EX-1.8

Title :

Sort an array of integers using the bubble sort technique.

Aim:

To design and implement a Python program to sort an array using the bubble sort algorithm.

Procedure:

1. Read the input size n.
2. Read n integers into the array.
3. Perform bubble sort:
    - Repeatedly traverse the array, comparing adjacent elements.
    - Swap them if they are in the wrong order.
    - Repeat this until the array is sorted.
4. Print the sorted array after sorting.

Algorithm:

1. Start
2. Read size n and array `arr`.
3. For `i` from 0 to `n-1`:
    - For `j` from 0 to `n-i-2`:
        - If `arr[j] > arr[j+1]`, swap `arr[j]` and `arr[j+1]`.
4. Print the sorted array.
5. Stop

Input:

5

64 34 25 12 22

Output:

12 22 25 34 64

Program :

```
def bubbleSort(arr):
    n = len(arr)
    for i in range(n):
        for j in range(n - i - 1):
            if arr[j] > arr[j + 1]:
                arr[j], arr[j + 1] = arr[j + 1], arr[j]
n = int(input("Enter size of array: "))
arr = list(map(int, input("Enter array elements: ").split()))

bubbleSort(arr)
print("Sorted array:", ' '.join(map(str, arr)))
```

Performance Analysis:

Time Complexity: $O(n^2)$

Space Complexity: O(1)

program output:

```
File  Edit  Format  Run  Options  Window  Help
def bubble_sort(arr):
    n = len(arr)
    for i in range(n):
        swapped = False
        for j in range(n - i - 1):
            if arr[j] > arr[j + 1]:
                arr[j], arr[j + 1] = arr[j + 1], arr[j]
                swapped = True
        if not swapped:
            break
    return arr

nums = list(map(int, input("Enter numbers separated by spaces: ").split()))

sorted_nums = bubble_sort(nums)
print("Sorted array:", sorted_nums)
```

```
IDLE Shell 3.13.5
File  Edit  Shell  Debug  Options  Window  Help
Python 3.13.5 (main, Jun 25 2025, 18:55:22) [GCC 14.2.0] on linux
Enter "help" below or click "Help" above for more information.
>>>

======= RESTART: /home/cyberkalai/Documents/DAA experiments files/exp1.8 =======
Enter numbers separated by spaces: 64 34 25 12 22 11 90
Sorted array: [11, 12, 22, 25, 34, 64, 90]
>>>
Ln: 7  Col: 0
```

Result :

Thus the given program Bubble Sort is executed and got output successfully.