

Lab No: 15

Date: 2081/

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

Binary search is an efficient searching algorithm used to find a specific element in a sorted list by repeatedly dividing the search space in half. Unlike linear search, which checks each element sequentially, binary search follows a divide-and-conquer approach. It starts by comparing the target element with the middle element of the list. If the middle element matches the target, the search ends. If the target is smaller than the middle element, the search continues in the left half of the list. If the target is larger, the search proceeds in the right half. This process repeats until the element is found or the search space is reduced to zero, indicating that the element is not present in the list.

IDE: Visual Studio Code

Language: C

Source code:

```
#include <stdio.h>

void binarySearch(int arr[], int n, int key)
{
    int low = 0, high = n - 1, mid, flag = 0;
    while (low <= high)
    {
        mid = (low + high) / 2;

        if (arr[mid] == key)
        {
            printf("Element found at index %d\n", mid);
            flag = 1;
            break;
        }
        else if (arr[mid] < key)
        {
            low = mid + 1;
        }
        else
        {
            high = mid - 1;
        }
    }
    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);

    binarySearch(arr, n, key); // Calling Binary Search function
    return 0;
}

```

Output:

```

Enter the size of array: 10
Enter the array data in sorted order (ascending or descending):
2
4
5
7
8
9
12
14
16
17
Enter the element to search: 5
Element found at index 2
PS C:\Users\Roshan\Desktop\Roshan saud DSA(2)> ./que15
Enter the size of array: 5
Enter the array data in sorted order (ascending or descending):
2
5
7
9
12
Enter the element to search: 1
Element not found in the array.
PS C:\Users\Roshan\Desktop\Roshan saud DSA(2)> █

```