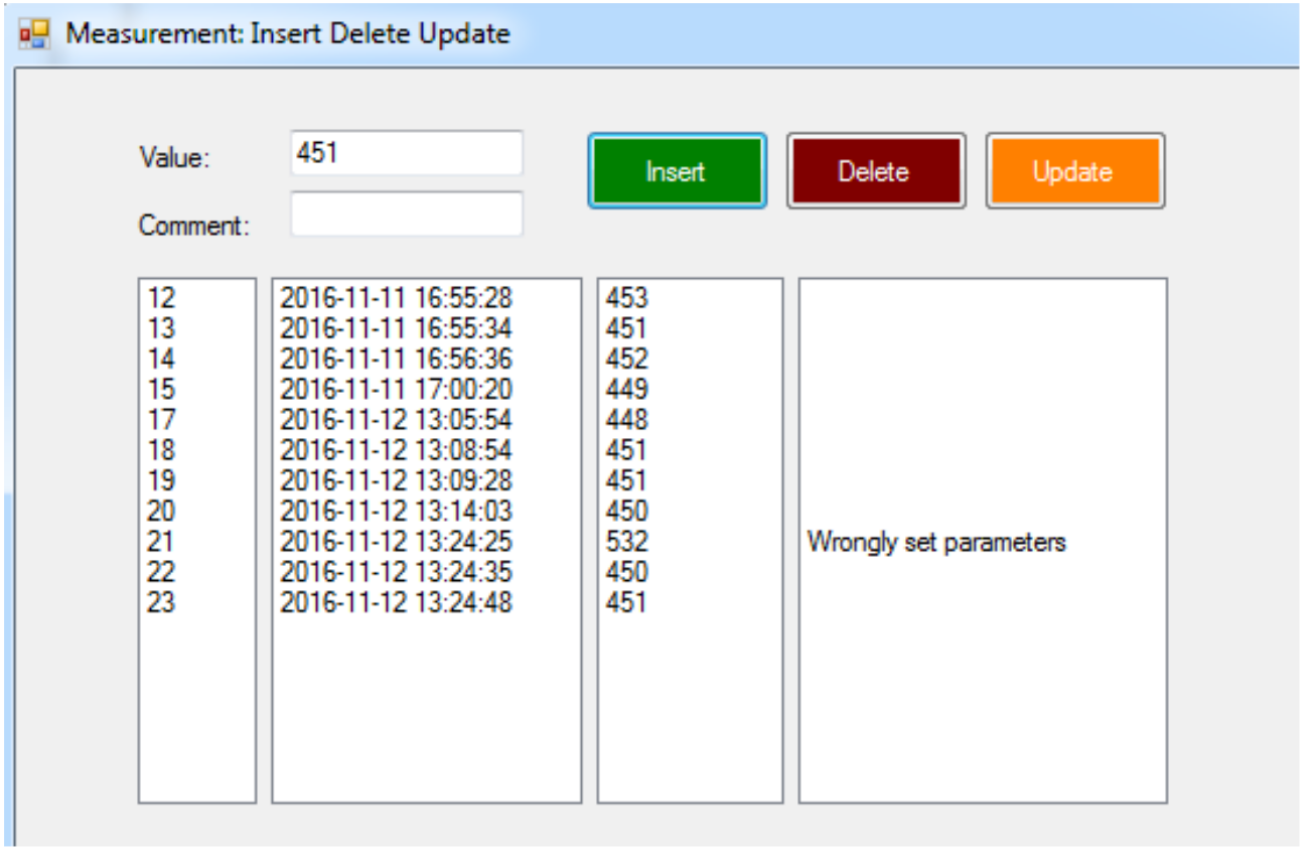
Task: database with Windows Forms

- Create application to manage measurements.

  Program should allow to:
  - Insert new measurement (value, comment)
  - Show measurements
  - Update row
  - Delete row

  + add GridView

  and bind it



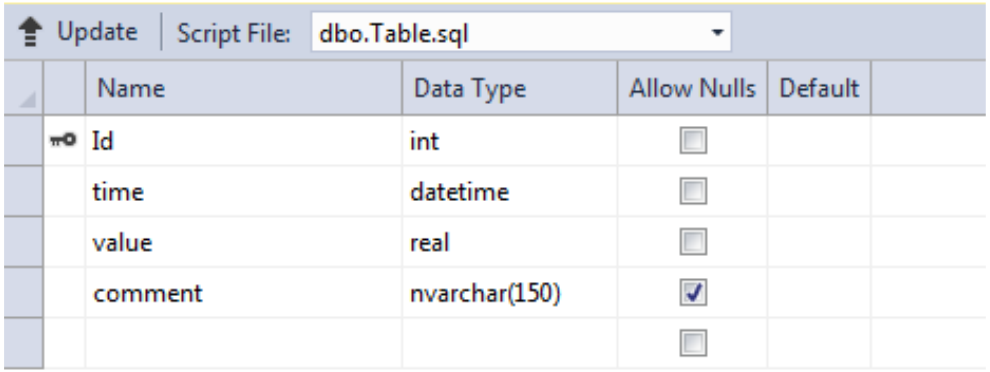
Steps to accomplish Task 2

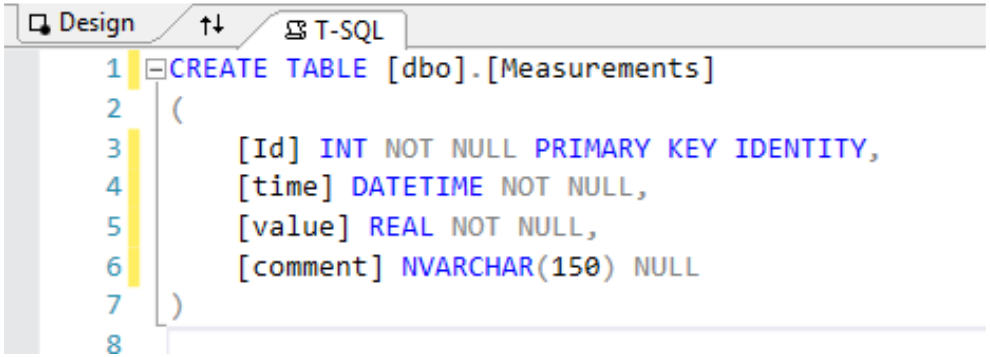
1. Create new database and table
2. Add all controls to the form
3. Program “insert” button
4. Program “update” and “delete” buttons
5. Play with “GridView” control

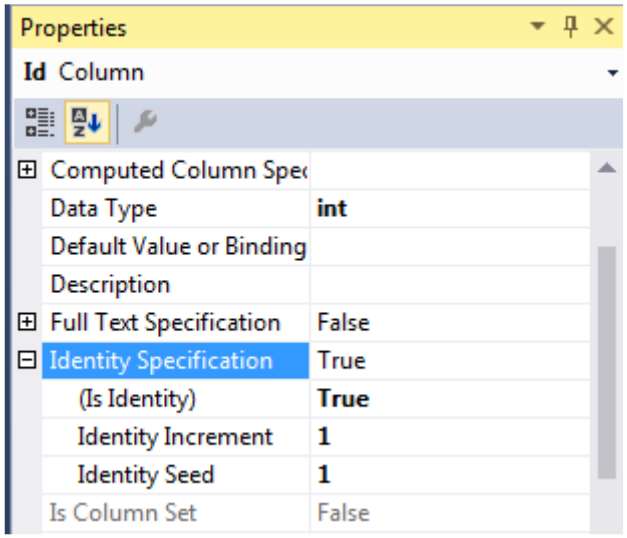
Prepare new database and table

Create Table Measurements with 4 columns:
- id (int)
- time (datetime)
- value (real)
- comment (nvarchar(150))

Only „comment” can be NULL.
Id is the Primary Key, should also be **identity** (check Column Properties)



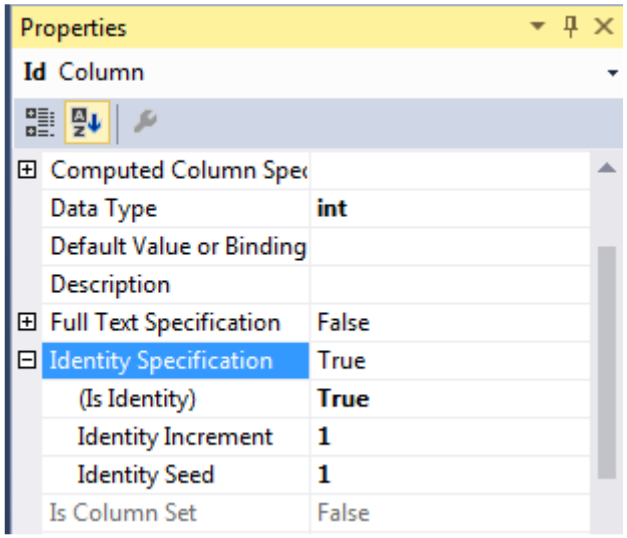


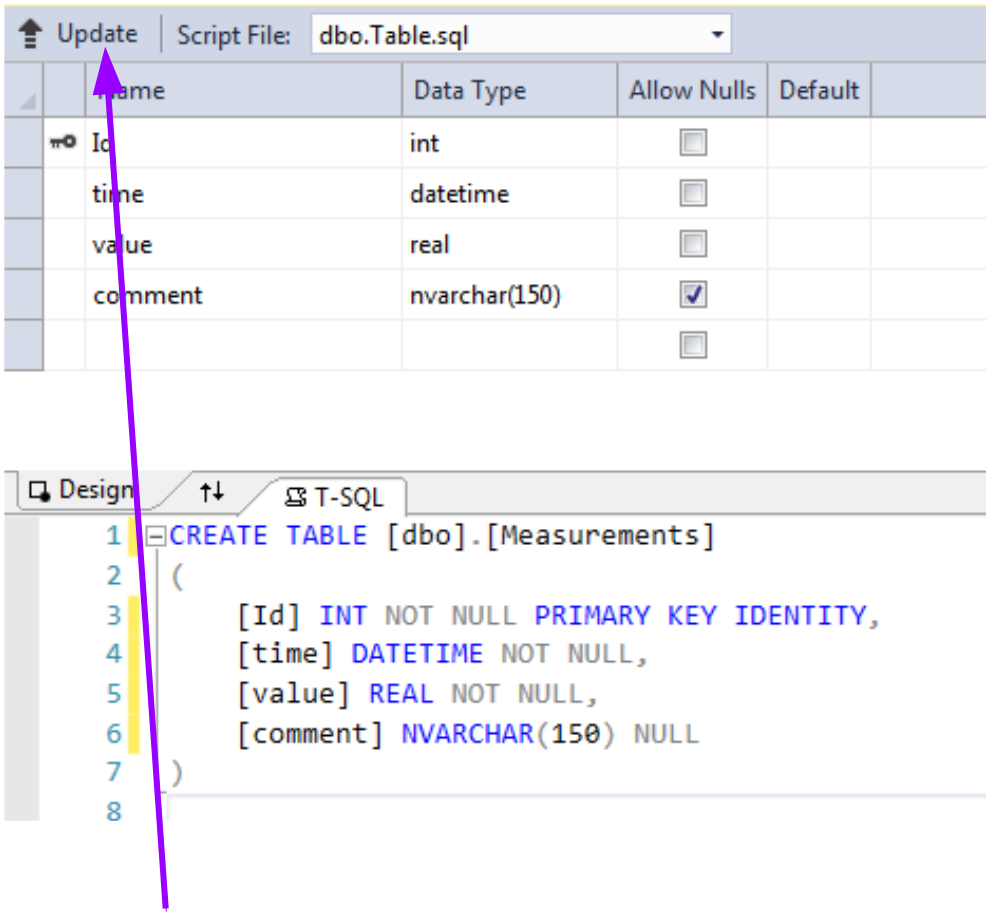


Prepare new database and table

Create Table Measurements with 4 columns:
- id (int)
- time (datetime)
- value (real)
- comment (nvarchar(150))

Only „comment” can be NULL.
Id is the Primary Key, should also be **identity** (check Column Properties)



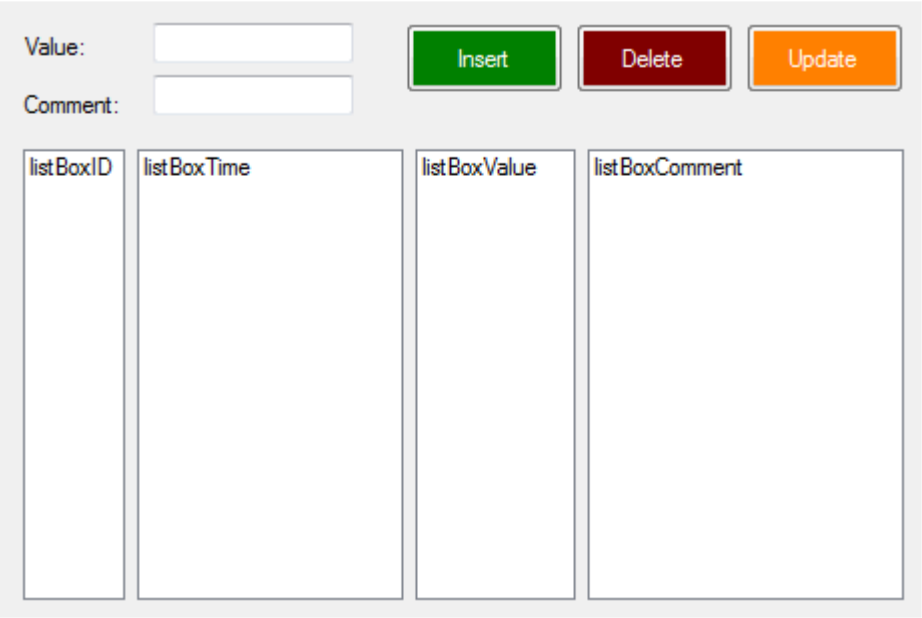


REMEMBER TO
Click „Update” when finished!
→ Update database

Insert, Delete, Update

INSERT button

- Add 2 TextBox'es
- Add 3 Buttons
- Add 4 listBoxes



- We start with INSERT button. When this button is clicked, we want to add to the database the content of the TextBox fields:
  - value – obligatory,
  - comment – not obligatory

  together with current datetime.

INSERT button

- Good practice: use try-catch close

```
try{
      //All commands
}
catch (Exception ex)
{
   MessageBox.Show(ex.Message, "Error");
}
```

- Show results in the ListBoxes
  - create „`private void loadlist()`” function that performs this task
  - Execute SELECT command and use SqlDataReader
  - Add new items to the ListBoxes

```
listBoxID.Items.Add(datareader[0].ToString());
```

INSERT button

- Advanced SQL commands:

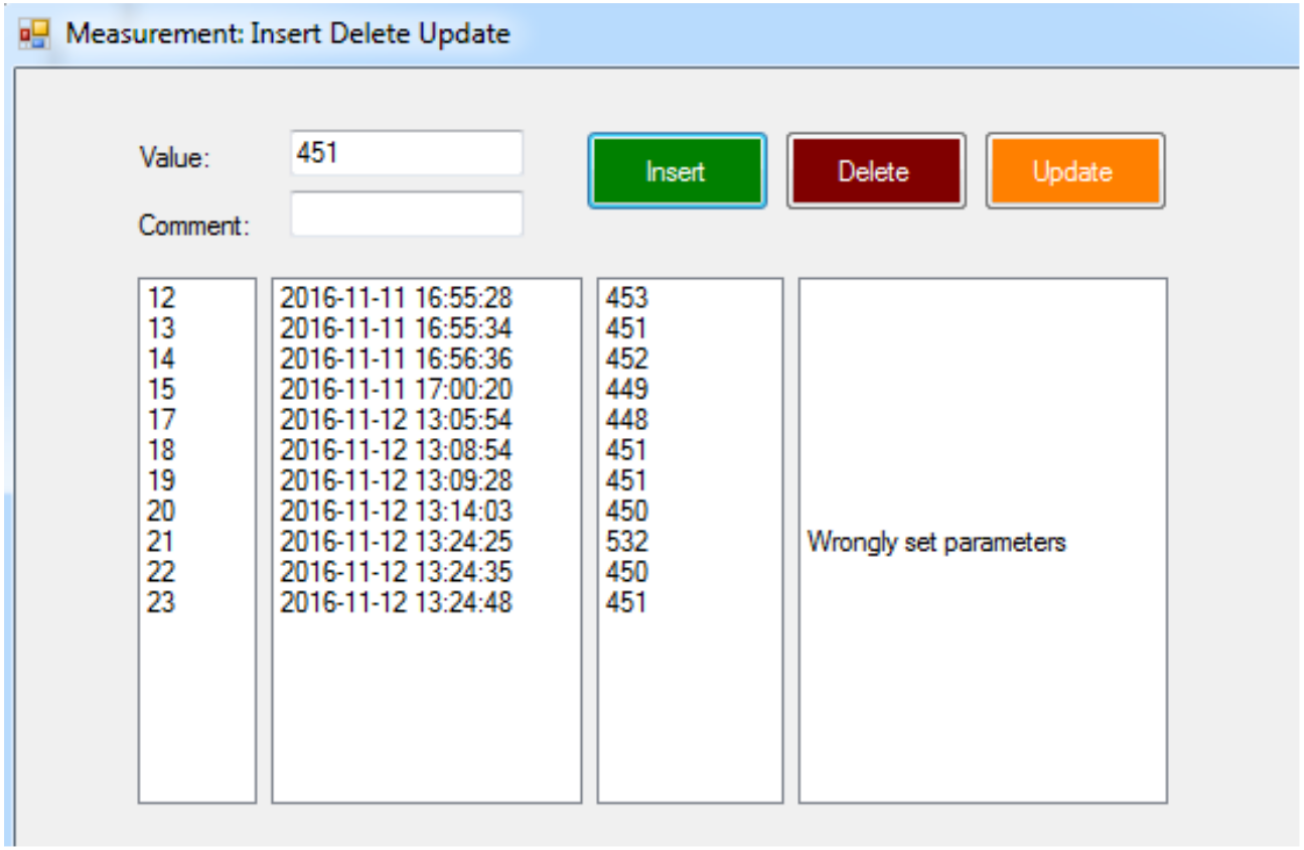
```
SqlCommand sqlCmd = new SqlCommand();

//set command text and parameters

sqlCmd.CommandText = "INSERT INTO TableName (value, comment, time)
VALUES (" + a + ", (@druga), (@time) )";

DateTime dateTimeVariable = DateTime.Now;

sqlCmd.Parameters.AddWithValue("@time", dateTimeVariable);

sqlCmd.Parameters.AddWithValue("@druga", "jakis tekst");

sqlCmd.Connection = sqlCon; //set connection

sqlCmd.ExecuteNonQuery(); //execute query
```

- In case of success:

```
MessageBox.Show("Saved succesfully");
```

INSERT button

Result:



DELETE button

- Delete button should delete measurement with **Id selected in the ListBoxId**
- The DELETE statement is used to delete records in a table.
  - DELETE FROM table_name WHERE some_column=some_value;
- Suggestions
  - Again „`sqlCmd.Parameters.AddWithValue`” will be useful to set „some_value”
  - Use **listBoxID.SelectedItem** to extract Id value

UPDATE button

- Update button should update measurement with **Id selected in the ListBoxId using values from the TextBoxes**
- The UPDATE statement is used to update existing records in a table.
  - UPDATE table_name
    SET column1=value1,column2=value2,...
    WHERE some_column=some_value;

Create Data Source & Connect to GridView

Bind Data to the Windows Forms DataGridView Control

The **Data Source Configuration Wizard** creates and edits data sources in your application. These data sources can be made from databases, services, or objects. They can also be bound to controls that display data. After you run the wizard, the data source is available in the Data Sources window. You can create data-bound controls by dragging the data source to a design surface.

Running the Wizard

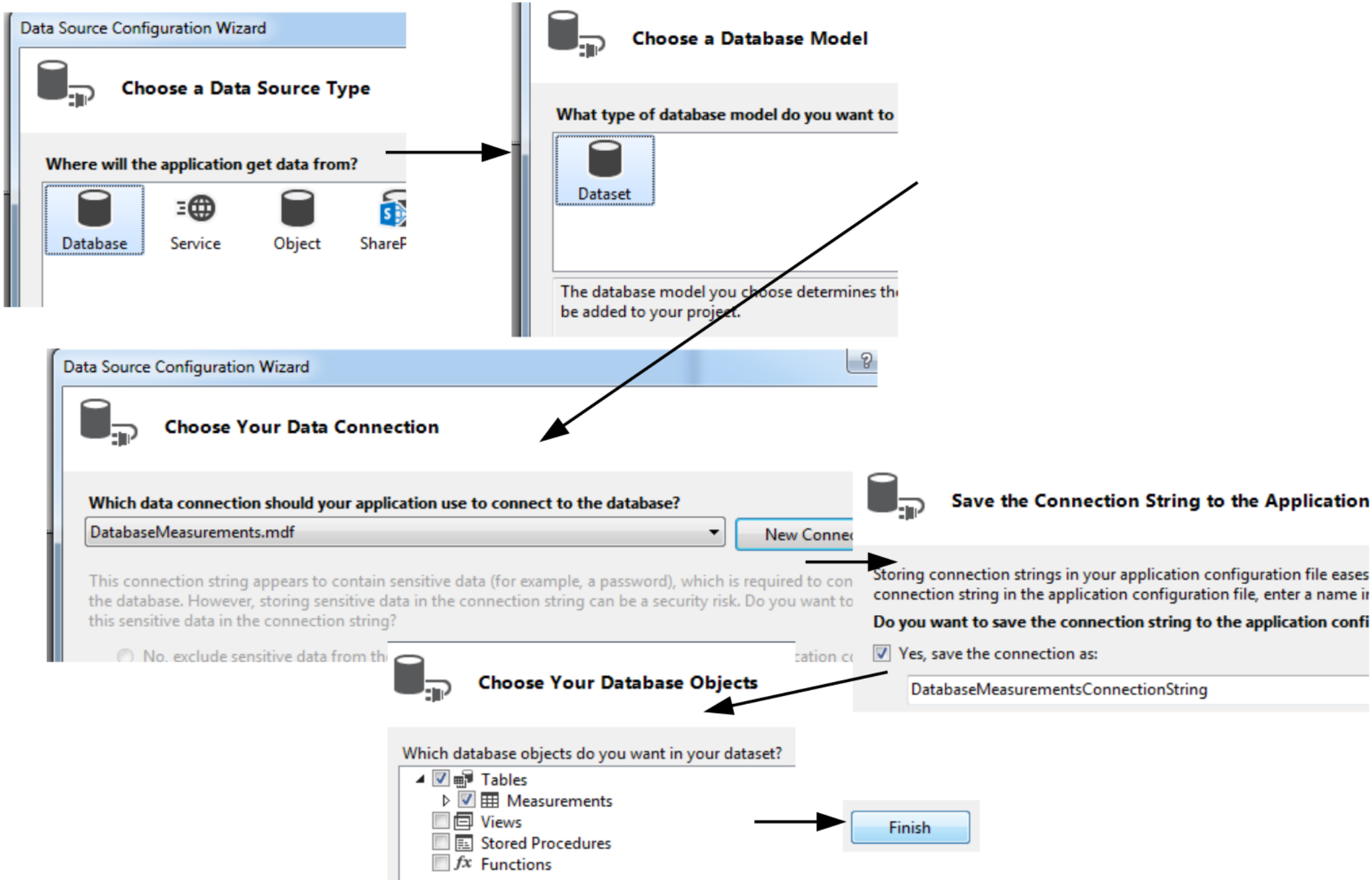
You can run the wizard in any one of the following ways:

- Choosing Add New Data Source from the Project menu.
- Choosing Add New Data Source from the Data Sources Window.
- Some bindable controls also provide a Add New Data Source command.

https://msdn.microsoft.com/en-us/library/w4dd7z6t(v=vs.110)

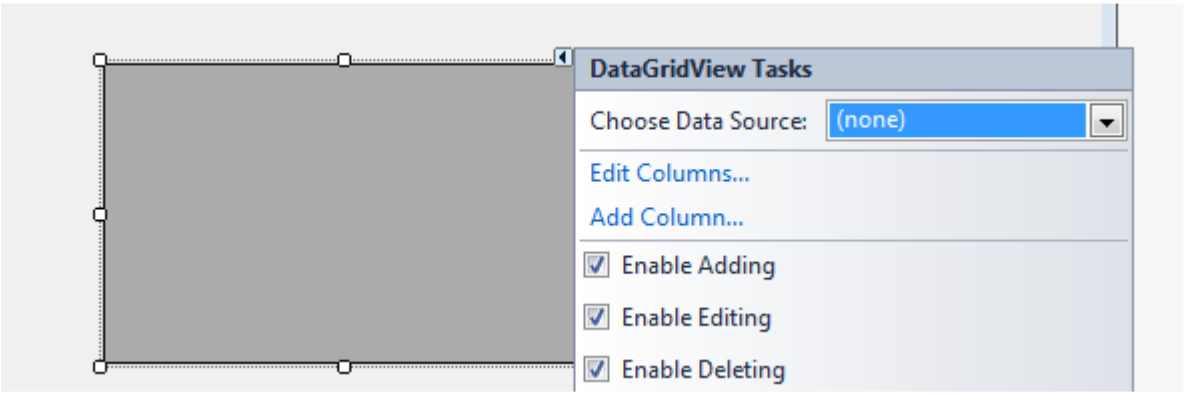
Task: add Project Data Source and follow the steps indicated by the wizard (see next slide).

Data Source Configuration Wizard

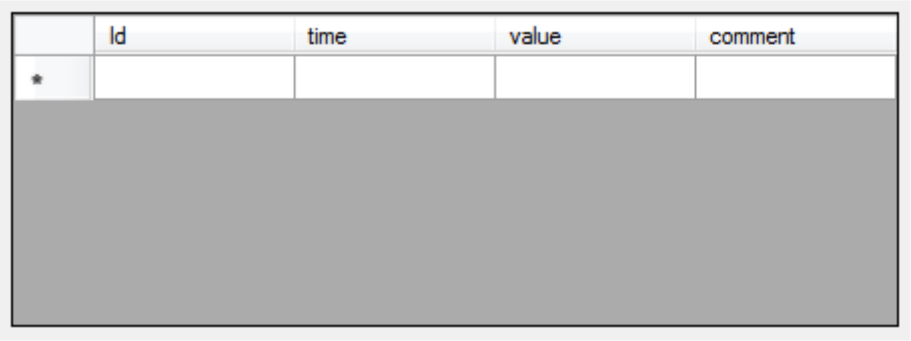


Data Source Configuration Wizard

- Toolbox → add DataGridView to the Form



- Bind to the Measurements table



More info: https://msdn.microsoft.com/library/33w255ac(v=vs.110)

THE END

dr inż. Małgorzata Janik

malgorzata.janik@pw.edu.pl

To update GridView

```
SqlCommand sqlCmd = new SqlCommand("select * from measurements", sqlCon);
        try{
              if (sqlCon.State == ConnectionState.Closed)
                  sqlCon.Open();

              SqlDataAdapter sda = new SqlDataAdapter();
              sda.SelectCommand = sqlCmd;
              DataTable dbdataset = new DataTable();
              sda.Fill(dbdataset);
              BindingSource bSource = new BindingSource();

              bSource.DataSource = dbdataset;
              dataGridView1.DataSource = dbdataset;
              sda.Update(dbdataset);
             }
       catch (Exception ex)
             {
              MessageBox.Show(ex.Message, "Error 2");
             }
       finally
             {
             sqlCon.Close();
             }
```

1.) Create a Binding Source
2.) Set the Datasource for this object to your Dataset Table
3.) Set The datasource for your DatagridView as the Binding source Object

Stored Procedures

```
CREATE PROCEDURE [dbo].[MeasurementAddOrEdit]
@mode nvarchar(10),
@Id int,
@time datetime,
@value real,
@comment nvarchar(150)

AS
if @mode='Add'
BEGIN
INSERT INTO Measurements (value, comment, time) VALUES
(@value,   @comment, @time)
END
RETURN 0
```