

AOA PRACTICAL LAB 1

Name: Brendan Lucas, Roll No:8953, Div: SE Comp B

Source Code:

```
#include <iostream>
#include <cstdlib>
using namespace std;

//int*/void bubblesort(int *arr,int n)
{
    // Declaring variables
    int j,i,temp;

    //First for loop
    for(i=0;i<n-1;i++)
    {
        //Second for loop
        for(j=0;j<n-i-1;j++)
        {
            //If current element is greater than the next element
            if(arr[j]>arr[j+1])
            {
                temp=arr[j];
                arr[j]=arr[j+1];
                arr[j+1]=temp;
            }
        }
    }

    // return arr;
}

int main(void)
{
    //Declaring variables
    int n,*arr,i;

    //Asking for No. of elements in array
    cout<<"Enter the no of elements in array:-\n";
    cin>>n;

    //Creating array of given size using malloc
    arr=(int*)malloc(sizeof(int)*n);

    //Taking input of elements of array
    cout<<"Enter the array\n";
    for(i=0;i<n;i++)
    {
        cin>>arr[i];
    }

    //Sorting the array
    bubblesort(arr, n);
    //selectionsort(arr, n);
    //quicksort(arr,0,n-1);

    //Displaying the final result
    cout<<"\nThe Sorted array is:- \n";
    for(i=0;i<n;i++)
    {
        cout<<arr[i]<<" ";
    }
    return 0;
}
```

Bubblesort Test

Time Complexity

Code:-

```

for (i=0; i<n; i++)
{
    for (j=0; j<n; j++)
    {
        if (a[j] > a[j+1])
        {
            temp = a[j];
            a[j] = a[j+1];
            a[j+1] = temp;
        }
    }
}

```

Analysis:-

$$\begin{aligned}
 f(n) &= \sum_{i=0}^{n-1} \sum_{j=0}^{n-1} 1 \\
 &= \sum_{i=0}^{n-1} (n-1) - 0 + 1 \\
 &= \sum_{i=0}^{n-1} (n) \\
 &= (n-1)(n) \\
 &= n^2 - n \dots \\
 &= O(n^2).
 \end{aligned}$$

∴ Time Complexity of bubblesort is $O(n)$ in all cases.