

**Assignment Set: 1    Problem No. 3**

**Problem Statement:** Write programs for linear search and binary search for searching integers, floating point numbers and words in arrays of respective types.

**Solution Approach:**

- Linear search – Traverse the array and look for the element
- Binary search – Traverse the sorted array, start from the middle, if middle element is bigger, search in the first half only. Thus continue. If found, return index, else return -1

**Structured Pseudocode:**

**1. Linear Search**

```
Read arr[n]
Read element
for i=1 to n :
    if(arr[i] == element):
        return i
return -1
```

**2. Binary Search**

```
Read arr[n]
Read element
lower_bound = 1
higher_bound = n
while element not found:
    if(lower_bound > higher_bound)
        print "element does not exist"
        exit program

    middle = (lower_bound + higher_bound)/2
    if arr[middle] == element
        print "Element Found"
        exit program
    else if arr[middle] > element
        higher_bound = middle
    else
        lower_bound = middle
    end if
end while
end program
```

**Results:**

output1: For integer

```
zulfiqar@zulqarnain: ~/assignmentGit/secondYear/DSAAssignment/assignment1
zulfiqar@zulqarnain:~/assignmentGit/secondYear/DSAAssignment/assignment1$ ./a.out
Enter array size: 7
Enter all elements space separated: 12 16 19 21 22 26 28
Enter a number to search index: 26
Linear search index: 5

Binary search index: 5

Actual array(i:el):- 0:12 1:16 2:19 3:21 4:22 5:26 6:28
zulfiqar@zulqarnain:~/assignmentGit/secondYear/DSAAssignment/assignment1$
```

output2: For float

```
zulfiqar@zulqarnain: ~/assignmentGit/secondYear/DSAAssignment/assignment1
zulfiqar@zulqarnain:~/assignmentGit/secondYear/DSAAssignment/assignment1$ ./a.out
Enter array size: 7
Enter all elements space separated: 3.4 5.1 6.23 8.26 10.3 10.9 12.0
Enter a number to search index: 10.9
Linear search index: 5

Binary search index: 5

Actual array(i:el):- 0:3.400000 1:5.100000 2:6.230000 3:8.260000 4:10.300000 5:10.900000 6:12.000000
zulfiqar@zulqarnain:~/assignmentGit/secondYear/DSAAssignment/assignment1$
```

output3: For string

```
zulfiqar@zulqarnain: ~/assignmentGit/secondYear/DSAAssignment/assignment1
zulfiqar@zulqarnain:~/assignmentGit/secondYear/DSAAssignment/assignment1$ ./a.out
Enter array size: 5
Enter all string in a new line:-
abcde
bcdef
defgh
ghijk
klmno
Enter the string to search index: ghijk
Linear search index: 3

Binary search index: 3

zulfiqar@zulqarnain:~/assignmentGit/secondYear/DSAAssignment/assignment1$
```

## Discussion

Code is implemented following the psueodo code.  
Separate function are defined to check equality of two strings.

**Separate files containing commented source code:** Two source code are attached, :  
assaignment3-a.c :- It implements binary and linear search for Integer.

assignment3-b.c :- It implements binary and linear search for Floats.  
assignment3-c.c :- It implements binary and linear search for String.