

1. **Given a sorted array of n integers and a target value, find the index of the target value in the array. Show the all active items [divided half] at every stage. Handle the situation when the target value is not found**

```
#include <iostream>

using namespace std;

int main(){

int lower=0,upper,size,targ,index=-1,temp=0;;

cout<<"enter size"<<endl;

cin>>size;

int arr[size];

upper=size-1;

for(int i=0;i<size;i++){

    cout<<"enter value no "<<i+1<<endl;

    cin>>arr[i];

}

for (int i = 0; i < size; i++) {

    for (int j = i + 1; j < size; j++) {

        if (arr[i] > arr[j]) {

            temp = arr[i];

            arr[i] = arr[j];

            arr[j] = temp;

        }

    }

}

cout<<"current array "<<endl;

for(int i=0;i<size;i++){

    cout<<arr[i];
```

```

    }
cout<<"\nEnter target to find\n";
cin>>targ;
while(lower<=upper){
    int mid=(lower+upper)/2;
    if(arr[mid]==targ){
        index=mid;
        cout<<"\ncurrent array = ";
        for(int i=lower;i<=upper;i++){
            cout<<arr[i];
            break;
        }
    }
    else if(arr[mid]>targ){
        upper=mid-1;
    }
    else{
        lower=mid+1;
    }
    cout<<"\ncurrent array = ";
    for(int i=lower;i<=upper;i++){
        cout<<arr[i];
    }
}
if(index<0){
    cout<<"\ntarget not found"<<endl;
}

```

```

else{

    cout<<"\ntarget found at index "<<index<<endl;

}

}

```

```

C:\Assignment\DSA\Lab 7\Binary search.exe
enter size
5
enter value no 1
1
enter value no 2
2
enter value no 3
1
enter value no 4
3
enter value no 5
1
current array
11123
Enter target to find
2

current array = 23
current array = 23
target found at index 3

-----
Process exited after 5.214 seconds with return value 0
Press any key to continue . . .

```

2. Given a sorted array of n integers and a target value, find the first occurrence of the target value in the array.

```

#include <iostream>
using namespace std;
int main(){
    int lower=0,upper,size,targ,index=-1,temp=0,mid;
    cout<<"enter size"<<endl;
    cin>>size;
    int arr[size];
    upper=size-1;
    for(int i=0;i<size;i++){
        cout<<"enter value no "<<i+1<<endl;
        cin>>arr[i];
    }
}

```

```

}
for (int i = 0; i < size; i++) {
    for (int j = i + 1; j < size; j++) {
        if (arr[i] > arr[j]) {
            temp = arr[i];
            arr[i] = arr[j];
            arr[j] = temp;
        }
    }
}
cout<<"current array "<<endl;
for(int i=0;i<size;i++){
    cout<<arr[i];
}
cout<<"\nEnter target to find\n";
cin>>targ;
lab:
while(lower<=upper){
    mid=(lower+upper)/2;
    if(arr[mid]==targ){
        index=mid;
        cout<<"\ncurrent array = ";
        for(int i=lower;i<=upper;i++){
            cout<<arr[i];
        }
        break;
    }
    else if(arr[mid]>targ){
        upper=mid-1;
    }
    else{
        lower=mid+1;
    }
    cout<<"\ncurrent array = ";
    for(int i=lower;i<=upper;i++){
        cout<<arr[i];
    }
}
}

```

```

for(int i=0;i<index;i++){
    if(targ==arr[i]&& i!=index){
        upper=index;

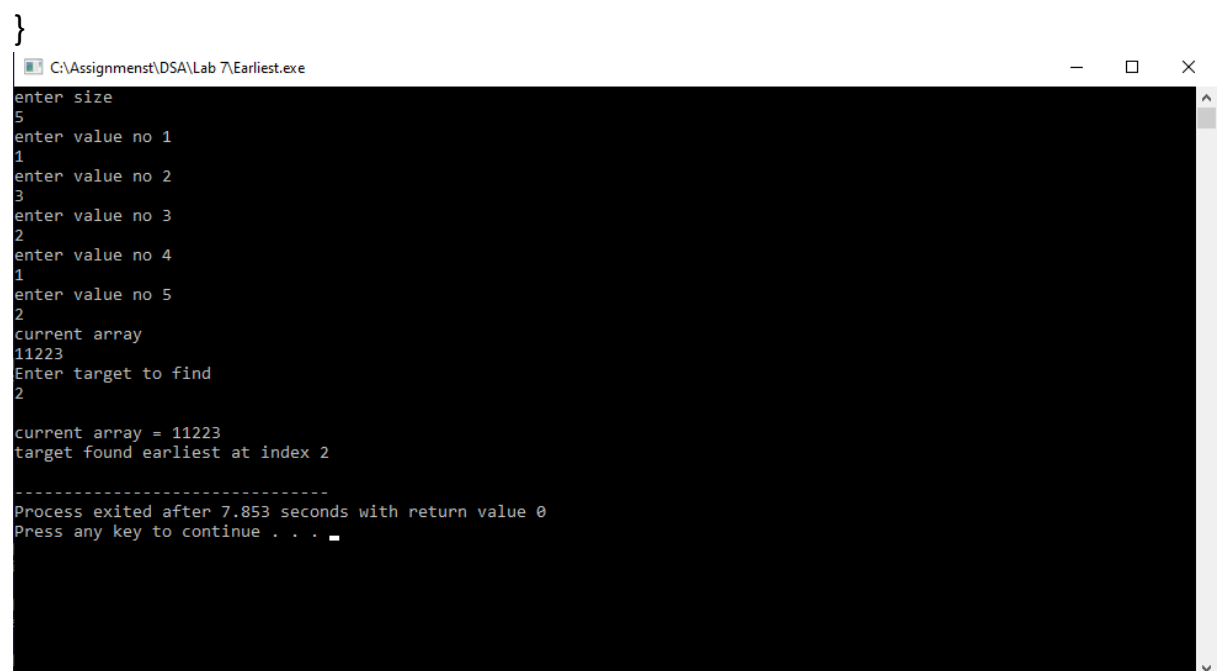
        goto lab;
    }
    else{
        continue;
    }
}
if(index<0){
    cout<<"\ntarget not found"<<endl;
}
else{
    cout<<"\ntarget found earliest at index "<<index<<endl;
}
}

```

```

}

```



```

C:\Assignment\DSA\Lab 7\Earliest.exe
enter size
5
enter value no 1
1
enter value no 2
3
enter value no 3
2
enter value no 4
1
enter value no 5
2
current array
11223
Enter target to find
2

current array = 11223
target found earliest at index 2

-----
Process exited after 7.853 seconds with return value 0
Press any key to continue . . .

```

3. **Given a sorted array of n integers and a target value, find the last occurrence of the target value in the array.**

```
#include <iostream>
using namespace std;
int main(){
    int lower=0,upper,size,targ,index=-1,temp=0,mid;
    cout<<"enter size"<<endl;
    cin>>size;
    int arr[size];
    upper=size-1;
    for(int i=0;i<size;i++){
        cout<<"enter value no "<<i+1<<endl;
        cin>>arr[i];
    }
    for (int i = 0; i < size; i++) {
        for (int j = i + 1; j < size; j++) {
            if (arr[i] > arr[j]) {
                temp = arr[i];
                arr[i] = arr[j];
                arr[j] = temp;
            }
        }
    }
    cout<<"current array "<<endl;
    for(int i=0;i<size;i++){
        cout<<arr[i];
    }
    cout<<"\nEnter target to find\n";
    cin>>targ;
    lab:
    while(lower<=upper){
        mid=(lower+upper)/2;
        if(arr[mid]==targ){
            index=mid;
            cout<<"\ncurrent array = ";
            for(int i=lower;i<=upper;i++){
                cout<<arr[i];
            }
        }
    }
}
```

```

        break;
    }
    else if(arr[mid]>targ){
        upper=mid-1;
    }
    else{
        lower=mid+1;
    }
    cout<<"\ncurrent array = ";
    for(int i=lower;i<=upper;i++){
        cout<<arr[i];
    }
}
for(int i=upper;i>lower;i--){
    if(targ==arr[i]&&i!=index){
        lower=index+1;

        goto lab;
    }
    else{
        continue;
    }
}
if(index<0){
    cout<<"\ntarget not found"<<endl;
}
else{
    cout<<"\ntarget found latest at index "<<index<<endl;
}

}

```

```
C:\Assignmenst\DSA\Lab 7\latest.exe
enter size
7
enter value no 1
1
enter value no 2
2
enter value no 3
1
enter value no 4
1
enter value no 5
2
enter value no 6
1
enter value no 7
2
current array
1111222
Enter target to find
1

current array = 1111222
current array = 2
current array =
target found latest at index 3

-----
Process exited after 4.605 seconds with return value 0
Press any key to continue . . .
```

4. **Given a sorted array of n integers and a target value, find the number of occurrences of the target value in the array.**

```
#include <iostream>
using namespace std;
int main(){
    int lower=0,upper,size,targ,index=-1,temp=0,mid,count=0;
    cout<<"enter size"<<endl;
    cin>>size;
    int arr[size];
    upper=size-1;
    for(int i=0;i<size;i++){
        cout<<"enter value no "<<i+1<<endl;
        cin>>arr[i];
    }
    for (int i = 0; i < size; i++) {
        for (int j = i + 1; j < size; j++) {
            if (arr[i] > arr[j]) {
                temp = arr[i];
                arr[i] = arr[j];
                arr[j] = temp;
            }
        }
    }
    cout<<"current array "<<endl;
```



```

    for(int i=0;i<size;i++){
        cout<<arr[i];
    }
    cout<<"\nEnter target to find\n";
    cin>>targ;
    lab:
    while(lower<=upper){
        mid=(lower+upper)/2;
        if(arr[mid]==targ){
            count++;
            index=mid;
            cout<<"\ncurrent array = ";
            for(int i=lower;i<=upper;i++){
                cout<<arr[i];
            }
            break;
        }
        else if(arr[mid]>targ){
            upper=mid-1;
        }
        else{
            lower=mid+1;
        }
        cout<<"\ncurrent array = ";
        for(int i=lower;i<=upper;i++){
            cout<<arr[i];
        }
    }
    for(int i=lower;i<upper;i++){
        if(targ==arr[i]){
            lower++;

            goto lab;
        }
        else{
            continue;
        }
    }
}

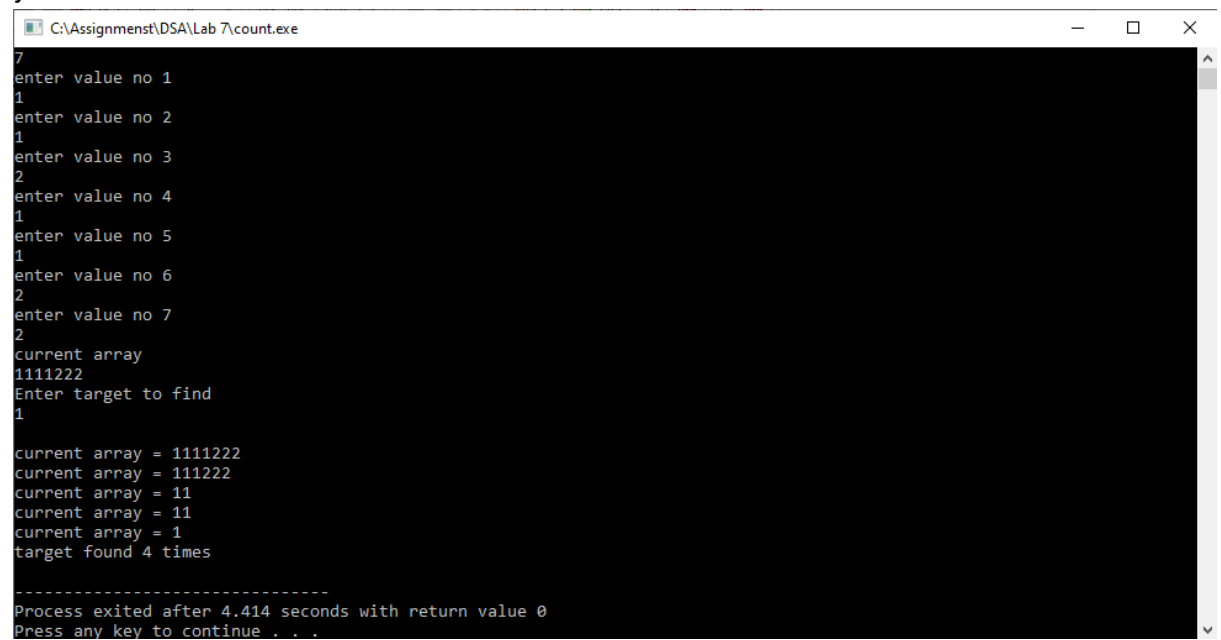
```

```

if(index<0){
    cout<<"\ntarget not found"<<endl;
}
else{
    cout<<"\ntarget found "<<count<<" times"<<endl;
}

}

```



```

C:\Assignment\DSA\Lab 7\count.exe
7
enter value no 1
1
enter value no 2
1
enter value no 3
2
enter value no 4
1
enter value no 5
1
enter value no 6
2
enter value no 7
2
current array
1111222
Enter target to find
1

current array = 1111222
current array = 111222
current array = 11
current array = 11
current array = 1
target found 4 times

-----
Process exited after 4.414 seconds with return value 0
Press any key to continue . . .

```