S.No: 24	Exp. Name: ***Write a Program to Search an element using Binary Search and Recursion***	Date:2023-06-16

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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 `BinarySearch.c`

Source Code:

BinarySearch.c

```
#include<stdio.h>
void read(int a[20],int n){
   int i;
   printf("Enter %d elements : ",n);
   for(i=0;i<n;i++){
      scanf("%d",&a[i]);
   }
}
```

```
void bubbleSort(int a[20],int n){
   int i,j,temp;
   for(i=0;i<n-1;i++){
      for(j=0;j<n-1;j++){
         if(a[j]>a[j+1]){
            temp=a[j];
            a[j]=a[j+1];
            a[j+1]=temp;
         }
      }
   }
}
void display(int a[20],int n){
   int i;
   for(i=0;i<n;i++){
      printf("%d ",a[i]);
   }
   printf("\n");
}
int binarySearch(int a[20],int low,int high,int key){
   int mid;
   if(low<=high){
      mid=(low+high)/2;
      if(a[mid]==key)
         return mid;
      else if(key<a[mid])
         binarySearch(a,low,mid-1,key);
      else if(key>a[mid])
            binarySearch(a,mid+1,high,key);
   }
   else{
      return-1;
   }
}
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,flag);
   }
}
```

Execution Results - All test cases have succeeded!

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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 9 45 18
After sorting the elements are : 9 18 23 45 24
Enter key element : 24
The given key element 24 is not found

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