Program :

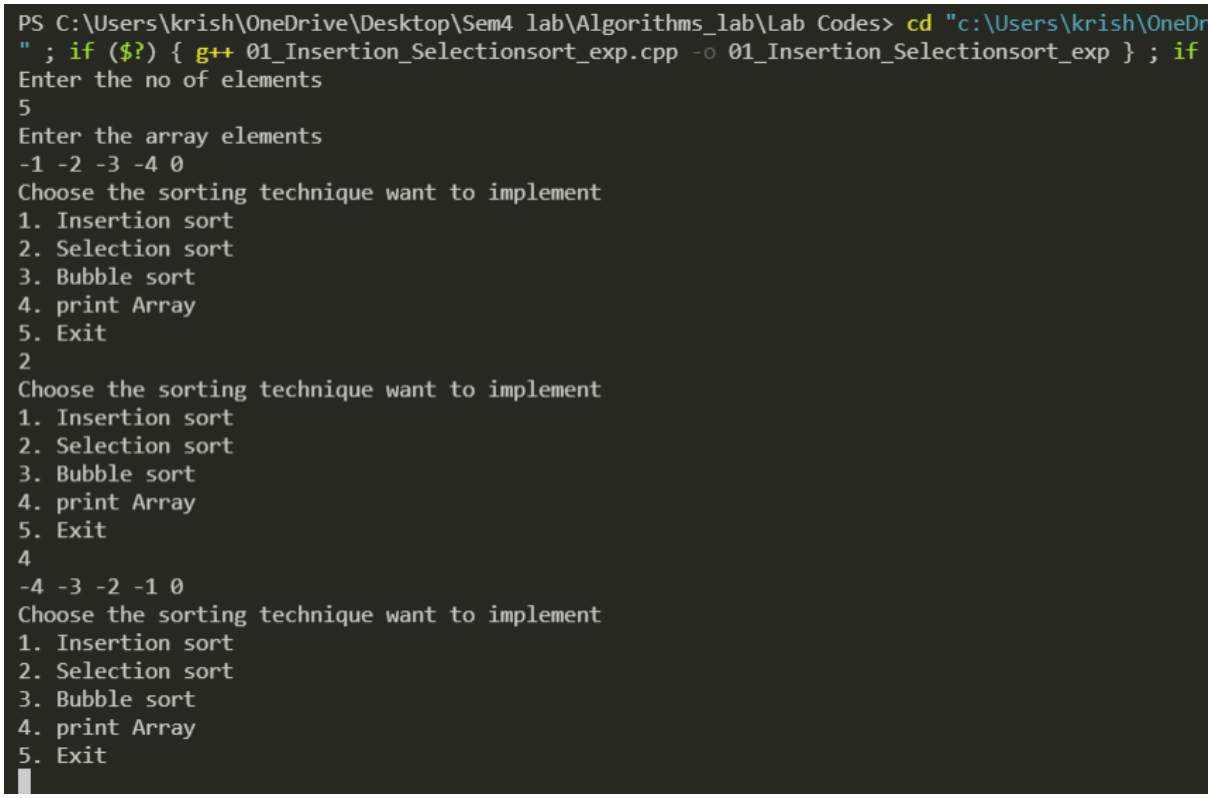
```
#include<bits/stdc++.h>
using namespace std;
void swap(int *a , int *b){
   int temp = *a ;
   *a = *b;
   *b = temp;
}

void bubbleSort(int *arr, int n){
   int i, j ;
   for(i = 0; i < n - 1; i++){
      for(j = 0; j < n - i - 1 ; j++){
         if(arr[j] > arr[j + 1]){
            swap(&arr[j], &arr[j + 1]);
         }

      }
   }
}
void selectionSort(int *arr, int n){
    int i, j;
   for (i = 0; i < n-1; i++){
      for( j = i + 1; j < n ; j++){
         if( arr[i] > arr[j]){
            swap(&arr[i], &arr[j]);
         }
      }
   }

}
void insertionSort(int *arr  , int n){
   int i , key , j ;
   for(i = 1 ; i < n   ; i ++){
      key = arr[i];
      j = i - 1 ;
      while( j >= 0  && arr[j] > key ){
         arr[j + 1] = arr[j];
         j --;
      }
      arr[j + 1] = key ;
```

```
    }
}
void printarray(int *arr , int n){

     for(int i = 0 ; i < n ; i++){
         cout<<arr[i]<<" ";
     }

}
int main(){
    int n;
    cout<<"Enter the no of elements"<<endl;
    cin >> n;
    cout<<"Enter the array elements"<<endl;
    int arr[n];
    for(int i = 0 ; i < n; i++){
        cin>>arr[i];
    }

    do{
        cout<<"Choose the sorting technique want to implement"<<endl;
        cout<<"1. Insertion sort"<<endl;
        cout<<"2. Selection sort"<<endl;
        cout<<"3. Bubble sort"<<endl;
        cout<<"4. print Array "<<endl;
        cout<<"5. Exit "<<endl;
    int ch ;
    cin >> ch;
    switch (ch)
    {
    case 1:
        insertionSort(arr,n);
        break;

    case 2:
        selectionSort(arr,n);
        break;

    case 3:
        bubbleSort(arr,n);
        break;
```

```
    case 4:
        printarray(arr,n);
        cout<<endl;
        break;

    case 5:
        return 0;
        break;

    default:
        break;
    }
    }while(1);

    return 0;

}
```

Output :

```
PS C:\Users\krish\OneDrive\Desktop\Sem4 lab\Algorithms_lab\Lab Codes> cd "c:\Users\krish
" ; if ($?) { g++ 01_Insertion_Selectionsort_exp.cpp -o 01_Insertion_Selectionsort_exp }
Enter the no of elements
5
Enter the array elements
1 3 2 4 5
Choose the sorting technique want to implement
1. Insertion sort
2. Selection sort
3. Bubble sort
4. print Array
5. Exit
1
Choose the sorting technique want to implement
1. Insertion sort
2. Selection sort
3. Bubble sort
4. print Array
5. Exit
4
1 2 3 4 5
Choose the sorting technique want to implement
1. Insertion sort
2. Selection sort
3. Bubble sort
4. print Array
5. Exit
```



Conclusion :

Thus we learned two sorting techniques Insertion sort and selection sort we first learned algorithm then implemented the program and also analysed the Time and space complexity of these algorithms and applications too .