Sorting: Bubble Sort

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Problem Submissions Leaderboard Discussions Editorial

Check out the resources on the page's right side to learn more about bubble sort. The video tutorial is by Gayle Laakmann McDowell, author of the best-selling interview book Cracking the Coding Interview.

Consider the following version of Bubble Sort:

```
for (int i = 0; i < n; i++) {
    // Track number of elements swapped during a single array traversal
    int numberOfSwaps = 0;

    for (int j = 0; j < n - 1; j++) {
        // Swap adjacent elements if they are in decreasing order
        if (a[j] > a[j + 1]) {
            swap(a[j], a[j + 1]);
            numberOfSwaps++;
        }
    }

    // If no elements were swapped during a traversal, array is sorted
    if (numberOfSwaps == 0) {
        break;
    }
}
```

Task

Given an n-element array, $A = a_0, a_1, \ldots, a_{n-1}$, of distinct elements, sort array A in ascending order using the *Bubble Sort* algorithm above. Once sorted, print the following three lines:

1. `Array is sorted in numSwaps swaps.`, where $numSwaps$ is the number of swaps that took place.
2. `First Element: firstElement`, where $firstElement$ is the *first* element in the sorted array.
3. `Last Element: lastElement`, where $lastElement$ is the *last* element in the sorted array.

Hint: To complete this challenge, you must add a variable that keeps a running tally of *all* swaps that occur during execution.

Input Format

The first line contains an integer, n, denoting the number of elements in array A.
The second line contains n space-separated integers describing the respective values of $a_0, a_1, \ldots, a_{n-1}$.

Constraints

- $2 \leq n \leq 600$
- $1 \leq a_i \leq 2 \times 10^6, \forall\, i \in [0,\ n-1]$

Output Format

You must print the following three lines of output:

1. `Array is sorted in numSwaps swaps.`, where $numSwaps$ is the number of swaps that took place.
2. `First Element: firstElement`, where $firstElement$ is the *first* element in the sorted array.
3. `Last Element: lastElement`, where $lastElement$ is the *last* element in the sorted array.

Sample Input 0

```
3
1 2 3
```

Sample Output 0

```
Array is sorted in 0 swaps.
First Element: 1
Last Element: 3
```

Explanation 0

The array is already sorted, so 0 swaps take place and we print the necessary three lines of output shown above.

Sample Input 1

```
3
3 2 1
```

Sample Output 1

```
Array is sorted in 3 swaps.
First Element: 1
Last Element: 3
```

Explanation 1

The array is *not sorted*, and its initial values are: $\{3, 2, 1\}$. The following 3 swaps take place:

1. $\{3, 2, 1\} \rightarrow \{2, 3, 1\}$
2. $\{2, 3, 1\} \rightarrow \{2, 1, 3\}$
3. $\{2, 1, 3\} \rightarrow \{1, 2, 3\}$

At this point the array is sorted and we print the necessary three lines of output shown above.

Submissions: 7306
Max Score: 30
Difficulty: Medium

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4:35

Bubble Sort

More

Current Buffer (saved locally, editable) C#

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Linq;
class Solution {

   public static int BubbleSort(int[] a)
        {
            int total_swaps = 0;
            int n = a.Length;

            for (int i = 0; i < n; i++)
            {
                // Track number of elements swapped during a single array traversal
                int numberOfSwaps = 0;
```

```
16
17                  for (int j = 0; j < n - 1; j++)
18                  {
19                      // Swap adjacent elements if they are in decreasing order
20                      if (a[j] > a[j + 1])
21                      {
22                          //swap(a[j], a[j + 1]);
23                          int temp = a[j];
24                          a[j] = a[j+1];
25                          a[j + 1] = temp;
26                          numberOfSwaps++;
27                          total_swaps++;
28                      }
29                  }
30
31                  // If no elements were swapped during a traversal, array is sorted
32                  if (numberOfSwaps == 0)
33                  {
34                      break;
35                  }
36              }
37              return total_swaps;
38          }
39
40
41          static void Main(string[] args)
42          {
43
44              //int[] a = { 3, 2, 1 };
45              //int[] a = { 6, 1, 5, 9, 4, 7, 3, 8,2 };
46              //BubbleSort(a);
47              //foreach (int elem in a)
48              //{
49              //    Console.Write(elem + " ");
50              //}
51
52              int n = Convert.ToInt32(Console.ReadLine());
53              string[] a_temp = Console.ReadLine().Split(' ');
54              int[] a = Array.ConvertAll(a_temp, e => int.Parse(e));
55
56              int total_swaps = BubbleSort(a);
57              Console.WriteLine("Array is sorted in {0} swaps.", total_swaps);
58              Console.WriteLine("First Element: {0}", a[0]);
59              Console.WriteLine("Last Element: {0}", a[a.Length - 1]);
60
61             // Console.ReadLine();
62          }
63      }
64
```

Line: 1 Col: 1

Upload Code as File Test against custom input Run Code Submit Code

Congrats, you solved this challenge!

✔ Test Case #0 ✔ Test Case #1 ✔ Test Case #2

Next Challenge