Practical - 4

Implement a function of sequential search and count the steps executed by functionon various inputs for best case and worst case. Also write complexity in each caseand draw a comparative chart.

CODE :-

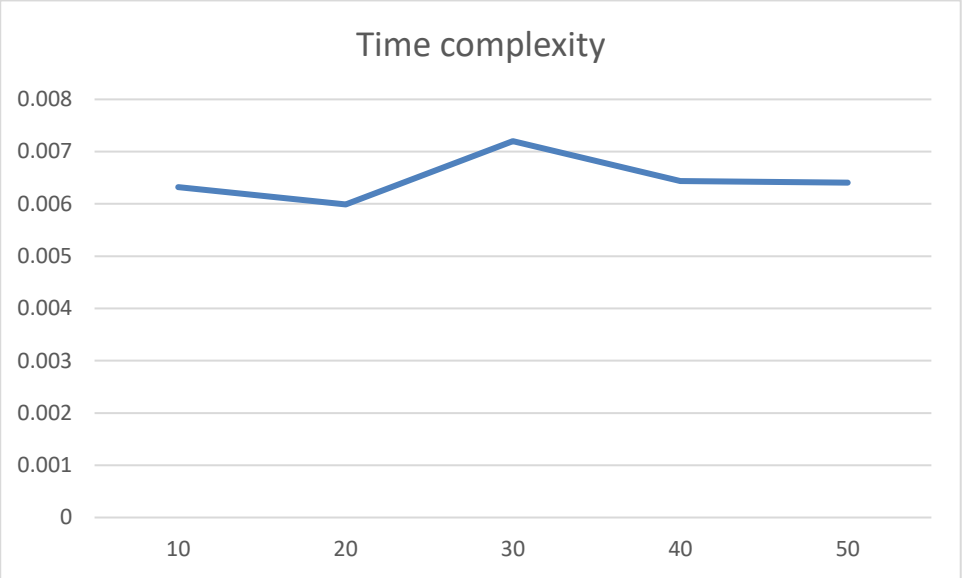
```
#include <stdio.h>

void Sequential_search(int n,int a[],int search)
{
      int i, count=0;
      for(i=0;i<n;i++)
      {
            count++;
          if(a[i]==search)
          {
              printf("Searched element found at index : %d",i);
              break;
          }
      }
      if(i==n)
      {
          printf("Searched element not found!!");
      }
      printf("\nCounter value : %d",count);
}
int main(void) {
     int arr[]={12,2,44,76,5,23,31,11,7,10};
     int n=sizeof(arr)/sizeof(arr[0]);
     int s;
     scanf("%d",&s);
     Sequential_search(n,arr,s);
     return 0;
}
```

Observation :-

- **BEST CASE :-**

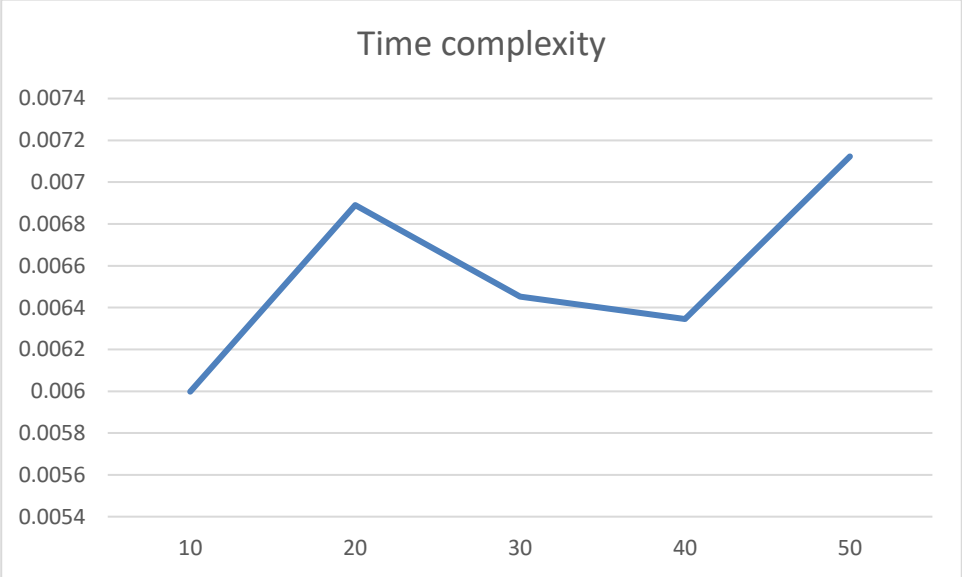
N-values	Time complexity
10	0.006324
20	0.00599
30	0.007201
40	0.006439
50	0.006407



- **Conclusion:** In Best case the Time complexity : O(1).

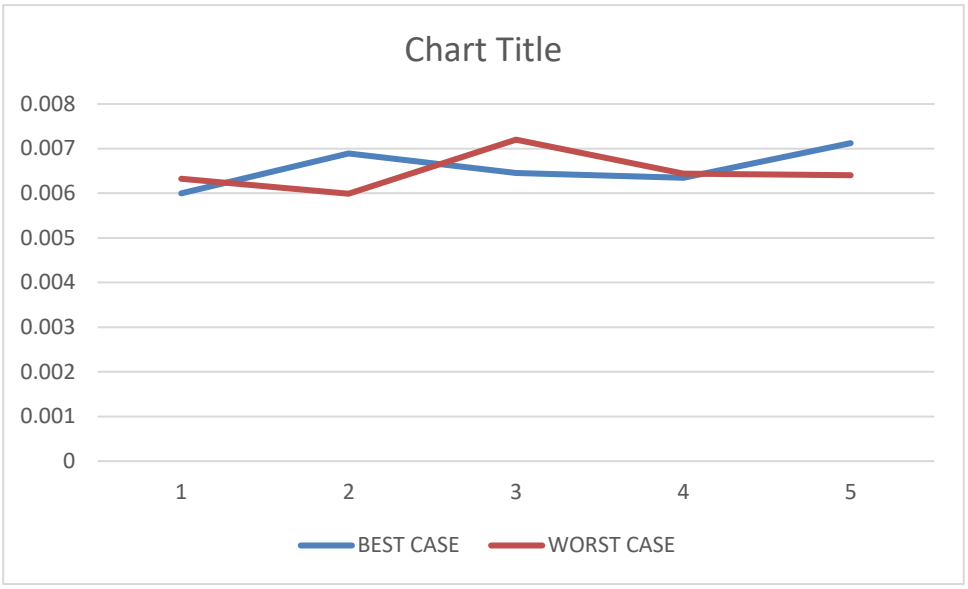
- **WORST CASE :-**

N-values	Time complexity
10	0.005998
20	0.006891
30	0.006453
40	0.006345
50	0.007123



- **Conclusion:** In Worst case the Time complexity : O(n).

- **Best case v/s worst case :-**



Implement a function of binary search and count the steps executed by function on various inputs for best case and worst case. Also write complexity in each case and draw a comparative chart.

CODE:-

```
#include <stdio.h>

int binarySearch(int array[], int x, int low, int high) {

  while (low <= high) {
    int mid = low + (high - low) / 2;

    if (array[mid] == x)
      return mid;

    if (array[mid] < x)
      low = mid + 1;


    else
      high = mid - 1;
  }

  return -1;
}

int main(void) {
    int n =10
   int array[] = {};

  int x = 4;
  int result = binarySearch(array, x, 0, n - 1);
```

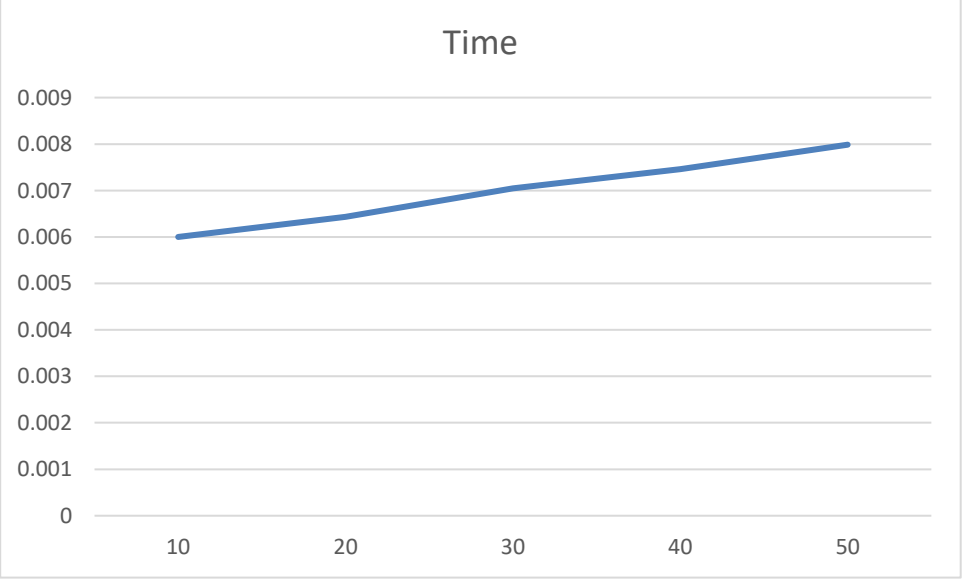
```
 if (result ==
 -1)
 printf("Not
 found"); else
   printf("Element is found at index
 %d", result);return 0;
}
```

Output

```
Element is found at index 9
```

Best Case :-

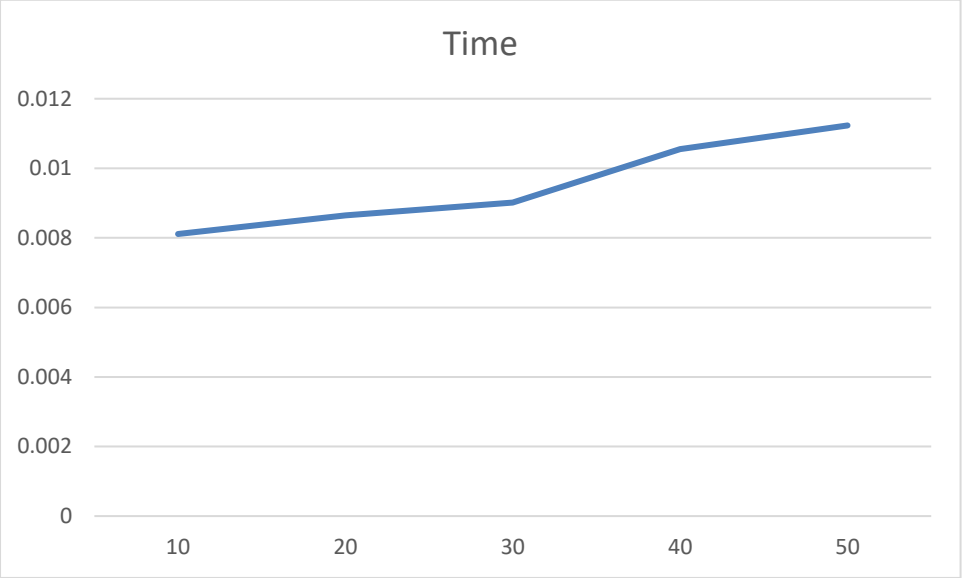
No.of Elements	Time
10	0.006000
20	0.006432
30	0.007043
40	0.007459
50	0.007986



Time Complexity: O(1)

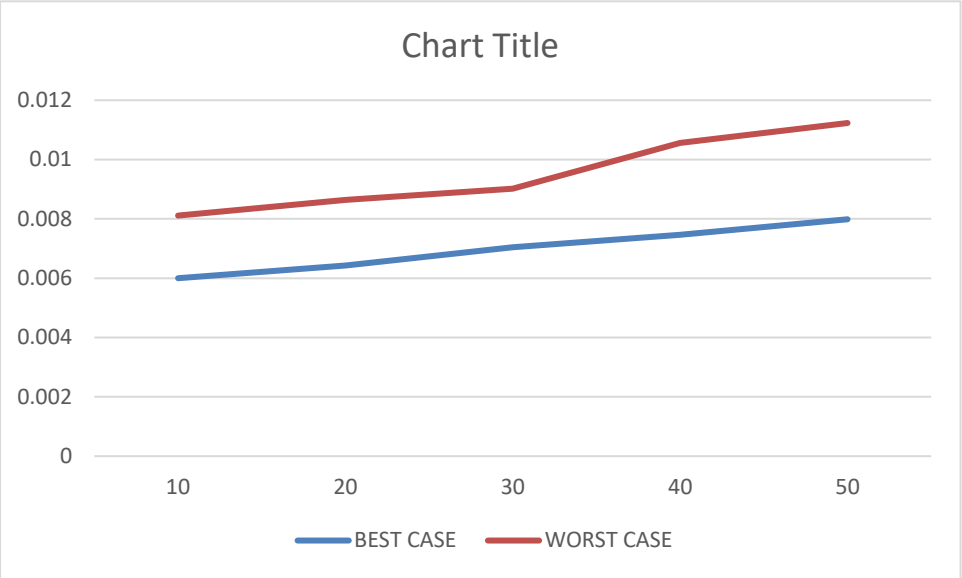
Worst Case :-

No of Elements	Time
10	0.008111
20	0.008645
30	0.009018
40	0.010556
50	0.011232



Time Complexity: O(logn)

Best Case Vs Worst Case :-



Conclusion :-

For Binary search best case will be when key element(element to be searched) is firstelement of the array and time complexity will be O(1)

And worst case will be key element is last element or not present in array in that casetime complexity will be O(logn)