DSA REPORT

Name: Anirban Das Roll: 001910501077 Class: BCSE -II Sem: First Session: 2020-21

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:

For the array of integers we run a binary search algorithm where we compare x(element to be seached) with the middle element of the array.

Three cases are handled here:

1.If x matches with middle element, we return the mid index.

2.If x is greater than the mid element, then x can only lie in right half subarray after the mid element. So we run recuursion for right half.

3.Else (x is smaller) recur for the left half.

For the array of floats and words a basic linear search aalgorithm is used. Here we traverse the whole array and make an equality check in every step. If the desired element is found 1(true) is returned, 0(false) otherwise.

Structured Pseudocode:

```
FUNCTION BSEARCH( INT ARRAY, INT LOWER, INT UPPER, INT X):
    IF (UPPER>=LOWER):
```

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```
        MID=LOWER+(UPPER-1)/2
        IF (ARRAY[MID]==X)
            RETURN MID
        IF (ARRAY[MID]>X)
            RETURN BSEARCH(ARRAY, LOWER, MID-1, X)
        IF (ARRAY[MID]<X)
            RETURN BSEARCH(ARRAY, MID+1, UPPER, X)
    RETURN -1

FUNCTION LSEARCH1 (INT ARRAY, INT N, INT X):
    FOR i=0 TO N-1 DO:
        IF (ARRAY[i]==X)
            RETURN 1
    RETURN -1

FUNCTON  LSEARCH2 (CHAR ARRAY[], INT N, CHAR X):
    FOR i=0 TO N-1 DO:
        COMPARE ARRAY[i] AND X:
            IF MATCHES
                RETURN 1
    RETURN 0
```

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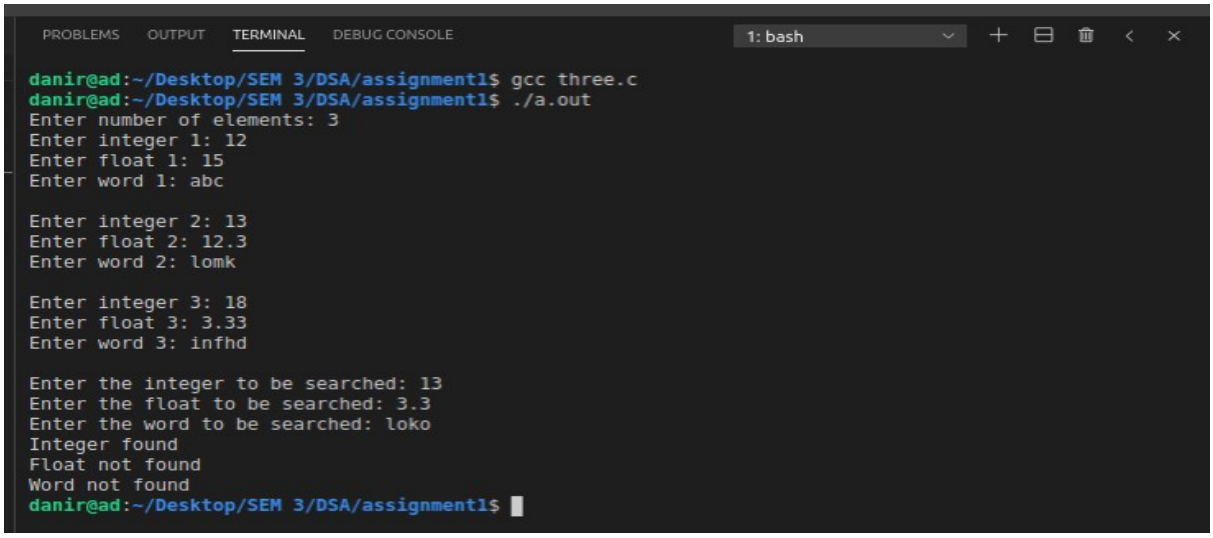
Results:



Discussions:

The binary search function takes O(log n) time complexity, whereas the linear search takes a classic O(n) as traversal of whole array takes place in the worst case. The space complexity is O(1).

Source Code:

FILE NAME: “three.c”

(can be found in the following link: https://drive.google.com/drive/folders/1-nNb6aRleNLE1mcE58i85096fDmDUCvd?usp=sharing)