

# Data Structure

## Practice Problems 3

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1. Consider the following unsorted array

7 3 4 2 9 21 15 23

- i) Apply Bubble sort algorithm which will start comparing from last index to sort the array.

Solution:

```
#include<stdio.h>
int main(){
int arr[]={7,3,4,2,9,21,15,23};
int n=sizeof(arr)/sizeof(arr[0]);
printf("Original array: 7,3,4,2,9,21,15,23 ");
printf("\n"); printf("\n");
for(int i=0;i<n-1;i++){ //Bubble Sort
for(int j=n-1;j>i;j--){
if(arr[j-1]>arr[j]){
int tmp=arr[j-1];
arr[j-1]=arr[j];
arr[j]=tmp;
}
}
printf("Array after implementing bubble sort:\n");
for(int i=0;i<n;i++){
printf("%d ",arr[i]);
}
printf("\n"); return 0; }
```

The screenshot shows a terminal window with the following output:

```
C:\Users\USER\Documents\d > Original array: 7,3,4,2,9,21,15,23
Array after implementing bubble sort:
2 3 4 7 9 15 21 23

Process returned 0 (0x0)  execution time : 0.031 s
Press any key to continue.
```

The terminal window has a dark background and light-colored text. It displays the original array [7, 3, 4, 2, 9, 21, 15, 23] and the sorted array [2, 3, 4, 7, 9, 15, 21, 23] separated by a header "Array after implementing bubble sort:". At the bottom, it shows the process returned 0 and the execution time was 0.031 seconds, with a prompt to press any key to continue.

ii) Apply Bubble sort algorithm which will start comparing from last index to sort the array. Apply Insertion sort algorithm which will start comparing from last index to sort the array.

iii) Insert 8 in the array in its sorted position.

[Hints: First, sort the array then insert 8 in the sorted position.]

solution:

```
#include<stdio.h>
int main(){
int arr[]={7,3,4,2,9,21,15,23};
printf("Original array:7,3,4,2,9,21,15,23 "); printf("\n");printf("\n");
int n=sizeof(arr)/sizeof(arr[0]);
for(int i=n-1;i>=0;i--){                                //Insertion Sort
int X=arr[i];
int j=i+1;
while(X>arr[j] && j<n){
arr[j-1]=arr[j];
arr[j]=X;
j=j+1;
}
printf("Array after implementing insertion sort:\n");
for(int i=0;i<n;i++){
printf("%d ",arr[i]);
}
printf("\n");printf("\n");
int X=8;                                         //sort the array then insert 8 in the sorted position
int x=n+1;
int arr1[x];
for(int i=0;i<n;i++){
arr1[i]=arr[i];
}
int a;
for(int i=0;i<x;i++){
if(arr1[i]==X){
continue;
}
if(X<arr1[i] && X>=arr1[i-1]){
a=i;
for(int j=n-1;j>=i;j--){
arr1[j+1]=arr1[j];
}
}
arr1[a]=X;
printf("Array after inserting %d:\n",X);
for(int i=0;i<x;i++){
printf("%d ",arr1[i]);
}
printf("\n"); return 0; }
```

```
C:\Users\USER\Documents\d
Original array:7,3,4,2,9,21,15,23
Array after implementing insertion sort:
2 3 4 7 9 15 21 23

Array after inserting 8:
2 3 4 7 8 9 15 21 23

Process returned 0 (0x0)  execution time : 0.020 s
Press any key to continue.
```