S.No: 4	Exp. Name: ***Write a C program to Search a Key element using Binary search Technique***	Date: 2022-06-20

Aim:

Write a program to **search** a key element in the given array of elements using `binary search`.

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 : 3
```

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

```
Enter element for a[0] :
Enter element for a[1] :
Enter element for a[2] :
```

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

```
Enter element for a[0] : 89
Enter element for a[1] : 33
Enter element for a[2] : 56
```

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

```
Enter key element :
```

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

```
Enter key element : 56
```

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

```
After sorting the elements in the array are
Value of a[0] = 33
Value of a[1] = 56
Value of a[2] = 89
The key element 56 is found at the position 1
```

Similarly if the key element is given as **25** for the above one dimensional array elements then the program should print the output as "**The Key element 25 is not found in the array**".

Source Code:

BinarySearchDemo3.c

```
#include<stdio.h>
void main() {
   int a[20], i, j, n, key, flag = 0, low, high, mid, temp;
   printf("Enter value of n : ");
   scanf("%d", &n);
   for(i=0;i<n;i++)
   {
```

```
      printf("Enter element for a[%d] : ",i);
      scanf("%d",&a[i]);
   }

   // Write the code to read an array of elements

   printf("Enter key element : ");
   scanf("%d", &key);
   for(i=0;i<n-1;i++)
   {
      for(j=0;j<n-1-i;j++)
      {
         if(a[j]>a[j+1])
         {
            temp=a[j];
            a[j]=a[j+1];
            a[j+1]=temp;
         }
      }
   }

   // Write the code to sort the elements using any sorting technique

   printf("After sorting the elements in the array are\n");
   for(i=0;i<n;i++)
   printf("Value of a[%d] = %d\n",i,a[i]);
   // Write the code to display the elements

   low = 0; // Complete the statement
   high = n-1; // Complete the statement

   // Write the code to search an element using  binary search process
   while(low<=high)
   {
      mid=(low+high)/2;
      if(key==a[mid])
      {
         flag=1;
         break;
      }
      else if(key<a[mid])
      high = mid-1;
      else
      low=mid+1;
   }

   if (flag==1) { // Write the condition part
      printf("The key element %d is found at the position %d\n",key,mid); // Complete t
he statement
   } else {
      printf("The Key element %d is not found in the array\n",key); // Complete the sta
tement
   }
}
```

Execution Results - All test cases have succeeded!

ID: 219X1A04E7

Test Case - 1
User Output
Enter value of n : 3
Enter element for a[0] : 25
Enter element for a[1] : 15
Enter element for a[2] : 35
Enter key element : 45
After sorting the elements in the array are
Value of a[0] = 15
Value of a[1] = 25
Value of a[2] = 35
The Key element 45 is not found in the array

Test Case - 2
User Output
Enter value of n : 4
Enter element for a[0] : 5
Enter element for a[1] : 3
Enter element for a[2] : 4
Enter element for a[3] : 2
Enter key element : 4
After sorting the elements in the array are
Value of a[0] = 2
Value of a[1] = 3
Value of a[2] = 4
Value of a[3] = 5
The key element 4 is found at the position 2

Test Case - 3
User Output
Enter value of n : 3
Enter element for a[0] : 20
Enter element for a[1] : 12
Enter element for a[2] : 40
Enter key element : 12
After sorting the elements in the array are
Value of a[0] = 12
Value of a[1] = 20
Value of a[2] = 40
The key element 12 is found at the position 0

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