

Experiment No- 04 (Group B)

Title:- Python program to compute Selection Sort and Bubble sort algorithm

Objectives:- To understand the use of sorting using algorithm

Problem Statement:-

Write a Python program to store first year percentage of students in array. Write function for sorting array of floating point numbers in ascending order using

- a) Selection Sort
- b) Bubble sort and display top five scores.

Outcomes:- Result of applying Selection sort algorithm and Bubble sort algorithm

Software and Hardware requirements:-

1. **Operating system:** Linux- Ubuntu 16.04 to 17.10, or Windows 7 to 10,
2. **RAM-** 2GB RAM (4GB preferable)
3. You have to install **Python3** or higher version

Theory-

Selection Sort Algorithm (Ascending order)

- Step 1 – Set MIN to location 0
- Step 2 – Search the minimum element in the list
- Step 3 – Swap with value at location MIN
- Step 4 – Increment MIN to point to next element
- Step 5 – Repeat until list is sorted

Consider the following depicted array as an **example**.



For the first position in the sorted list, the whole list is scanned sequentially. The first position where 14 is stored presently, we search the whole list and find that 10 is the lowest value.



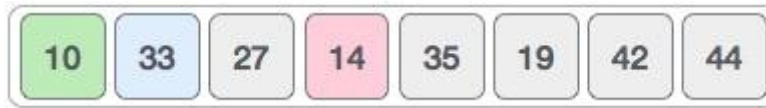
So we replace 14 with 10. After one iteration 10, which happens to be the minimum value in the list, appears in the first position of the sorted list.



For the second position, where 33 is residing, we start scanning the rest of the list in a linear manner.



We find that 14 is the second lowest value in the list and it should appear at the second place. We swap these values.

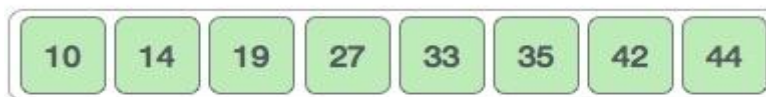
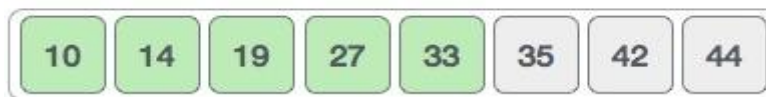
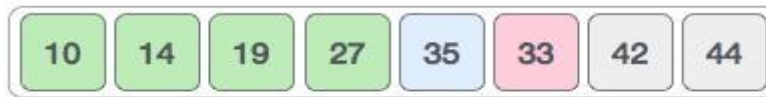
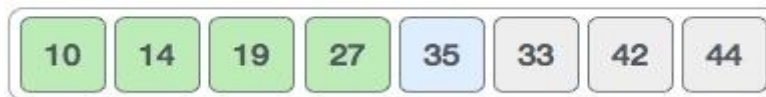
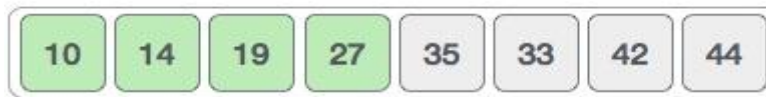


After two iterations, two least values are positioned at the beginning in a sorted manner.



The same process is applied to the rest of the items in the array.

Following is a pictorial depiction of the entire sorting process –



Bubble Sort Algorithm: (Ascending order)

Step 1. Read the total number of elements say n

Step 2. Store the element in array & set i=0

Step 3. compare the current element with next element of array

Step 4. If the current element is greater than the next element of the list swap them.

Step 5. If the Current element is less than the next element, move to the next element.

Repeat step 3 for n elements

Step 6. Increment value of i by 1 & Repeat step 34 for $i < n$

Step 7. Print the sorted array of elements

Step 8. Stop

Example. Bubble sort takes $O(n^2)$ time so we're keeping it short and precise.



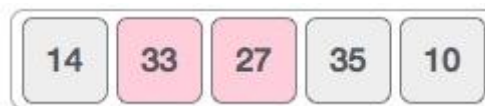
Bubble sort starts with very first two elements, comparing them to check which one is greater.



In this case, value 33 is greater than 14, so it is already in sorted locations. Next, we compare 33 with 27.



We find that 27 is smaller than 33 and these two values must be swapped.



The new array should look like this –



Next we compare 33 and 35. We find that both are in already sorted positions.



Then we move to the next two values, 35 and 10.



We know then that 10 is smaller 35. Hence they are not sorted.



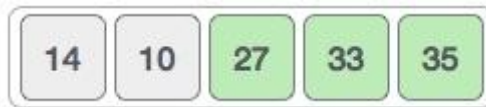
We swap these values. We find that we have reached the end of the array. After one iteration, the array should look like this –



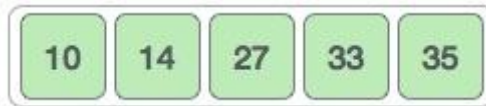
To be precise, we are now showing how an array should look like after each iteration. After the second iteration, it should look like this –



Notice that after each iteration, at least one value moves at the end.



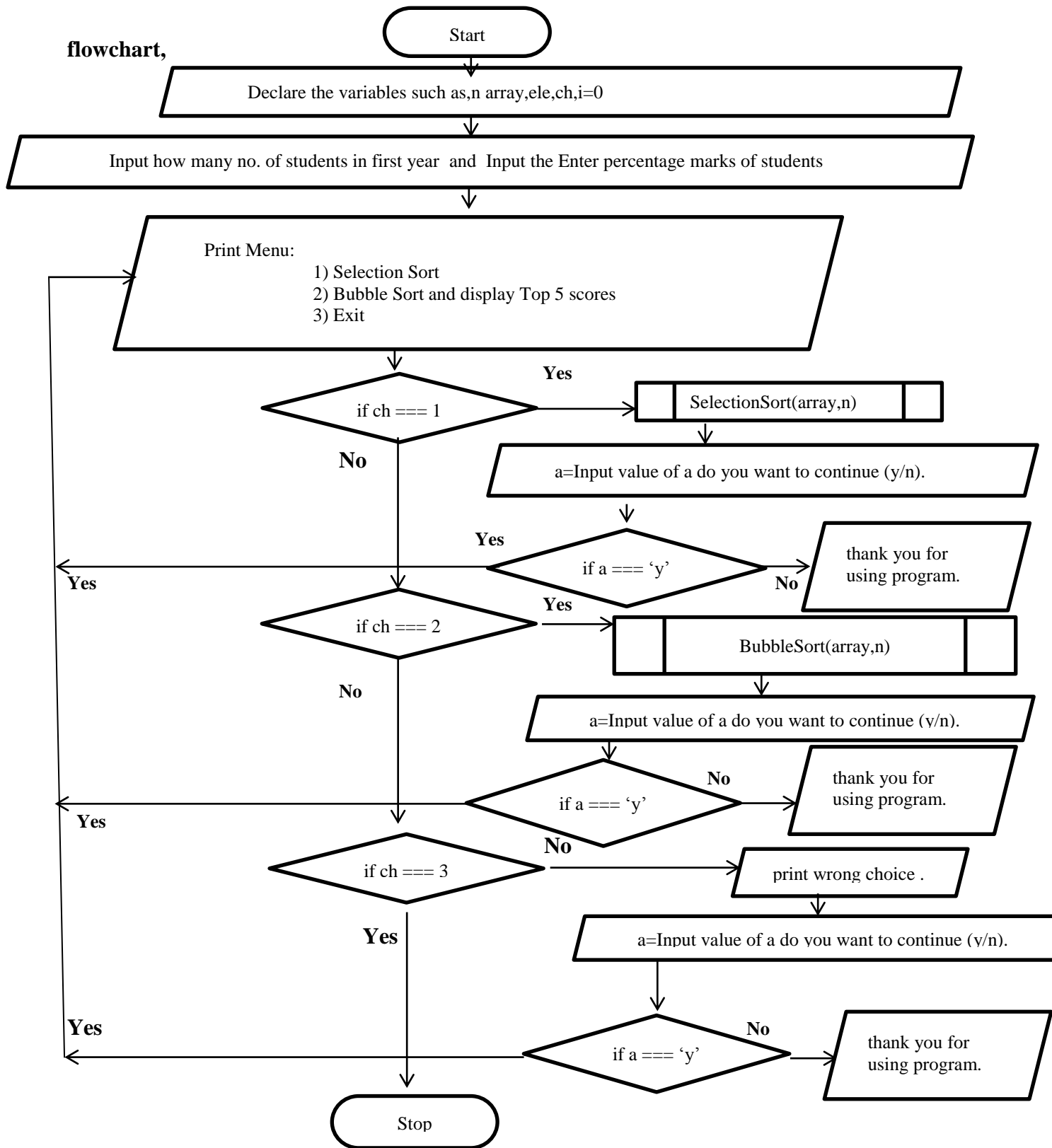
And when there's no swap required, bubble sorts learns that an array is completely sorted.



Algorithm:-

- 1) Start
- 2) Declare the variables such as, n array, ele, ch, i=0
- 3) Input how many no. of students in first year
- 4) Input the Enter percentage marks of students
- 5) Print Menu:
 - 1) Selection Sort
 - 2) Bubble Sort and display Top 5 scores
 - 3) Exitch= Input enter your choice
- 6) If ch==1 then call function SelectionSort(array,n)
a= input value of a Do you want to continue(y/n)
if a=="y" then go to step 5
else Thank you for using this program!
- 7) else if ch==2 then call function BubbleSort(array,n)
a= input value of a Do you want to continue(y/n)
if a=="y" then go to step 5
else Thank you for using this program!
- 8) else If ch==3 then go to step 9
else print wrong choice
a=input value of a Do you want to continue(y/n)
if a=="y" then go to step 5
else
Thank you for using this program!
- 9) Stop

flowchart,



Conclusion:

In this way, we perform Sorting of marks using Selection sort and Bubble sort algorithm.