Experiment No.:09

Aim: Implementation of Binary Search Technique considering a real-world application.

Program:

```
#include <stdio.h>
#include <stdlib.h>

void insertionSort(int arr[], int n);

void main()
{
   int arr[100], i, n, x, choice, flag = 0;
   printf("\t --- WELCOME TO IMPLEMENTATION OF BINARY SEARCH --- \n");
   printf("\n Enter the number of elements of the array [maximum size = 100] : ");
   scanf("%d", &n);
   printf("\n Enter %d elements of the array : \n", n);
   for (i = 0; i < n; i++)
   {
      scanf(" %d", &arr[i]);
   }
   insertionSort(arr, n);
   do
   {
      printf("\n\n !! -- Operations available -- !!");
      printf("\n 1. Display Sorted List \t 2. Search a particular value \t 3. Exit");
      printf("\n Please Enter your choice : ");
      scanf("%d", &choice);
      switch (choice)
      {
      case 1:
      {
         printf("\n\n The sorted array is : \n");
         for (i = 0; i < n; i++)
         {
            printf(" %d \t", arr[i]);
         }
         break;
      }
      case 2:
      {
         printf("\n Enter the number to be searched : ");
         scanf("%d", &x);
         int beg = 0, end = n - 1, mid;
         while (beg <= end)
         {
            mid = (beg + end) / 2;
            if (arr[mid] == x)
            {
               printf("\n %d is present in the sorted array at index : %d", x, mid);
               flag = 1;
               break;
            }
            else if (arr[mid] > x)
            {
               end = mid - 1;
```

```
            }
            else
            {
               beg = mid + 1;
            }
         }
         if (beg > end || flag == 0)
         {
            printf("\n %d does not exist int the array", x);
         }
         break;
      }
      case 3:
      {
         printf("\n Program Finished !! Thank You");
         break;
      }
      default:
      {
         printf("\n Please enter a valid choice 1, 2, 3.");
      }
      }
   } while (choice != 3);
}

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

Output:

```
dl404@itadmin:~/Desktop$ ./a.out
         --- WELCOME TO IMPLEMENTATION OF BINARY SEARCH ---

 Enter the number of elements of the array [maximum size = 100] : 5

 Enter 5 elements of the array :
5
4
3
2
1


 !! -- Operations available -- !!
 1. Display Sorted List          2. Search a particular value    3. Exit
 Please Enter your choice : 1


 The sorted array is :
 1       2       3       4       5

 !! -- Operations available -- !!
 1. Display Sorted List          2. Search a particular value    3. Exit
 Please Enter your choice : 2

 Enter the number to be searched : 3

 3 is present in the sorted array at index : 2

 !! -- Operations available -- !!
 1. Display Sorted List          2. Search a particular value    3. Exit
 Please Enter your choice : 3

 Program Finished !! Thank Youdl404@itadmin:~/Desktop$
```