Sorting

Dr. Ramesh Ragala

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School of Computer Science and Engineering
In-LAB Exercises

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Course	:	**Data Structures and Algorithms**	Slot	:	**L51+L52**
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Practices Problems on Sorting

Bubble Sort:

1. The following table shows the marks obtained by student with their names in a course.

Table 1: Student Marks

S.No	StudentName	Mark
1	Bharat	25
2	Amar	35
3	Kush	31
4	Yash	41
5	Kumaran	39
6	Yajadeep	49
7	Ramesh	37
8	Umesh	30
9	Manuteja	28
10	Lahari	44

Your task is to rearrange the data (records) based on StudentName in alphabetical order using Bubblesort algorithm. And also return first record and last record in the sorted list.

Sample Input and Output:
Input:
10 → total number of records
Bharat 25
Amar 35
Kush 31
Yash 41
Kumaran 39
Yajadeep 49
Ramesh 37
Umesh 30
Manuteja 28
Lahari 44 → StudentName and Mark
Output:
Amar 35
Bharat 25
Kumaran 39
Kush 31
Lahari 44
Manuteja 28
Ramesh 37
Umesh 30
Yajadeep 49
Yash 41
Amar 35
Yash 41

2. Your task is to rearrange the data given in Table - 1 based on the Mark obtained by the students in ascending order using bubble sort. You need to return records which has maximum and minimum marks obtained by the students in sorted list.
Sample Input and Output:
Input:
10 → total number of records
Bharat 25
Amar 35
Kush 31
Yash 41

Kumaran 39
Yajadeep 49
Ramesh 37
Umesh 30
Manuteja 28
Lahari 44 → StudentName and Mark
Output:
Bharat 25
Manuteja 28
Umesh 30
Kush 31
Amar 35
Ramesh 37
Kumaran 39
Yash 41
Lahari 44
Yajadeep 49
Bharat 25
Yajadeep 49

3. Your task is to rearrange the data given in Table - 1 based on the Mark obtained by the studnets in ascending order using **modified bubble sort**. The procedure used in modified bubble sort is same as basic bubble sort algorithm. The modified bubble sort considers (n-i) elements in i^{th} pass, as it already sorted the remaining i elements. you also needs to return the average mark obtained by the students in each passes of modified bubble sort.

4. Your task is to rearrange the data given in Table - 1 based on the Mark obtained by the students in descending order using bubble sort. You need to return total number of swap operations happend in each of the passes. And also return pass number which have used maximum number of swap operations. And also return the pass number which have used minimum number of swap operatins. And also returns the total number of swap operations occurred during the entire procedure of bubble sort.

5. Your task is to rearrange the data given in Table - 1 based on the Mark obtained by the students in descending order using bubble sort.

You need to return total number of comarisons happend in each of the passes. And also return pass number which have used maximum number of comparisons. And also return the pass number which have used minimum comparisons. And also returns the total number of comparisons occurred during the entire procedure of bubble sort and modified bubble sort which is discussed in 3^{rd} question.

6. Your task is to rearrange the data given in Table - 1 based on the Mark obtained by students in descending order using **better version of bubble sort**. A better version of bubble sort, similar to basic bubble sort. But it includes a flag that is set if an exchange is made after an entire pass over the list. If no exchange is made, then it should be clear that the list is already in order because no two elements need to be switched. In that case, the sort should end. Your also needs to return the total number of times the flag has changed from one state to other state.