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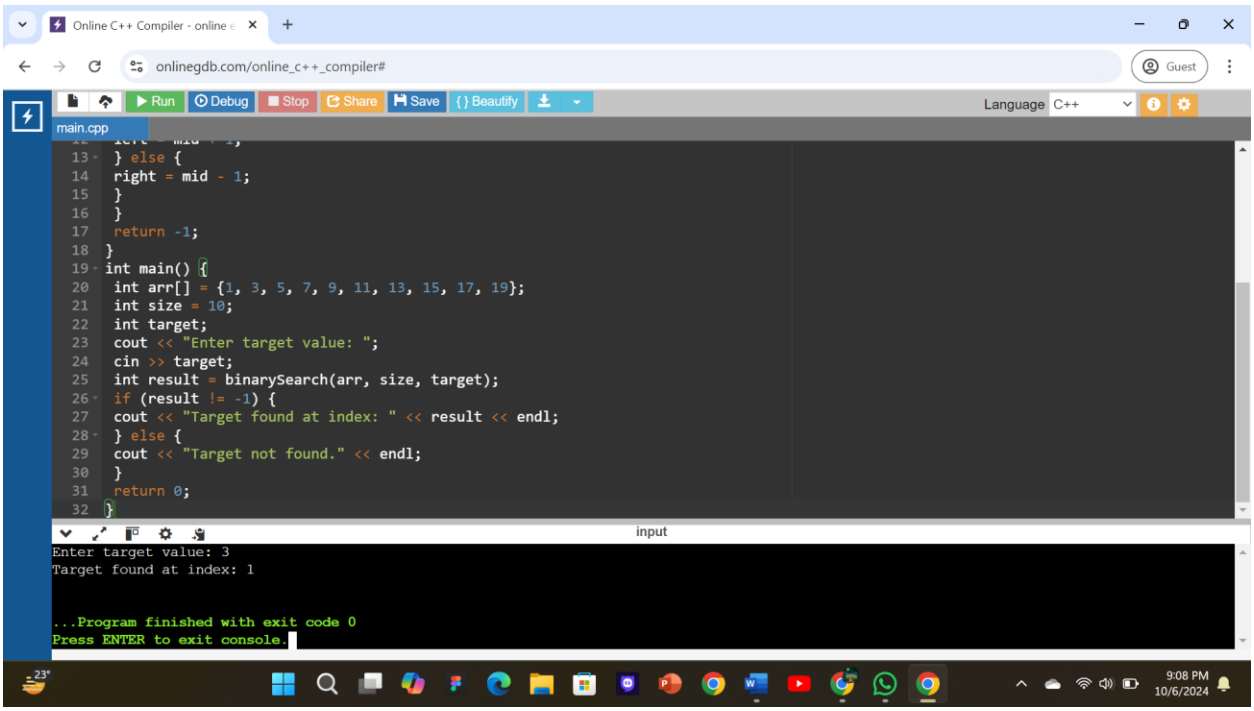
//QUESTION#1

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

int binarySearch(int arr[], int size, int target) {
    int left = 0;
    int right = size - 1;

    while (left <= right) {
        int mid = (left + right) / 2;

        if (arr[mid] == target) {
            return mid;
        } else if (arr[mid] < target) {
            left = mid + 1;
        } else {
            right = mid - 1;
        }
    }

    return -1;
```

```
}

int main() {
    int arr[] = {1, 3, 5, 7, 9, 11, 13, 15, 17, 19};
    int size = 10;

    int target;
    cout << "Enter target value: ";
    cin >> target;

    int result = binarySearch(arr, size, target);

    if (result != -1) {
        cout << "Target found at index: " << result << endl;
    } else {
        cout << "Target not found." << endl;
    }

    return 0;
}
```

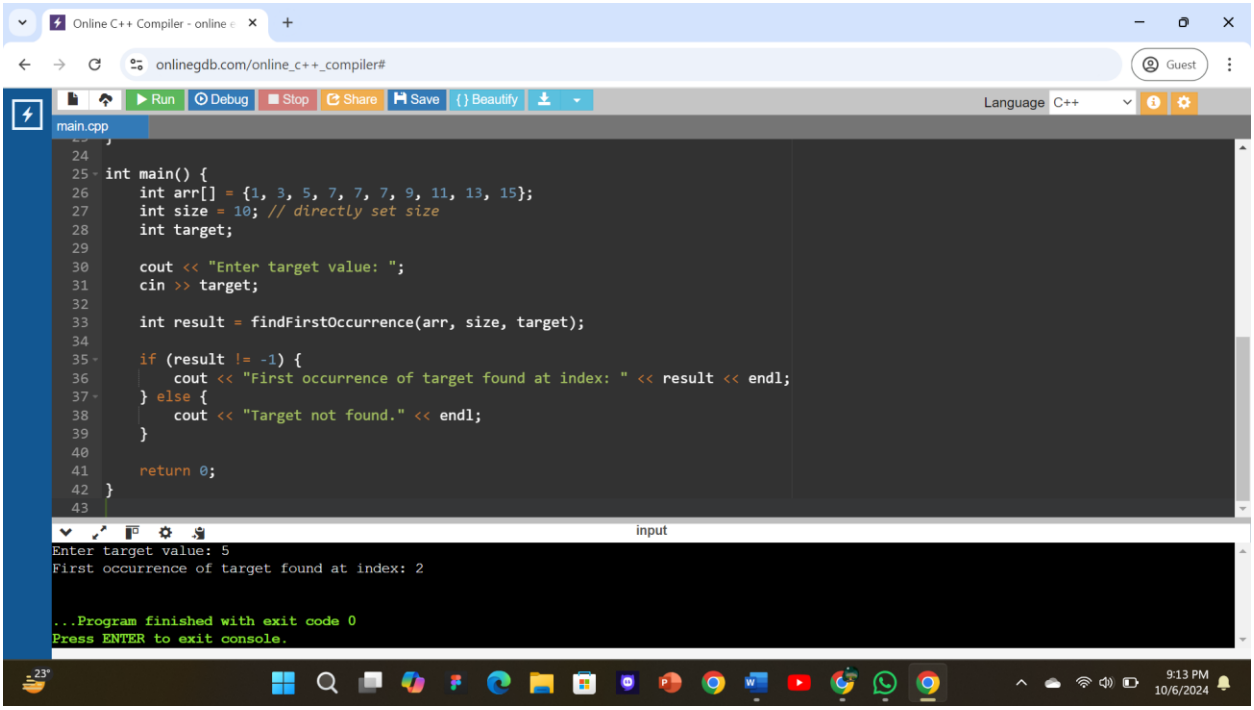


//QUESTION#2

```
#include <iostream>

using namespace std;


int findFirstOccurrence(int arr[], int size, int target) {

    int left = 0;

    int right = size - 1;

    int result = -1;


    while (left <= right) {

        int mid = (left + right) / 2;


        if (arr[mid] == target) {

            result = mid;
```

```
            right = mid - 1;
        } else if (arr[mid] < target) {
            left = mid + 1;
        } else {
            right = mid - 1;
        }
    }

    return result;
}

int main() {
    int arr[] = {1, 3, 5, 7, 7, 7, 9, 11, 13, 15};
    int size = 10;
    int target;

    cout << "Enter target value: ";
    cin >> target;

    int result = findFirstOccurrence(arr, size, target);

    if (result != -1) {
        cout << "First occurrence of target found at index: " << result << endl;
    } else {
        cout << "Target not found." << endl;
    }
```

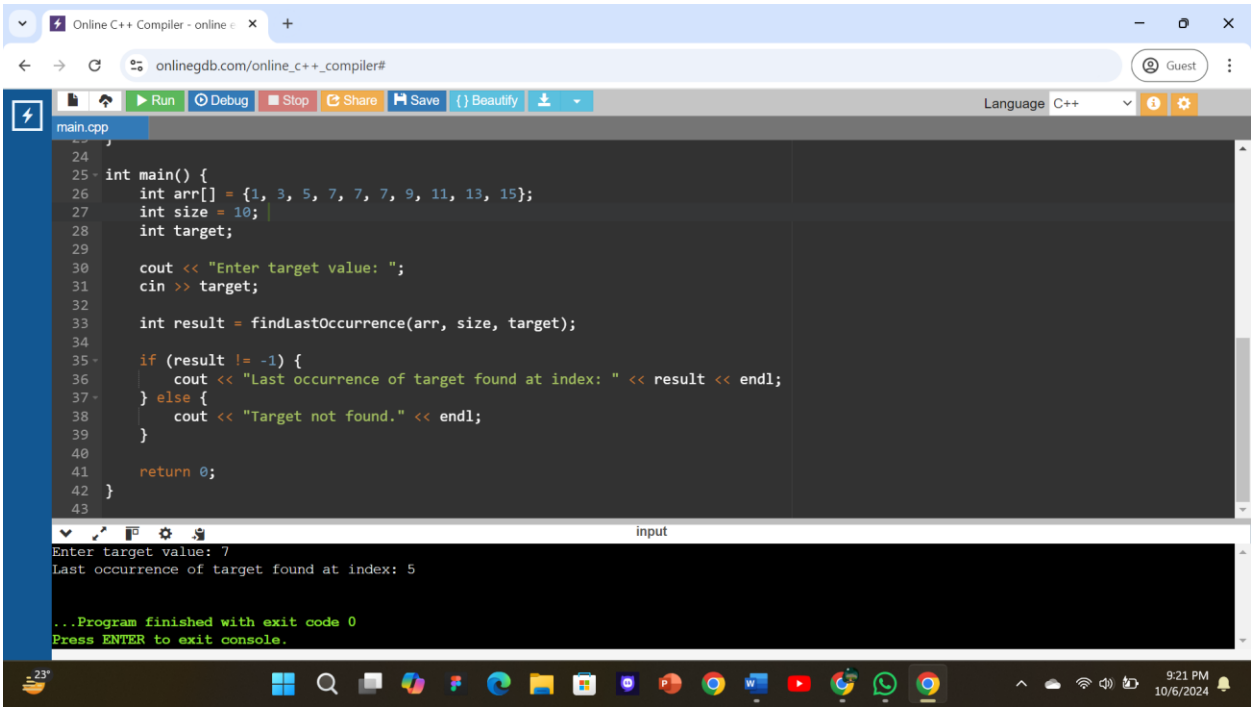
```
    return 0;
}
```




```
//QUESTION#3
#include <iostream>
using namespace std;

int findLastOccurrence(int arr[], int size, int target) {
    int left = 0;
    int right = size - 1;
    int result = -1;

    while (left <= right) {
        int mid = (left + right) / 2;
```

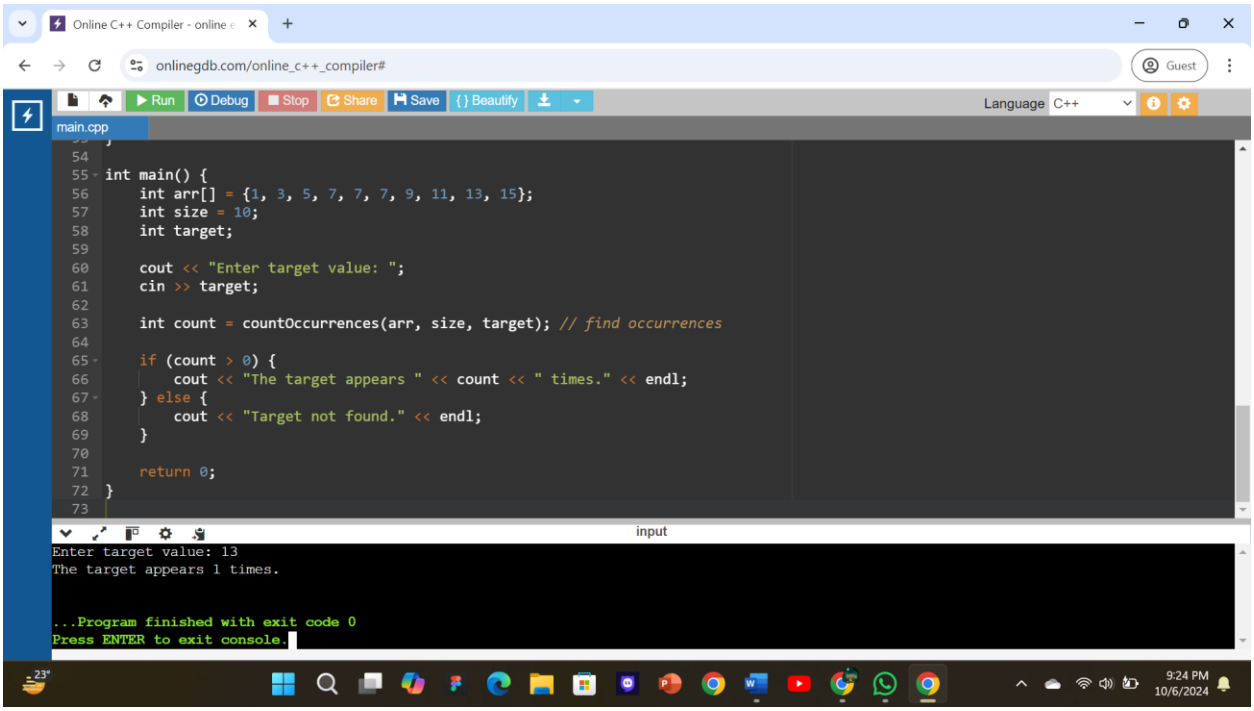
```
        if (arr[mid] == target) {
            result = mid;
            left = mid + 1;
        } else if (arr[mid] < target) {
            left = mid + 1;
        } else {
            right = mid - 1;
        }
    }

    return result;
}

int main() {
    int arr[] = {1, 3, 5, 7, 7, 7, 9, 11, 13, 15};
    int size = 10;
    int target;

    cout << "Enter target value: ";
    cin >> target;

    int result = findLastOccurrence(arr, size, target);

    if (result != -1) {
        cout << "Last occurrence of target found at index: " << result << endl;
    } else {
```

```
        cout << "Target not found." << endl;
    }

    return 0;
}
```




```
//QUESTION#4
#include <iostream>
using namespace std;

int findFirstOccurrence(int arr[], int size, int target) {
    int left = 0;
    int right = size - 1;
    int result = -1;
```

```
    while (left <= right) {
        int mid = (left + right) / 2;

        if (arr[mid] == target) {
            result = mid;
            right = mid - 1;
        } else if (arr[mid] < target) {
            left = mid + 1;
        } else {
            right = mid - 1;
        }
    }

    return result;
}

int findLastOccurrence(int arr[], int size, int target) {
    int left = 0;
    int right = size - 1;
    int result = -1;

    while (left <= right) {
        int mid = (left + right) / 2;

        if (arr[mid] == target) {
            result = mid;
```

```
            left = mid + 1;
        } else if (arr[mid] < target) {
            left = mid + 1;
        } else {
            right = mid - 1;
        }
    }

    return result;
}

int countOccurrences(int arr[], int size, int target) {
    int first = findFirstOccurrence(arr, size, target);
    if (first == -1) {
        return 0;
    }
    int last = findLastOccurrence(arr, size, target);
    return last - first + 1;
}

int main() {
    int arr[] = {1, 3, 5, 7, 7, 7, 9, 11, 13, 15};
    int size = 10;
    int target;

    cout << "Enter target value: ";
```

```
    cin >> target;

    int count = countOccurrences(arr, size, target); // find occurrences

    if (count > 0) {
        cout << "The target appears " << count << " times." << endl;
    } else {
        cout << "Target not found." << endl;
    }

    return 0;
}
```