**Objective -**

Write a program to implement Selection Sort

**Description –**

Selection sort

* It is conceptually the most simplest sorting algorithm. This algorithm will first find the **smallest** element in the array and swap it with the element in the **first** position, then it will find the **second smallest** element and swap it with the element in the **second** position, and it will keep on doing this until the entire array is sorted.
* It is called selection sort because it repeatedly **selects** the next-smallest element and swaps it into the right place.

Following are the steps involved in selection sort(for sorting a given array in ascending order):

1. Starting from the first element, we search the smallest element in the array, and replace it with the element in the first position.
2. We then move on to the second position, and look for smallest element present in the subarray, starting from index 1, till the last index.
3. We replace the element at the **second** position in the original array, or we can say at the first position in the subarray, with the second smallest element.
4. This is repeated, until the array is completely sorted.

### **Complexity Analysis of Selection Sort**

Selection Sort requires two nested for loops to complete itself, one for loop is in the function selectionSort, and inside the first loop we are making a call to another function indexOfMinimum, which has the second(inner) for loop.:

Worst Case Time Complexity [ Big-O ]: **O(n2)**

Best Case Time Complexity [Big-omega]: **O(n2)**

Average Time Complexity [Big-theta]: **O(n2)**

Space Complexity: **O(1)**

### **Algorithm**

**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

**Program –**

#include<stdio.h>

#include<conio.h> //pre-processor directives

/\* utility function to sort elements in ascending order \*/

void selection\_sort(int x[],int n)

{

int i,j,min,pos;

for(i=0;i<=n-1;i++)

{

min=x[i];

for(j=i+1;j<n;j++)

if(x[j]<min)

{

min = x[j];

pos = j;

}

x[pos]=x[i];

x[i]=min;

}

}

/\* driver program to call stubs \*/

int main(void)

{

int a[25];

int n,i;

clrscr();

printf("\n enter the no.of elements= ");

scanf("%d", &n);

printf("\n enter the elements in array= ");

for(i=0;i<n;i++) //for loop

scanf("%d", &a[i]);

printf("\n Original Array");

for(i=0;i<n;i++)

printf("\n %d", a[i]);

selection\_sort(a,n); //function calling

printf("\nSorted Array ");

for(i=0;i<n;i++)

printf("\n %d", a[i]);

getch();

}

**Output -**

