S.No: 24	Exp. Name: ***Write a Program to Search an element using Binary Search and Recursion***	Date:2023-06-19

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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 - i - 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);
```


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```
    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!

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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