

PROGRAM 2

Implement Recursive Binary search and Linear search and determine the time required to search an element. Repeat the experiment for different values of N and plot a graph of the time taken versus N.

//code

```
#include<iostream>
```

```
#include<ctime>
```

```
using namespace std;
```

```
int binsearch(int low,int high,int arr[],int key){
```

```
    int mid;
```

```
    while(low<=high){
```

```
        mid=(low+high)/2;
```

```
        if(arr[mid] == key){
```

```
            cout<<"Element found at: "<<mid+1<<endl;
```

```
            return 1;
```

```
        }
```

```
        else if(arr[mid]>key)
```

```
            return binsearch(low,mid-1,arr,key);
```

```
        else
```

```
            return binsearch(mid+1,high,arr,key);
```

```
    }
```

```
    return -1;
```

```
}
```

```
int linsearch(int arr[],int n,int ele,int i)
```

```
{
```

```
    while(i<n){
```

```
        if(arr[i]==ele){
```

```
            cout<<"Element found at: "<<i+1<<endl;
```

```
            return 1;
```

```
        }
```

```

        else
            return linsearch(arr,n,ele,i+1);
    }
    return -1;
}

```

```

int main(){
    int n,key,res;
    clock_t start,stop;

    cout<<" Enter n: ";
    cin>>n;
    cout<<"\n";
    int arr[n];

    cout<<" Enter elements: ";
    for(int i=0;i<n;i++)
        cin>>arr[i];
    cout<<" Enter key: ";
    cin>>key;
    cout<<"\n\n";

    cout<<" **LINEAR SEARCH** "<<endl;
    start=clock();
    res=linsearch(arr,n,key,0);
    if (res==-1)
        cout<<" Element not found "<<endl;
    stop=clock();
    cout<<" Duration: "<<stop-start<<" clocks "<<"\n\n";

    cout<<" **BINARY SEARCH** "<<endl;
    start=clock();
    res=binsearch(0,n-1,arr,key);
    if (res==-1)
        cout<<" Element not found "<<endl;
    stop=clock();
}

```

```
    cout<<" Duration: "<<stop-start<<" clocks "<<endl;
}
```

//Output

```
❏ clang++-7 -pthread -std=c++17 -o main main.cpp
❏ ./main
Enter n: 5
```

Enter elements:

23

45

67

81

99

Enter key: 67

****LINEAR SEARCH****

Element found at: 3

Duration: 23 clocks

****BINARY SEARCH****

Element found at: 3

Duration: 8 clocks

```
❏ █
```