Experiment 1.2

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UID: **Section/Group:**

Date of performance: **Subject name: Data Structures**

AIM:

Write a program to demonstrate the use of linear and binary search to find a given element in an array.

PROGRAM CODE:

```
#include <iostream>
using namespace std;

int main()
{
    // Declaring variables and taking array as input from the user
    int size;
    int position, fact = 0, n;
    cout << "\n";
    cout << "Enter number of elements - ";
    cin >> size;
    int a[size], arr[size];
    cout << "\nEnter Elements of the array: " << endl;
    for (int i = 0; i < size; i++)
    {
        cin >> a[i];
    }

    // Element to search in the array
    int f;
    cout << "Enter element to search: ";
    cin >> f;

    //performing Linear Search
    cout << "\n------------LINEAR SEARCH------------" << endl;

    for (int j = 0; j < size; j++)
    {
```

```
        if (a[j] == f)
        {
            fact = 1;
            position = j;
        }
    }

    if (fact == 1)
    {
        cout << "\nElement is found at index " << position << endl;
        cout << "\n";
    }
    else
    {
        cout << "\nElement not found in the array.";
        cout << "\n";
    }

    //performing Binary Search
    cout << "\n------------BINARY SEARCH------------" << endl;
    {
        int low, high, mid;
        int temp;

        //Sorting array because Binary search can only be implemented on sorted
array.
        for (int j = 0; j < size; j++)
        {
            for (int i = 0; i < size; i++)
            {
                if (a[i] > a[i + 1])
                {
                    temp = a[i];
                    a[i] = a[i + 1];
                    a[i + 1] = temp;
                }
            }
        }
        cout << "\nSorted Array : " << endl;
        for (int i = 0; i < size; i++)
            cout << a[i] << " ";
        cout << "\n\n";

        //Searching element using Binary Search
        high = 0;
        low = size - 1;
        mid = ((high + low) / 2);
        while (high <= low)
        {
```

```
            if (a[mid] < f)
            {
                high = mid + 1;
            }
            else if (a[mid] == f)
            {
                cout << "Number Found at index " << mid;
                cout << "\n\n";
                break;
            }
            else
            {
                low = mid - 1;
            }
            mid = (high + low) / 2;
        }
        if (high > low)
            cout << "Element not found in the array.";
    }
}
```

OUTPUT:

```
Enter number of elements - 4

Enter Elements of the array:
5
2
6
3
Enter element to search: 3

------------LINEAR SEARCH------------

Element is found at index 3


------------BINARY SEARCH------------

Sorted Array :
2 3 4 5

Number Found at index 1
```