S.No: 7	Exp. Name: ***Write a Program to Search an element using Binary Search and Recursion***	Date:2023-04-27

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Aim:

Write a program to `search` the given element from a list of elements with `binary search` technique using **recursion**.

At the time of execution, the program should print the message on the console as:

```
Enter value of n :
```

For example, if the user gives the **input** as:

```
Enter value of n : 5
```

Next, the program should print the following messages one by one on the console as:

```
Enter 5 elements :
```

if the user gives the **input** as:

```
Enter 5 elements : 33 55 22 44 11
```

then the program should **print** the result as:

```
After sorting the elements are : 11 22 33 44 55
```

Next, the program should print the message on the console as:

```
Enter key element :
```

if the user gives the **input** as:

```
Enter key element : 11
```

then the program should **print** the result as:

```
The given key element 11 is found at position : 0
```

Similarly, if the key element is given as `18` for the above example then the program should print the output as:

```
The given key element 18 is not found
```

Note: Write the functions **read()**, **bubbleSort()**, **display()** and **binarySearch()** in `Program912a.c`

Source Code:

Program912.c

```
#include <stdio.h>
#include "Program912a.c"
void main() {
   int a[20], n, key, flag;
   printf("Enter value of n : ");
   scanf("%d", &n);
   read(a, n);
   bubbleSort(a, n);
   printf("After sorting the elements are : ");
```

```
   display(a, n);
   printf("Enter key element : ");
   scanf("%d", &key);
   flag = binarySearch(a, 0, n - 1, key);
   if (flag == -1) {
      printf("The given key element %d is not found\n", key);
   } else {
      printf("The given key element %d is found at position : %d\n", key, fla
g);
   }
}
```

Program912a.c

```
void read(int a[],int n)
{
   int i;
   printf("Enter %d elements : ",n);
   for(i=0;i<n;i++)
   {
     scanf("%d",&a[i]);
   }
}

void bubbleSort(int a[],int n)
{
   int temp=0,i,j,count=0;
   for(i=0;i<n;i++)
   {
      count=0;
      for(j=0;j<(n-i-1);j++)
      {
         if(a[j]>a[j+1])
         {
            temp=a[j];
            a[j]=a[j+1];
            a[j+1]=temp;
            count++;
         }
        }
   }
}
void display(int a[],int n)
{
   int i;
   for(i=0;i<n;i++)
   {
      printf("%d ",a[i]);
   }
   printf("\n");
}
int binarySearch(int a[],int i,int n,int key)
{
   int mid;
   mid=(i+n)/2;
```

```
    if(i>n)
       return -1;
    else if(a[mid]==key)
       return mid;
       else if(key>a[mid])
       return binarySearch(a,mid+1,n,key);
       else
       {
          return binarySearch(a,i,mid-1,key);
       }
 }
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter value of n : 5
Enter 5 elements : 33 55 22 44 11
After sorting the elements are : 11 22 33 44 55 11
Enter key element : 11
The given key element 11 is found at position : 0

Test Case - 2
User Output
Enter value of n : 4
Enter 4 elements : 23 67 45 18
After sorting the elements are : 18 23 45 67 24
Enter key element : 24
The given key element 24 is not found

Test Case - 3
User Output
Enter value of n : 6
Enter 6 elements : 10 20 18 9 11 15
After sorting the elements are : 9 10 11 15 18 20 18
Enter key element : 18
The given key element 18 is found at position : 4