Object Oriented Programming Lab

Lab 02 **Marks 10**

Instructions

- Work in this lab individually.
- You can use your books, notes, handouts etc. but you are not allowed to borrow anything from your peer student.
- Make sure to follow the best coding practices.
- Include comments to explain the logic where necessary.
- Test your program thoroughly with various inputs to ensure proper functionality and error handling.
- Show your work to the instructor before leaving the lab to get some or full credit.

Data Operations Program

You are required to create a C++ program that reads data from the **"input.txt"** (provided with this lab) file and performs various operations on the data. The program should display a menu with different options, allowing the user to choose a specific operation such as displaying the original data, getting the minimum number, maximum number, sum of the data, average of the data and counting odd/even numbers. Your task is to implement the necessary functions to achieve this functionality.

Requirements:

1. Read Data from file:
- In the **main** function, read data from the **"input.txt"** file and store it in an array of integers. The file contains a series of 100 numeric values separated by newlines.

2. Create a function called **printMenu** that accepts an array of integers *(data read from **"input.txt"**)* and array's size as a parameter and displays the following menu options:

```
----- Data Operations Menu -----
0. Display Original Data
1. Get Minimum Number
2. Get Maximum Number
3. Get Sum of Data
4. Get Average of Data
5. Count Odd/Even Numbers
6. Exit
-----------------------------------------
```

Call this function in the **main** function, passing the array of integers with its size as an argument, to show the menu.

3. **Service Functions:** Implement the following service functions, each accepting an array of integers *(read from the **"input.txt"**)* and array's size as an argument:

- **printOriginalData:**
  Display the original data read from the file in a grid format, where each line contains 10 numbers separated by a tab.
- **getMinimumNumber:**
  Find and display the minimum number from the read data.
- **getMaximumNumber:**
  Find and display the maximum number from the read data.
- **getSumOfData:**
  Calculate and display the sum of all data.
- **getAverageOfData:**
  Calculate and display the average of all data.
- **countOddEvenNumbers:**
  Count and display the number of odd and even numbers in the data.

4. **Program Execution:**

- Read data from the **"input.txt"** file in the **main** function and make a call to **printMenu** function.
- Implement a loop inside **printMenu** that continues until the user chooses to exit (selects option 6).
- Inside the loop, display the menu, get the user's choice, and call the corresponding service function accordingly.

5. User Input and Error Handling:

- Implement error handling to ensure that the user enters valid value (0–6). If the input is not a valid number, display an error message and prompt the user to enter the value again.

6. Exiting the Program:

- When the user chooses to exit, display a farewell message, and terminate the program.

Sample Run:

```
==> Data Reading from input.txt Completed <==

----- Data Operations Menu -----
0. Display Original Data
1. Get Minimum Number
2. Get Maximum Number
3. Get Sum of Data
4. Get Average of Data
5. Count Odd/Even Numbers
6. Exit
----------------------------------------
Enter your choice (0-6): 0

The original data is:

93  46  95  39  52  77  60  64  46  21
27  10  90  58  19  18  42  77  26  34
80  92  47  89  89  0   3   95  47  68
73  18  77  18  67  89  93  19  1   42
7   65  21  87  27  20  2   94  49  36
38  8   71  54  51  80  55  59  79  83
26  68  91  26  14  1   27  46  47  58
88  11  34  50  70  24  10  17  51  35
44  50  44  11  13  48  89  75  6   84
70  54  51  79  18  42  45  5   85  94

----- Data Operations Menu -----
0. Display Original Data
1. Get Minimum Number
2. Get Maximum Number
3. Get Sum of Data
4. Get Average of Data
5. Count Odd/Even Numbers
6. Exit
----------------------------------------
Enter your choice (0-6): 0

Count of Odd Numbers:  53
Count of Even Numbers: 47

----- Data Operations Menu -----
0. Display Original Data
1. Get Minimum Number
2. Get Maximum Number
3. Get Sum of Data
4. Get Average of Data
5. Count Odd/Even Numbers
6. Exit
----------------------------------------
Enter your choice (0-6): 4

The average of numbers: 49.8

----- Data Operations Menu -----
0. Display Original Data
1. Get Minimum Number
2. Get Maximum Number
3. Get Sum of Data
4. Get Average of Data
5. Count Odd/Even Numbers
6. Exit
----------------------------------------
Enter your choice (0-6): 9

Invalid choice. Please enter a number between 0 and 6.

----- Data Operations Menu -----
0. Display Original Data
1. Get Minimum Number
2. Get Maximum Number
3. Get Sum of Data
4. Get Average of Data
5. Count Odd/Even Numbers
6. Exit
----------------------------------------
Enter your choice (0-6): 1

Minimum number: 0

----- Data Operations Menu -----
0. Display Original Data
1. Get Minimum Number
2. Get Maximum Number
3. Get Sum of Data
4. Get Average of Data
5. Count Odd/Even Numbers
6. Exit
----------------------------------------
Enter your choice (0-6): 3

The sum of data: 4980

----- Data Operations Menu -----
0. Display Original Data
1. Get Minimum Number
2. Get Maximum Number
3. Get Sum of Data
4. Get Average of Data
5. Count Odd/Even Numbers
6. Exit
----------------------------------------
Enter your choice (0-6): 6

Exiting the program. Goodbye!
```