This sheet is to be returned at the conclusion of the lab session.

Student Name:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯   Student Number:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

ENG 1D04, Lab 9, Marked Assignment 4, Files, Thursday

This assignment has to be submitted via ELM before 2:10 pm. **Assignments will not be accepted after this time.** Please remember to submit your work early and resubmit often. **You should not wait until the end of the lab to start submitting.** You must do the assignment on your own. Conversations between students will not be permitted. You cannot bring reference material into the lab or access information through the Internet. You may use the Visual C# help, Notepad, and the Calculator program.

Overview

Your program will read a data file of numbers into an array, perform a calculation on the array, and then output the result of the calculation. Design, implement, and test the application described in the requirements below. A sample data file named `data.txt` is attached to this assignment on ELM. Name the application

> *MacID_StudentNumber_LabSection_*`Lab9`

where *MacID*, *StudentNumber*, and *LabSection* are your MacID, student number, and lab section (written as L*xy*), respectively. When done, compress the project and similarly name the zip file

> *MacID_StudentNumber_LabSection_*`Lab9.zip`

Details of what you must submit are specified below.

Requirements

1. A graphical user interface (GUI) consisting of a form with the controls described below. The text `Data Analysis Program` is at the top of the form. (The placement of the controls is your decision.)

2. One input label box with the label `Input File Name`, followed by a text box to accept the name of the input file, followed by an associated `Browse` button that opens an Open File Dialog box to help find a file name. When the application starts, the input text box is empty.

3. An output label box with label `Result` to show the result of performing a calculation on the data in the input file.

4. A `Read Input File` button that when clicked (1) reads the data in the file with the name of the input box into an array named `data_array` of type `double [ ]` and (2) displays the data in `data_array` in a message box with one value per line.

5. A `Calculate` button that when clicked replaces the label `Result` by `The Span of the Values of the Data = X` where `X` is the value of

> $max - min,$

`max` is the maximum value of the data in `data_array`, and `min` is the minimum value of the data in `data_array`.

6. A `Clear` button that when clicked causes the input text box to be cleared of its value and restores the output label box back to the original value of `Result`.

Design

In your project folder include a separate text document (using Notepad) with the file name *Name_LabNumber*`Lab9.txt` where *Name* is your name and *LabNumber* is your lab section. The report will answer two questions, one related to design and the other related to testing. The testing question is given below. The design question is:

> The implementation instructions below say that you may assume that the input files for your program hold no more than 1000 entries. How should this assumption be implemented so that it can be easily changed?

Implementation in Visual C#

Implement the requirements listed above. Your program should include the following methods:

- A method with the heading

  ```
  int readInput(string inputFileName, double [] a)
  ```

  that reads the contents of the input file into the array `a` and returns the number n of data entries in the input file.

- A method with the heading

  ```
  double calculate(int n, double [] a)
  ```

  that performs the calculation specified above on the first `n` values in `a`.

- A method with the heading

  ```
  void writeOutput(double result)
  ```

  that shows the value `result` in the output label as specified above.

You may assume that each input file will hold at least one and no more than 1000 entries and that there will be no errors in the format of the data.

Testing

In the *Name_LabNumber*`Lab9.txt` file, answer the following testing question:

> If your program fails on a test case, does it necessarily mean that the `calculate` method is incorrect? Explain your answer.