KIET Group of Institutions, Ghaziabad

Department of Computer Applications

(An ISO – 9001: 2015 Certified & 'A' Grade accredited Institution by NAAC)

Design and Analysis of Algorithm

RCA 352: Session 2020-21

DAA Lab

Experiment-No.1

Objective: Implement the Insertion sort algorithm to sort the given list of N numbers and plot graph.

Scheduled Date:	Compiled Date:	Submitted Date:
14/08/2020	25/08/2020	26/08/2020

Algorithm:

```
1. for j 2 to A.size do
2. key= A[ j]
3. // Insert A[ j] into the sorted sequence A[1 . . j -1]
4. i = j -1
5. while i > 0 and A[i] > key do
6. A[i +1]= A[i]
7. i--;
8. endwhile
9. A[i +1] key
10.  endfor
```

PROGRAM FILE: linearRecur.c

```
#include<stdio.h>
int count =0;
void insertionSort(int a[],int range)
{
  int i,j,key;
  count++;
  for (i = 1; i < range; i += 1)
  {
      key=a[i];
      count++;
      j = i-1;
      count++;
      count++;
      while (j>-1 && a[j]>key)
      {
            a[j+1] = a[j];//shifting
            count++;
            j--;
            count++;
      }
      a[j+1] = key; //swapping
```

```
        count++;
    }
}

void main()
{
    int a[100],range,i;
    printf("please enter the range of array\n");
    scanf("%d",&range);
    printf("please enter the element into the array\n");

    for (i = 0; i < range; i += 1)
    {
        scanf("%d",&a[i]);
    }

    for (i = 0; i < range; i += 1)
    {
        printf("%d ",a[i]);
    }
    insertionSort(a,range);
    printf("\nsorted elements are :");
    for (i = 0; i < range; i += 1)
    {
        printf("%d ",a[i]);
    }
    printf("\ncount = %d\n",count);
}
```

Output

Input Size	Best Case	Average Case	Worst Case
5	18	33	48
10	38	74	173
15	58	172	373
20	78	315	648
25	98	344	998

KIET Group of Institutions, Ghaziabad

Department of Computer Applications

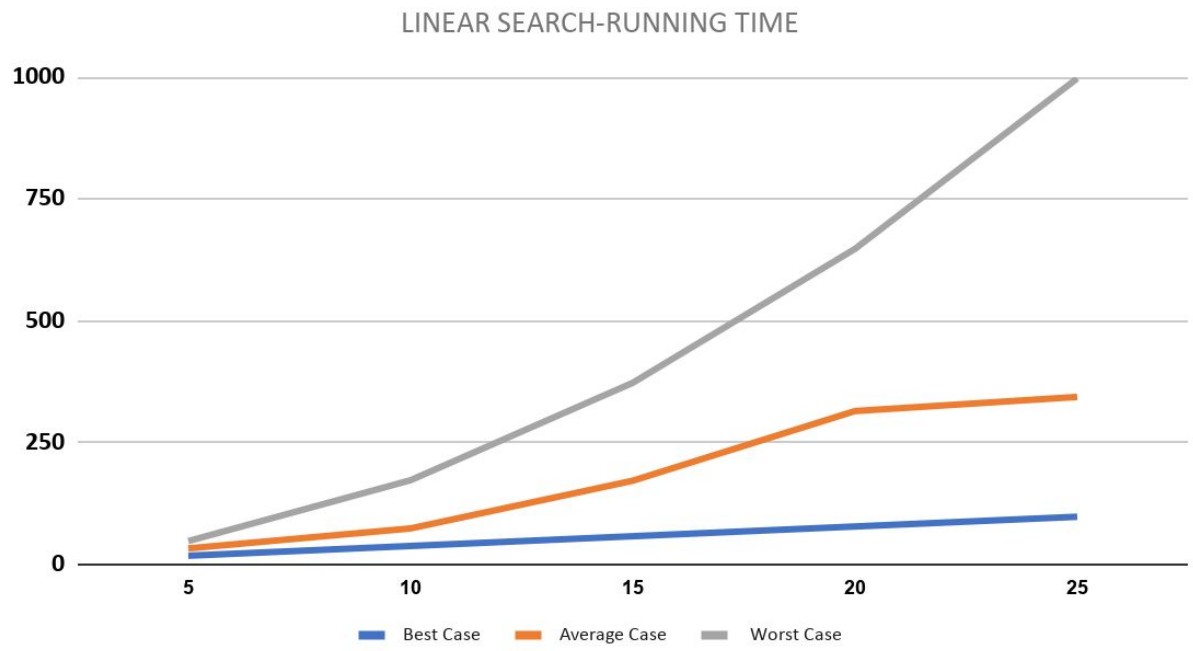
(An ISO – 9001: 2015 Certified & 'A' Grade accredited Institution by NAAC)

Design and Analysis of Algorithm

RCA 352: Session 2020-21

DAA Lab

Graph:



Conclusion

Case	Running Time : Growth of Function mathematically	Running Time : Growth of Function after observing graph
Best Case	O(1)	O(1)
Average Case	O($n2$)	O(n2)
Worst Case	O(n2)	O(n 2)