Lab No: 14 **Date: 2081/**

Title: Write a program to search the user input key in the list using linear search

Linear search, also known as sequential search, is a simple algorithm used to find a specific element within a list by checking each element sequentially from the beginning until a match is found or the end of the list is reached. The algorithm iterates through all elements of the list and compares each one with the target element. If a match is found, it returns the index of the current element. If no match is found after checking all elements, it returns -1, indicating that the element is not present in the list.

The time complexity of linear search in the worst case is **O(n)** since it may require checking every element in the list before finding the target or confirming its absence. On average, if all elements are equally likely to be searched, the algorithm makes about **(n+1)/2** comparisons. However, the efficiency of the search can be affected if different elements have varying probabilities of being searched..

IDE: Visual Studio Code

Language: C

Source code:

```
#include <stdio.h>

void linearSearch(int arr[], int n, int key)
{
    int i, flag = 0;
    for (i = 0; i < n; i++)
    {
        if (arr[i] == key)
        {
            printf("Element found at index %d\n", i);
            flag = 1;
            break;
        }
    }
    if (!flag)
    {
        printf("Element not found in the array.\n");
    }
}
int main()
{
    int n, i, key;
    printf("Enter the size of array: ");
    scanf("%d", &n);
    int arr[n];
    printf("Enter the array data in sorted order (ascending or
descending):\n"); // Taking input from user
    for (i = 0; i < n; i++)
    {
        scanf("%d", &arr[i]);
    }
    printf("Enter the element to search: ");
    scanf("%d", &key);

    linearSearch(arr, n, key); // Calling Linear Search function
    return 0;
}
```

Output:

```
Enter the size of array: 8
Enter the array data in sorted order (ascending or descending):
2
4
5
6
7
8
9
12
Enter the element to search: 5
Checking index 0: 2
Checking index 1: 4
Checking index 2: 5
Element found at index 2
PS C:\Users\Roshan\Desktop\Roshan saud DSA(2)> .\que14
Enter the size of array: 5
Enter the array data in sorted order (ascending or descending):
2
4
5
7
9
Enter the element to search: 1
Checking index 0: 2
Checking index 1: 4
Checking index 2: 5
Checking index 3: 7
Checking index 4: 9
Element not found in the array.
PS C:\Users\Roshan\Desktop\Roshan saud DSA(2)>
```