| S.No: 2 | Exp. Name: ***Write a Program to Search an element using Binary Search and Recursion*** | Date:2024-10-28 |
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## Aim:

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

**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);
   read1(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);
   }
}
```

Program912a.c

```
#include<stdio.h>
void read1(int a[], int n) {
   printf("Enter %d elements : ", n);
   for(int i = 0; i < n; i++) {
      scanf("%d", &a[i]);
   }
}
void bubbleSort(int a[], int n) {
   for(int i = 0; i < n-1; i++) {
      for(int j = 0; j < n-i-1; j++) {
         if(a[j] > a[j+1]) {
            int temp = a[j];
            a[j] = a[j + 1];
            a[j + 1] = temp;
         }
      }
   }
}
```

```
void display(int a[], int n) {
   for(int i = 0; i < n; i++) {
      printf("%d ", a[i]);
   }
   printf("\n");
}

int binarySearch(int a[], int low, int high, int key) {
   if(low > high) {
      return -1;
   }
   int mid = (low + high) / 2;
   if(a[mid] == key) {
      return mid;
   }
   else if(a[mid] > key) {
      return binarySearch(a, low, mid - 1, key);
   }
   else {
      return binarySearch(a, mid + 1, high, 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 |


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