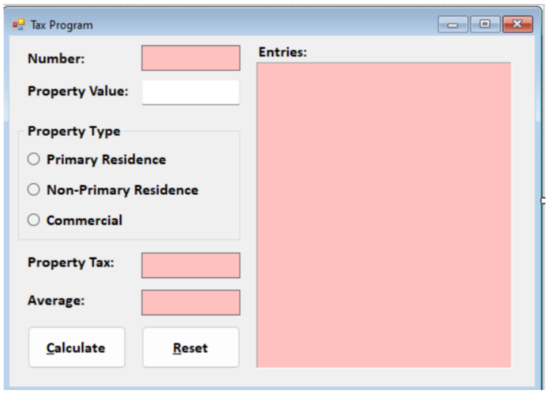
PROG1337A: Programming Fundamentals - Lab 4: Arrays

Due: see Brightspace **Marks: 35 (rubric)**

In this lab, you will practice data validation, if, switch, methods, arrays and loops. Create a program named **LastnameLab4** and create this form: (form seen in **Design** window)



1. **Form Design:**
   a. Form size is 570, 410 and the font used for the entire form is Calibri size 12 bold.
   b. All colored boxes on the form are labels for displaying information. Make them all the same color. The entries label has a font of Courier New, 10 bold for aligning text.
   c. The form centers when run and the tab order is textbox, radiobuttons, then buttons (top to bottom).

2. **Comments**: Comment header at top of the program (name, date, description). Comment all methods and events.

3. **Class-level Variables**: place the code below the comment header and outside of all events
   a. Create a class-level array **taxList** that will store the tax amount for a maximum of 5 properties.
   b. Create two class-level constants: **SIZE** initialized to 5 and **MYNAME** initialized to your name. Always use the constants within the program (never type 5 or your name).
   c. Create a class-level integer named **index** initialized to 0. This variable tracks the subscript position in the array.

   These are the only class-level variables allowed for this lab.

4. **Code requirements:**
   a. All formatting can be done using parameters in the **ToString** method.
   b. Repeated code must be in methods.
   c. Use **void methods** when possible.
   d. Two methods returning data. One **return** statement in each method only. **The data returned must be used.**
   e. One **switch**. Look for code that is comparing using equal to.
   f. One **TryParse** for data validation.
   g. **If else-if chain** in **Calculate**. Do not use **return** statements to stop code from executing.
   h. Always use **For** loops for traversing the array. If there are 3 entries, you only look at those 3 entries.

5. All message boxes have your name as the title.

6. All fixed values ($50,000, $1,500,000, 1.714%, 2.275%, 2.7518%) in the program must be declared as constants. These constants are NOT class-level, they are declared in the events/ methods that use them.

7. After the **Calculate** works properly with no errors, set the **Calculate** button to not be enabled (**Enabled** property). After a **Reset**, the **Calculate** must be enabled. This ensures that a **Reset** takes place after each **Calculate**.

8. Validate the number entered for property value in this order:
   a. It must be a double.
   b. It must be between $50,000 and $1,500,000.

   Give different messages if either causes an error. Display the valid range if the second error occurs.
   If an error occurs, use the method **SelectAll** on the textbox to select the entry. You must still move the cursor there.

9. The property tax amount is determined by the choices in **Property Type**. The percentages are:

Property Type	Percentage
Primary Residence	**1.714%**
Non-Primary Residence	**2.275%**
Commercial	**2.7518%**

10. The number shown at the top of the form signifies the transaction starting at 1 formatted as seen. **Do not put a 0 in front of the number use a format given with ToString.** Use the class-level variable **index** for this. Within the program the index must start at 0 (array) but for displays to the user, the index must start at 1. When a property tax gets calculated, display it in currency format on the form. Display the entry line as seen in the screen shots. Place the property tax calculated into the next element in the array. Calculate the average of all property taxes and display it in the bottom label.

11. After a valid calculation is done and the user hits **Reset**, the next number appears at the top and the cursor will be in the textbox. See screenshots. Leave all entries as shown. After 5 entries have been made and **Reset** is chosen, inform the user the maximum entries have been made. Ask them if they want to restart with a message box having the buttons **Yes** and **No**. If the user selects **Yes**, clear out the array (set all elements to 0), clear out the entries and restart at index 0. If they say **No**, display a message that the form is closing and close the form.
    Syntax when capturing a return value from a MessageBox: (***buttons*** and ***icon*** are selected by you)

```
DialogResult selection = MessageBox.Show(message, title, MessageBoxButtons.buttons, MessageBoxIcon.icon);
if (selection == DialogResult.Yes)  or (selection == DialogResult.No)
```

12. Something for you to try after everything works → Change the class-level **SIZE** to 8. Run the program and 8 entries should always be allowed. If not, find the problem in the code and fix it. Submit with **SIZE** set to 5.

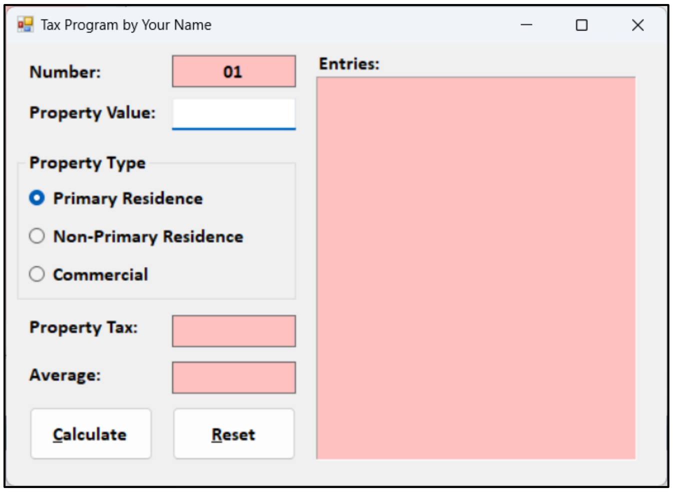
Submission Requirements:
Open the Word document named Memo included in the dropbox for this lab. Save it on your computer named **LastnameLab4** with the following in this order:

- **Memo**: fill in the memo with your name and lab number. In proper sentences formatted in paragraphs, explain the issues you encountered while completing the lab, how you resolved them and the approximate amount of time it took to complete.

Brightspace: Submit 2 files for marking:

✓ **LastnameLab4.docx** (file created above. Includes the memo and all code.)
✓ **Zip of entire program: LastnameLab4.zip:** Right-click on the top folder.

Screenshots: **Form Load**
(Same display after 5 entries and select Yes)



Tax Program by Your Name

Number: 01

Property Value:

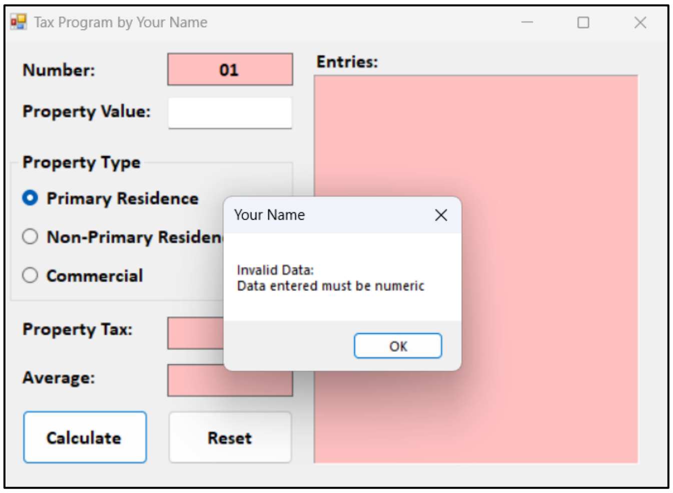
Property Type
● Primary Residence
○ Non-Primary Residence
○ Commercial

Property Tax:

Average:

Entries:

Select Calculate: empty textbox



Tax Program by Your Name

Number: 01

Property Value:

Property Type
● Primary Residence
○ Non-Primary Residen
○ Commercial

Property Tax:

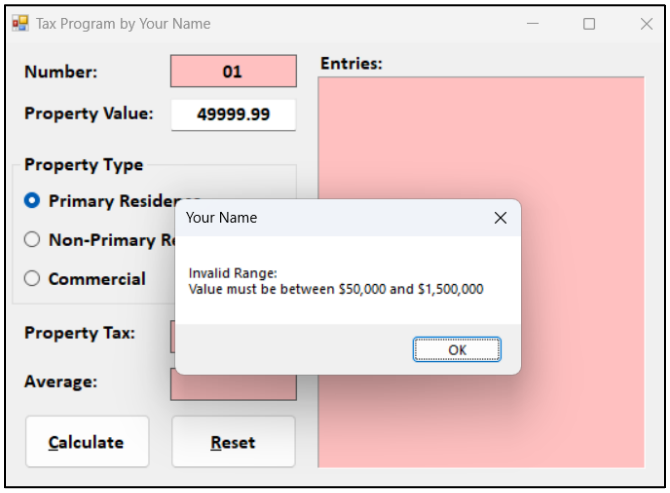
Average:

Entries:

Your Name

Invalid Data:
Data entered must be numeric

Enter **49999.99** and select **Calculate**



Tax Program by Your Name

Number: 01

Property Value: 49999.99

Property Type
● Primary Resider
○ Non-Primary R
○ Commercial

Property Tax:

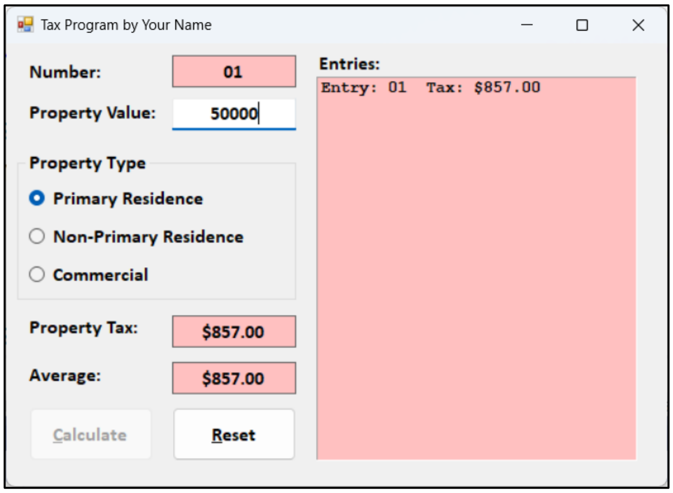
Average:

Entries:

Your Name

Invalid Range:
Value must be between $50,000 and $1,500,000

Enter **50000** and **Calculate (Primary)**
Note: changes after **Calculate** works



Tax Program by Your Name

Number: 01

Property Value: 50000

Property Type
● Primary Residence
○ Non-Primary Residence
○ Commercial

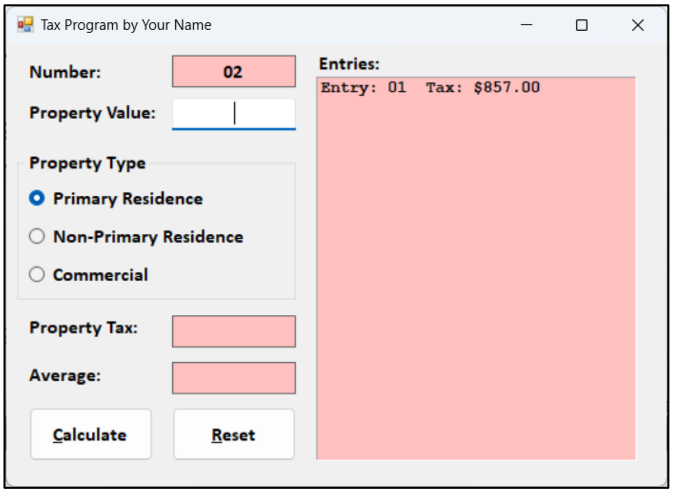
Property Tax: $857.00

Average: $857.00

Entries:

```
Entry: 01   Tax: $857.00
```

Select **Reset**
Note: changes after **Reset** runs



Tax Program by Your Name

Number: 02

Property Value:

Property Type
● Primary Residence
○ Non-Primary Residence
○ Commercial

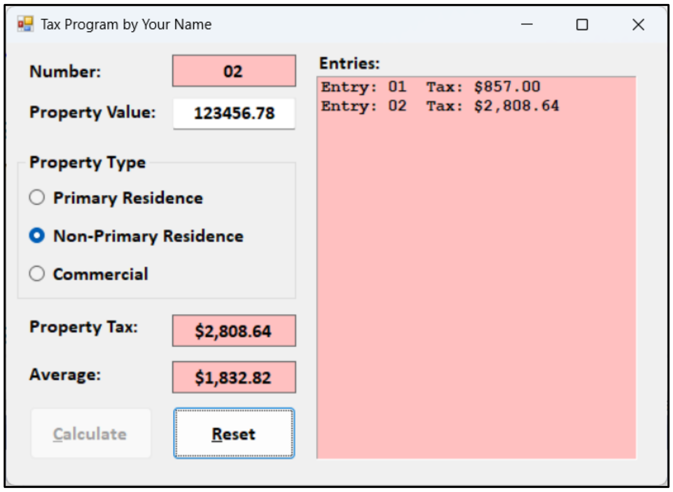
Property Tax:

Average:

Entries:

```
Entry: 01   Tax: $857.00
```

Enter **123456.78** and **Calculate (Non-Primary)**



Tax Program by Your Name

Number: 02

Property Value: 123456.78

Property Type
○ Primary Residence
● Non-Primary Residence
○ Commercial

Property Tax: $2,808.64

Average: $1,832.82

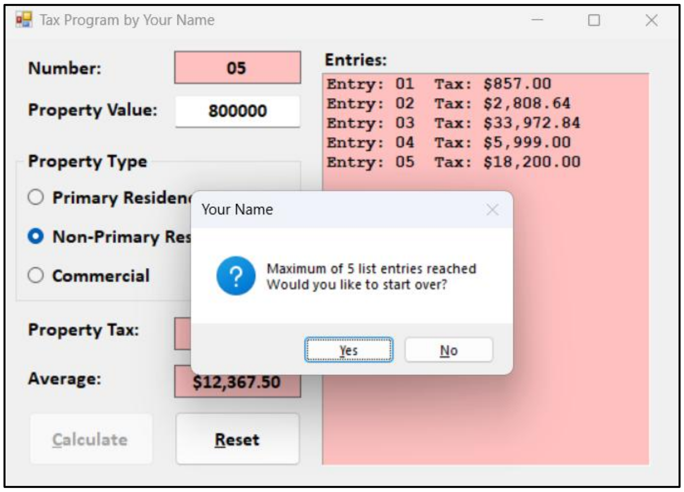
Entries:

```
Entry: 01   Tax: $857.00
Entry: 02   Tax: $2,808.64
```

The next entries for this example:

Choose	Enter	Property Tax	Average
Reset	Number: 03 Property Value: 1,234,567.89 Property Type: Commercial	$33,972.84	$12,546.16
Reset	Number: 04 Property Value: 350,000 Property Type: Primary Residence	$5,999.00	$10,909.37
Reset	Number: 05 Property Value: 800,000 Property Type: Non-primary Residence	$18,200.00	$12,367.50
Reset	After 5, see the message box below. Selecting Yes will return to form load status. Selecting No will display message and close the form.		

Select **Reset** after 5 entries


Tax Program by Your Name

Number: 05

Property Value: 800000

Property Type

○ Primary Residen

● Non-Primary Res

○ Commercial

Property Tax:

Average: $12,367.50

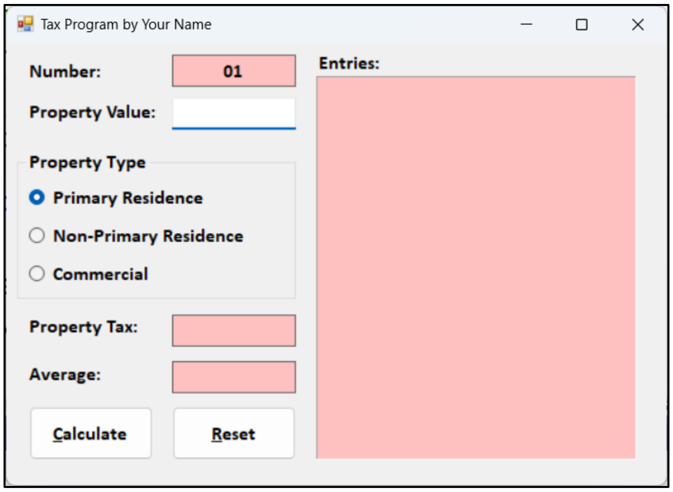
Entries:

```
Entry: 01  Tax: $857.00
Entry: 02  Tax: $2,808.64
Entry: 03  Tax: $33,972.84
Entry: 04  Tax: $5,999.00
Entry: 05  Tax: $18,200.00
```

Your Name

Maximum of 5 list entries reached
Would you like to start over?

Select **Yes** from Message box


Tax Program by Your Name

Number: 01

Property Value:

Property Type

● Primary Residence

○ Non-Primary Residence

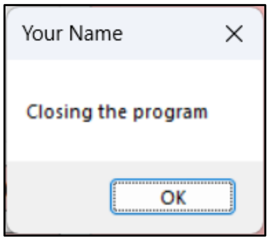
○ Commercial

Property Tax:

Average:

Entries:

Select **No** from Message box


Your Name

Closing the program