Creative Software Design, Assignment 3-1

Deadline: 2024-09-24 23:59 (No score for late submission)

- Submit your homework by uploading your zip file to the LMS assignment section. Below is an example.

```
13178_Assignment1-1_2024123456.zip
    ├─ 1.cc
    ├─ 2.cc
    ├─ 3.cc
    └─ ...
```

- Your zip file name should follow this format:
  13178_Assignment[Assignment-number]_[Student-ID].zip
  - Ex. 13178_Assignment1-1_2024123456.zip
- Source files should be named as **<filename>.cc** *or* **<filename>.cpp**
- **You must submit your solution in the zip file before the deadline.**

1. Write a C++ program that calculates the maximum, minimum, and average of N integers. You need to take these N integers as inputs and dynamically allocate memory for an array to store the N integers.

   A. **Requirements**

      1) **Max Function**:
         - Create a function that finds the maximum value among the N integers.
         - The function should take two arguments:
            i. An `int*` array (`numBox`), which stores the N integers.
            ii. An `int*` pointer (`max`), where the maximum value will be stored
         - The function returns `void`.
      2) **Min Function**:
         - Create a function that finds the minimum value among the N integers.
         - The function should take two arguments:
            i. An `int*` array (`numBox`), which stores the N integers.
            ii. An `int*` pointer (`min`), where the minimum value will be stored.
         - The function returns `void`.
      3) **Average Function**:
         - Create a function that calculates the average of the N integers.
         - The function should take two arguments:
            i. An `int*` array (`numBox`), which stores the N integers.
            ii. A `double*` pointer (`ave`), where the average value will be stored.
         - The function returns `void`.
      4) Use the above functions in the main function to calculate and display the maximum, minimum, and average values. Do not use `std::cout` inside the three functions. The type of the average should be `double`, while the maximum and minimum should be of type `int`.
      5) Constraints:
         i. Range of N: No limit.
         ii. Ensure there are no memory leaks.
         iii. Do **not** use `malloc` or `free`.

B. You need to create three functions in total:

i. `max` function

ii. `min` function

iii. `average` function

C. Example output of your program (Bold text indicates user input):

```
5⏎
10 20 30 40 50⏎
Max: 50
Min: 10
Average: 30.000000
```

D. Submission file: one C++ source file (File name: 1.**cc** or 1.**cpp**)

2. Write a C++ program that implements a `mySwap` function that changes the value of two variables using both:

1. Pointers

2. References

A. Function Requirements:

i. Create a `mySwap` function using both pointers and references.

ii. You can use function overloading to achieve this.

```
void main(){
   // Write your code
   std::cout << "Before Swap - x: " << x << ", y: "  << y << std::endl;

   mySwap(x,y); // or mySwap(&x, &y)

   std::cout << "After Swap - x: " << x << ", y: "  << y << std::endl;
}
```

B. Example output of your program (Bold text indicates user input):

```
x: 5⏎
y: 10⏎
Before Swap - x: 5, y: 10
After Swap - x: 10, y: 5
```

C. Submission file: one C++ source file (File name: 2.**cc** or 2.**cpp**)

3. (Bonus) This is a modified version of Problem 1, where you must use only references without using pointers. Global variables are not allowed. Solving this problem correctly will earn you 20 extra points, which can help compensate for any points lost in the assignment (each homework is worth 100 points). However, you can still earn full credit on the homework without solving the bonus question.

   Tip. You can assume that N is a fixed constant instead of a user-provided value.

   A. Submission file: one C++ source file (File name: 3.**cc** or 3.**cpp**)