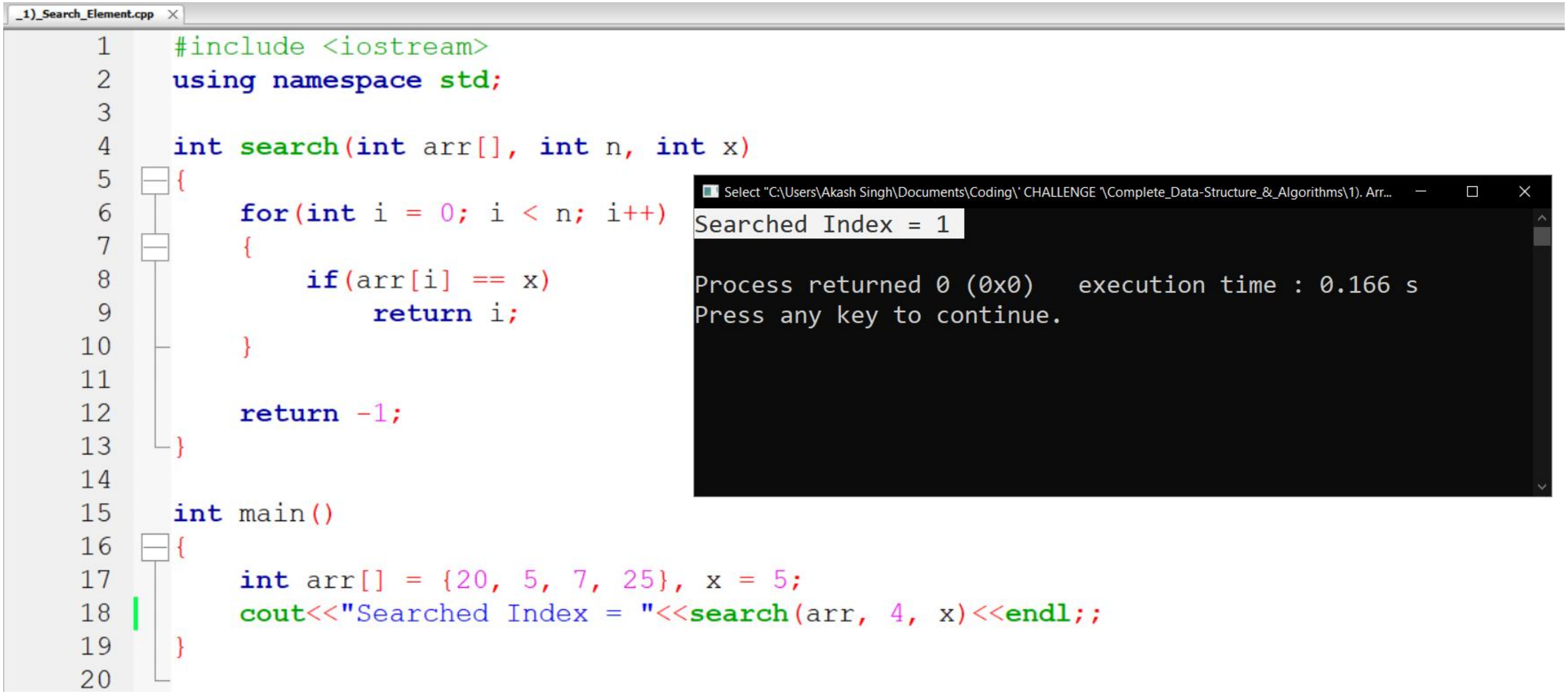
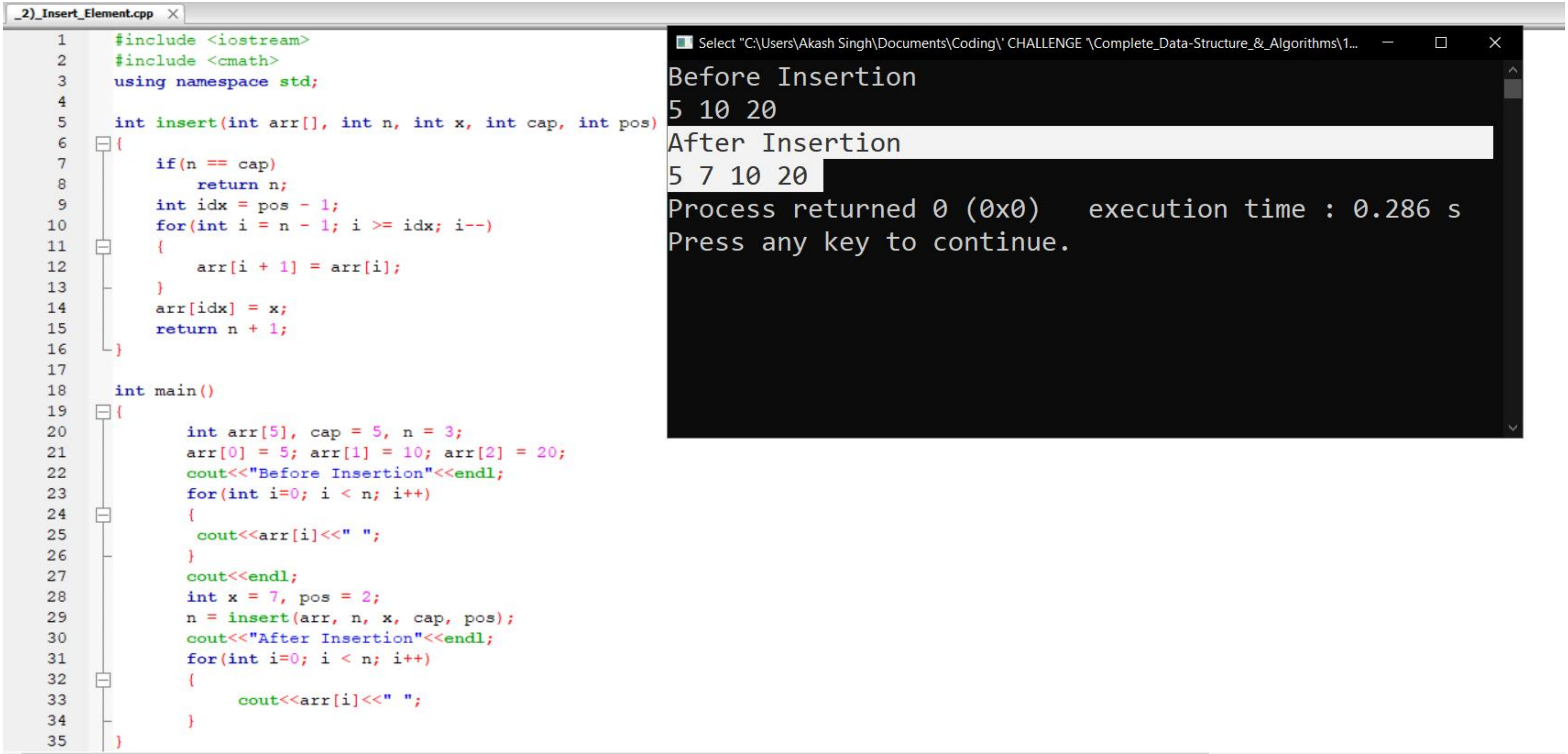

_1)_Search_Element.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete_Data-Structure_&_Algorithms\1). Arr...

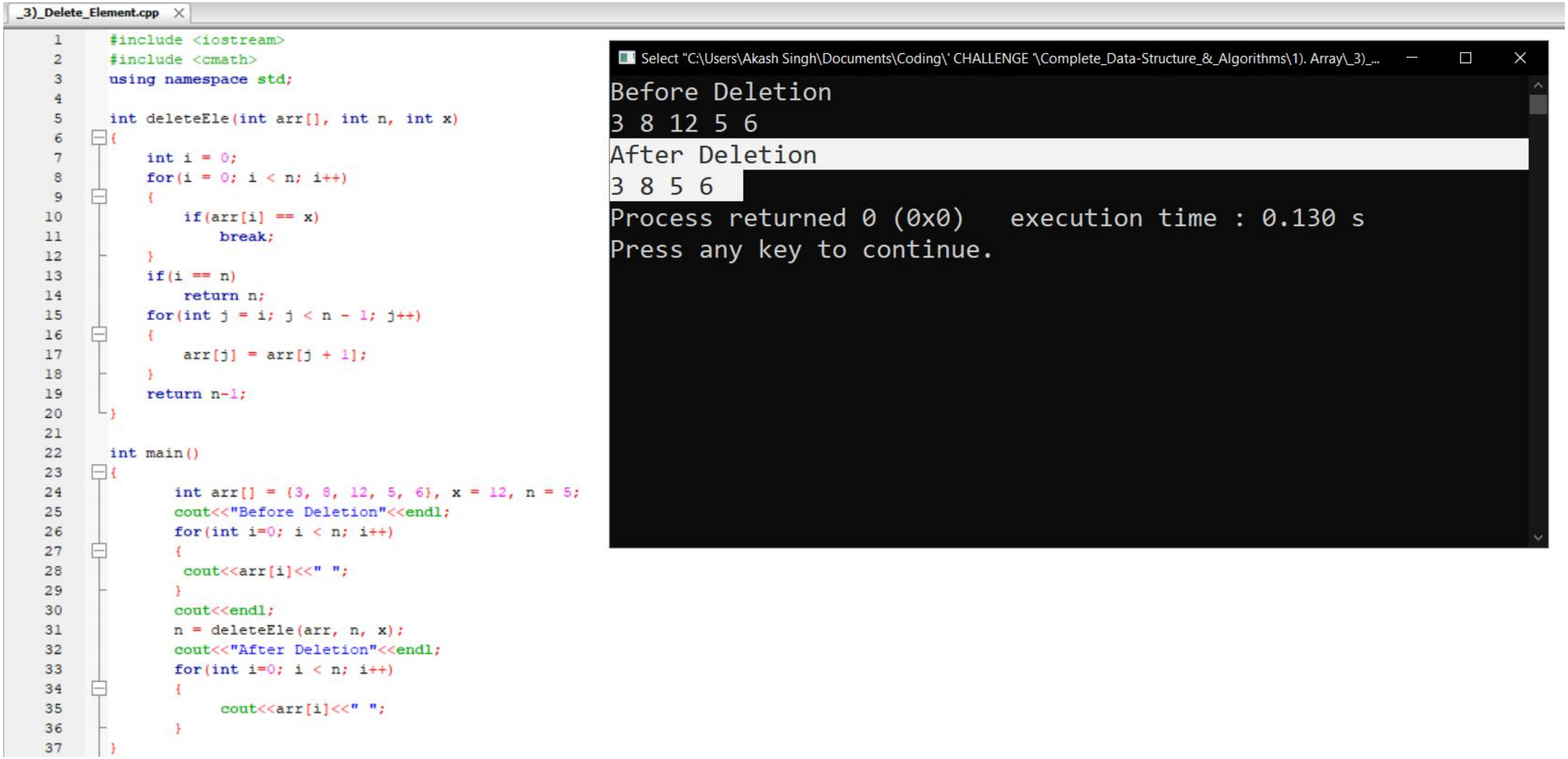
```cpp
#include <iostream>
using namespace std;

int search(int arr[], int n, int x)
{
    for(int i = 0; i < n; i++)
    {
        if(arr[i] == x)
            return i;
    }

    return -1;
}

int main()
{
    int arr[] = {20, 5, 7, 25}, x = 5;
    cout<<"Searched Index = "<<search(arr, 4, x)<<endl;;
}

```

```
Searched Index = 1

Process returned 0 (0x0)   execution time : 0.166 s
Press any key to continue.
```


_2)_Insert_Element.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete_Data-Structure_&_Algorithms\1...

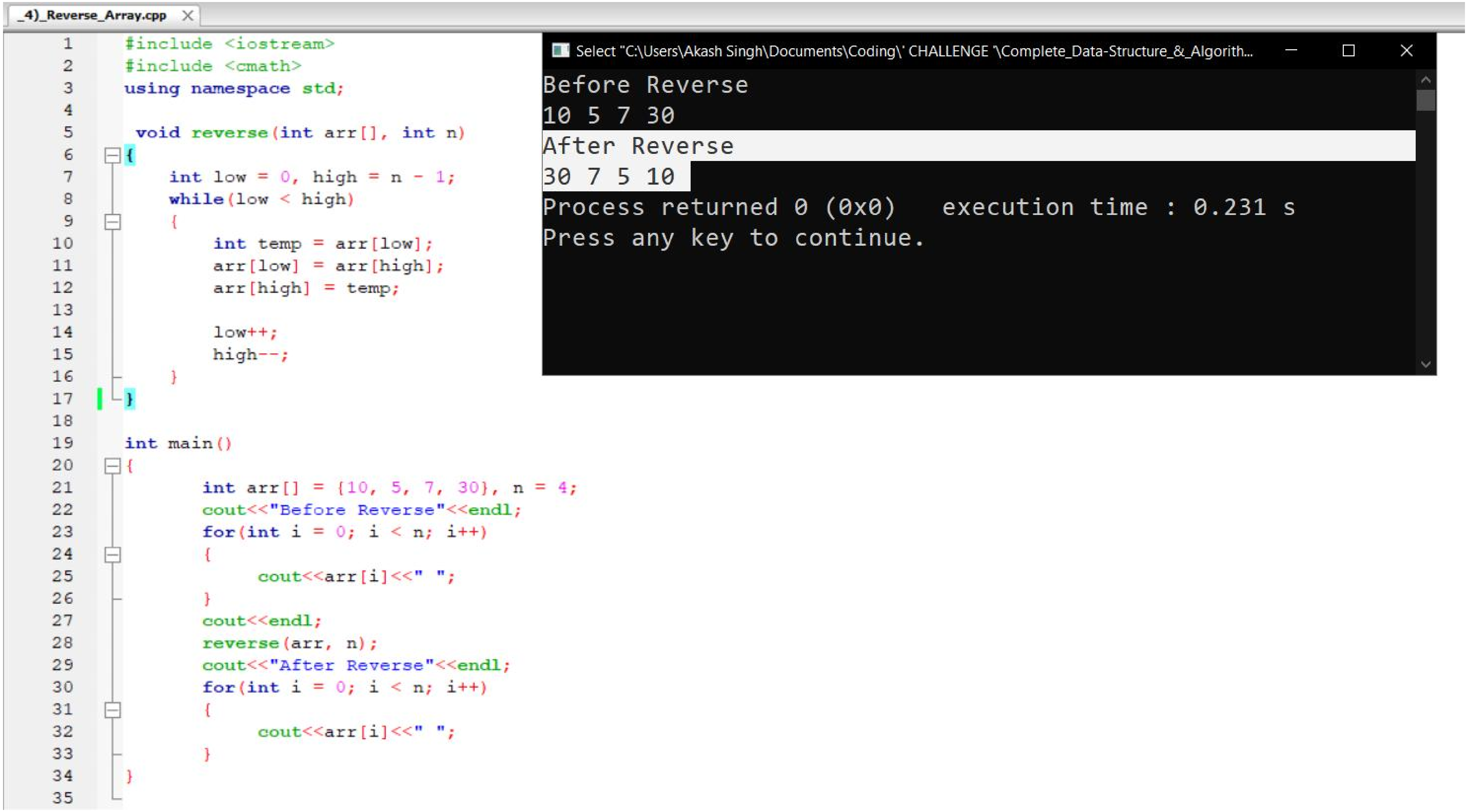
```cpp
#include <iostream>
#include <cmath>
using namespace std;

int insert(int arr[], int n, int x, int cap, int pos)
{
    if(n == cap)
        return n;
    int idx = pos - 1;
    for(int i = n - 1; i >= idx; i--)
    {
        arr[i + 1] = arr[i];
    }
    arr[idx] = x;
    return n + 1;
}

int main()
{
       int arr[5], cap = 5, n = 3;
       arr[0] = 5; arr[1] = 10; arr[2] = 20;
       cout<<"Before Insertion"<<endl;
       for(int i=0; i < n; i++)
       {
        cout<<arr[i]<<" ";
       }
       cout<<endl;
       int x = 7, pos = 2;
       n = insert(arr, n, x, cap, pos);
       cout<<"After Insertion"<<endl;
       for(int i=0; i < n; i++)
       {
            cout<<arr[i]<<" ";
       }
}
```

```
Before Insertion
5 10 20
After Insertion
5 7 10 20
Process returned 0 (0x0)   execution time : 0.286 s
Press any key to continue.
```


_3)_Delete_Element.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete_Data-Structure_&_Algorithms\1). Array_3)_...

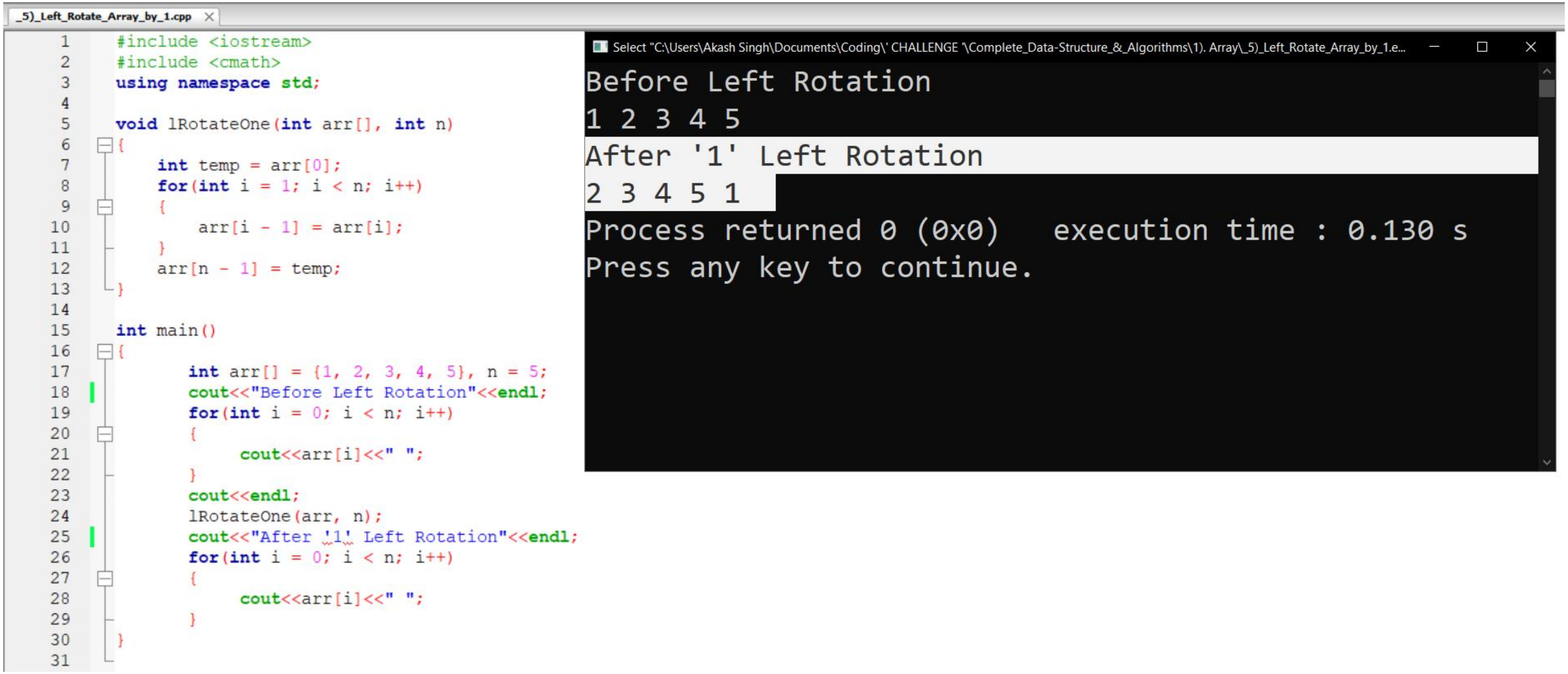
```cpp
#include <iostream>
#include <cmath>
using namespace std;

int deleteEle(int arr[], int n, int x)
{
    int i = 0;
    for(i = 0; i < n; i++)
    {
        if(arr[i] == x)
            break;
    }
    if(i == n)
        return n;
    for(int j = i; j < n - 1; j++)
    {
        arr[j] = arr[j + 1];
    }
    return n-1;
}

int main()
{
       int arr[] = {3, 8, 12, 5, 6}, x = 12, n = 5;
       cout<<"Before Deletion"<<endl;
       for(int i=0; i < n; i++)
       {
        cout<<arr[i]<<" ";
       }
       cout<<endl;
       n = deleteEle(arr, n, x);
       cout<<"After Deletion"<<endl;
       for(int i=0; i < n; i++)
       {
            cout<<arr[i]<<" ";
       }
}
```

```
Before Deletion
3 8 12 5 6
After Deletion
3 8 5 6
Process returned 0 (0x0)   execution time : 0.130 s
Press any key to continue.
```


_4)_Reverse_Array.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete_Data-Structure_&_Algorith...

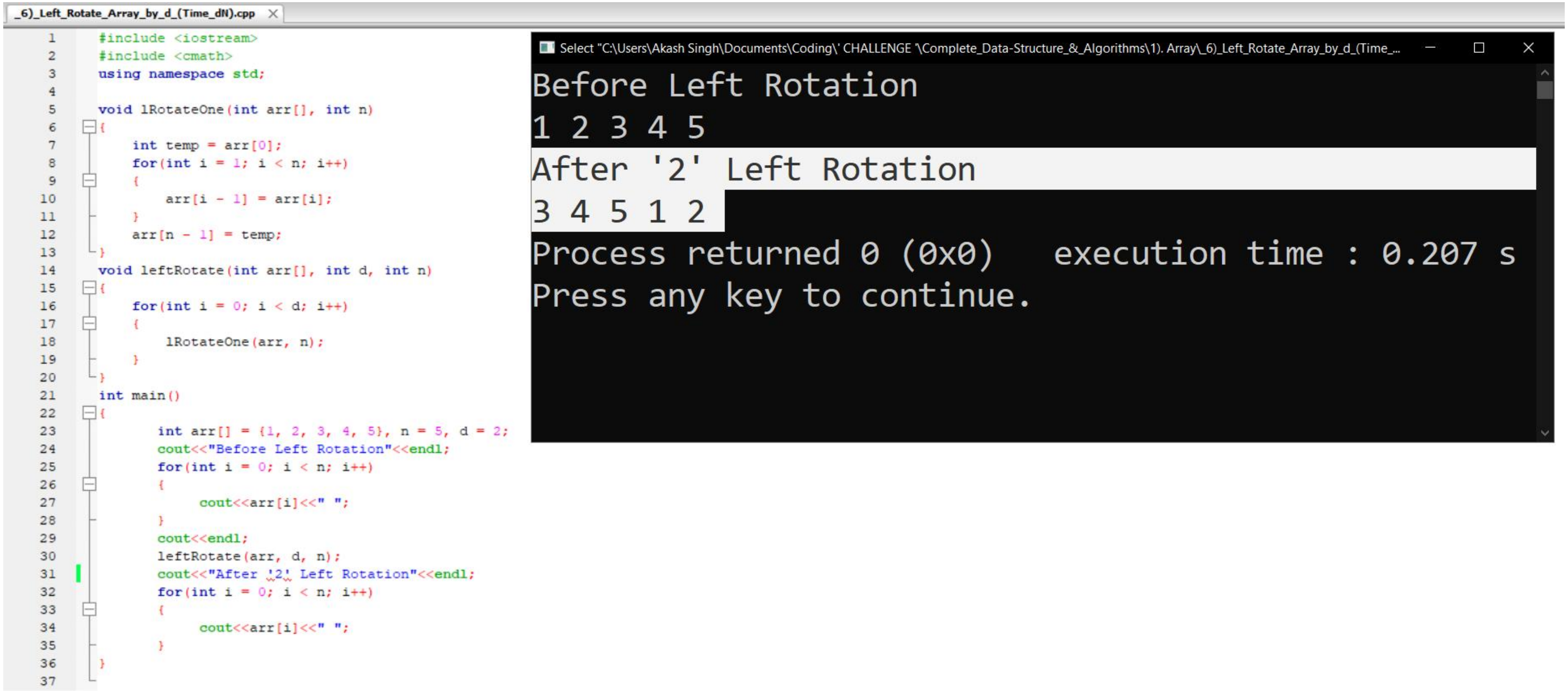
```cpp
#include <iostream>
#include <cmath>
using namespace std;

 void reverse(int arr[], int n)
{
    int low = 0, high = n - 1;
    while(low < high)
    {
        int temp = arr[low];
        arr[low] = arr[high];
        arr[high] = temp;

        low++;
        high--;
    }
}

int main()
{
       int arr[] = {10, 5, 7, 30}, n = 4;
       cout<<"Before Reverse"<<endl;
       for(int i = 0; i < n; i++)
       {
            cout<<arr[i]<<" ";
       }
       cout<<endl;
       reverse(arr, n);
       cout<<"After Reverse"<<endl;
       for(int i = 0; i < n; i++)
       {
            cout<<arr[i]<<" ";
       }
}

```

```
Before Reverse
10 5 7 30
After Reverse
30 7 5 10
Process returned 0 (0x0)   execution time : 0.231 s
Press any key to continue.
```


_5)_Left_Rotate_Array_by_1.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete_Data-Structure_&_Algorithms\1). Array_5)_Left_Rotate_Array_by_1.e...

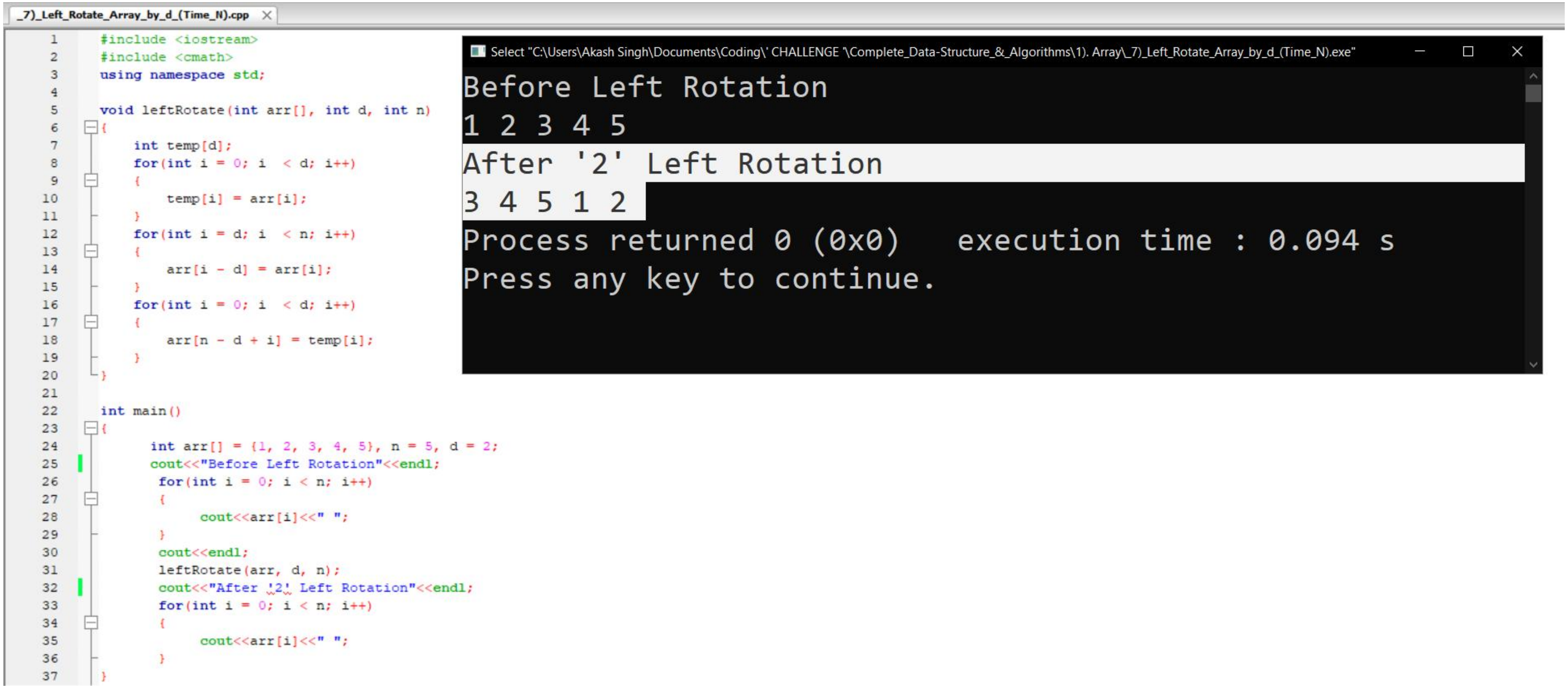
```cpp
#include <iostream>
#include <cmath>
using namespace std;

void lRotateOne(int arr[], int n)
{
    int temp = arr[0];
    for(int i = 1; i < n; i++)
    {
        arr[i - 1] = arr[i];
    }
    arr[n - 1] = temp;
}

int main()
{
       int arr[] = {1, 2, 3, 4, 5}, n = 5;
       cout<<"Before Left Rotation"<<endl;
       for(int i = 0; i < n; i++)
       {
            cout<<arr[i]<<" ";
       }
       cout<<endl;
       lRotateOne(arr, n);
       cout<<"After '1' Left Rotation"<<endl;
       for(int i = 0; i < n; i++)
       {
            cout<<arr[i]<<" ";
       }
}
```

```
Before Left Rotation
1 2 3 4 5
After '1' Left Rotation
2 3 4 5 1
Process returned 0 (0x0)   execution time : 0.130 s
Press any key to continue.
```


_6)_Left_Rotate_Array_by_d_(Time_dN).cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete_Data-Structure_&_Algorithms\1). Array_6)_Left_Rotate_Array_by_d_(Time_...

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

void lRotateOne(int arr[], int n)
{
    int temp = arr[0];
    for(int i = 1; i < n; i++)
    {
        arr[i - 1] = arr[i];
    }
    arr[n - 1] = temp;
}
void leftRotate(int arr[], int d, int n)
{
    for(int i = 0; i < d; i++)
    {
        lRotateOne(arr, n);
    }
}
int main()
{
       int arr[] = {1, 2, 3, 4, 5}, n = 5, d = 2;
       cout<<"Before Left Rotation"<<endl;
       for(int i = 0; i < n; i++)
       {
            cout<<arr[i]<<" ";
       }
       cout<<endl;
       leftRotate(arr, d, n);
       cout<<"After '2' Left Rotation"<<endl;
       for(int i = 0; i < n; i++)
       {
            cout<<arr[i]<<" ";
       }
}

```

```
Before Left Rotation
1 2 3 4 5
After '2' Left Rotation
3 4 5 1 2
Process returned 0 (0x0)   execution time : 0.207 s
Press any key to continue.
```

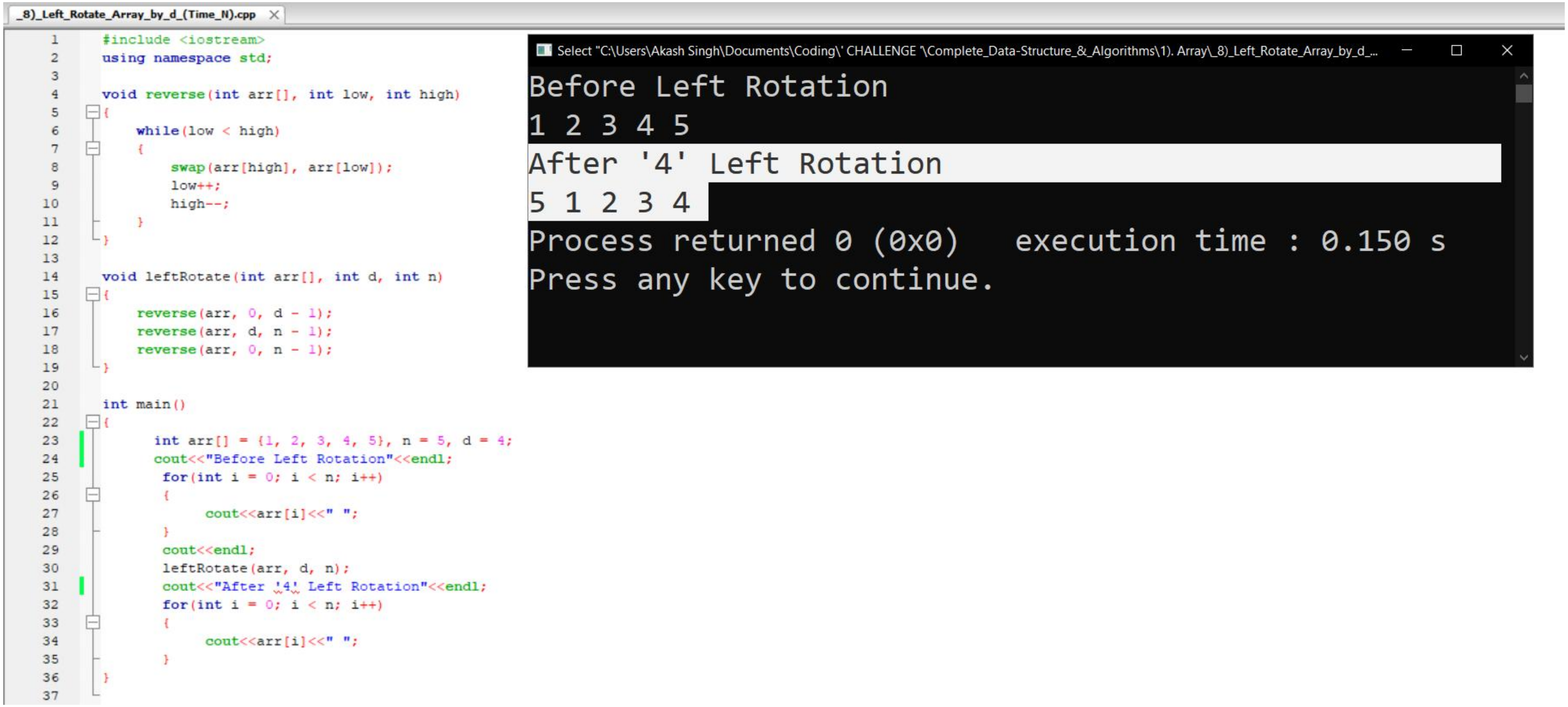


_7)_Left_Rotate_Array_by_d_(Time_N).cpp

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

void leftRotate(int arr[], int d, int n)
{
    int temp[d];
    for(int i = 0; i  < d; i++)
    {
        temp[i] = arr[i];
    }
    for(int i = d; i  < n; i++)
    {
        arr[i - d] = arr[i];
    }
    for(int i = 0; i  < d; i++)
    {
        arr[n - d + i] = temp[i];
    }
}

int main()
{
      int arr[] = {1, 2, 3, 4, 5}, n = 5, d = 2;
      cout<<"Before Left Rotation"<<endl;
       for(int i = 0; i < n; i++)
       {
            cout<<arr[i]<<" ";
       }
       cout<<endl;
       leftRotate(arr, d, n);
       cout<<"After '2' Left Rotation"<<endl;
       for(int i = 0; i < n; i++)
       {
            cout<<arr[i]<<" ";
       }
}
```

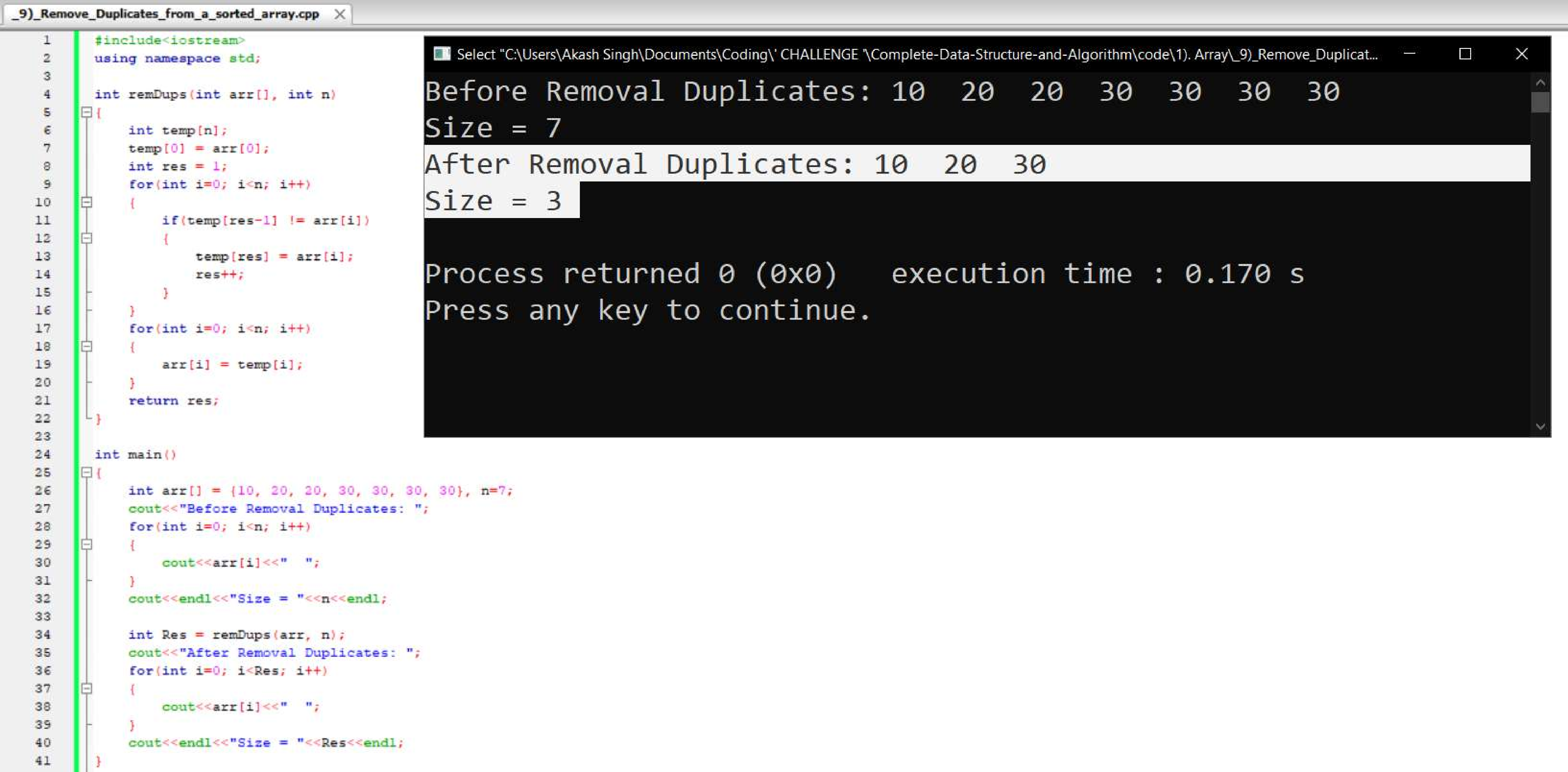
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete_Data-Structure_&_Algorithms\1). Array_7)_Left_Rotate_Array_by_d_(Time_N).exe"

```
Before Left Rotation
1 2 3 4 5
After '2' Left Rotation
3 4 5 1 2
Process returned 0 (0x0)   execution time : 0.094 s
Press any key to continue.
```


_8)_Left_Rotate_Array_by_d_(Time_N).cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete_Data-Structure_&_Algorithms\1). Array_8)_Left_Rotate_Array_by_d_...

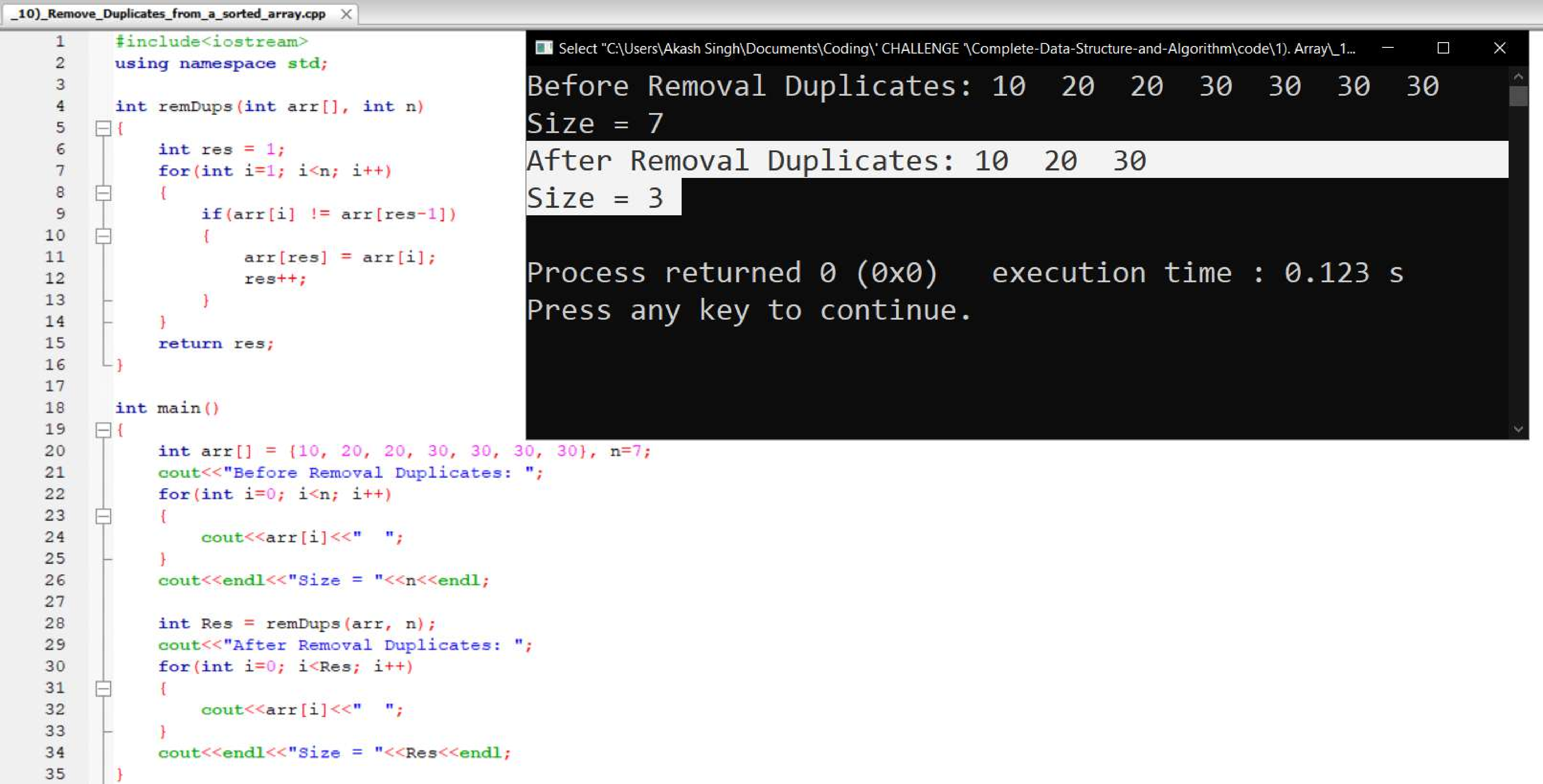
```cpp
#include <iostream>
using namespace std;

void reverse(int arr[], int low, int high)
{
    while(low < high)
    {
        swap(arr[high], arr[low]);
        low++;
        high--;
    }
}

void leftRotate(int arr[], int d, int n)
{
    reverse(arr, 0, d - 1);
    reverse(arr, d, n - 1);
    reverse(arr, 0, n - 1);
}

int main()
{
      int arr[] = {1, 2, 3, 4, 5}, n = 5, d = 4;
      cout<<"Before Left Rotation"<<endl;
       for(int i = 0; i < n; i++)
       {
            cout<<arr[i]<<" ";
       }
       cout<<endl;
       leftRotate(arr, d, n);
       cout<<"After '4' Left Rotation"<<endl;
       for(int i = 0; i < n; i++)
       {
            cout<<arr[i]<<" ";
       }
}
```

```
Before Left Rotation
1 2 3 4 5
After '4' Left Rotation
5 1 2 3 4
Process returned 0 (0x0)   execution time : 0.150 s
Press any key to continue.
```


_9)_Remove_Duplicates_from_a_sorted_array.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\code\1). Array_9)_Remove_Duplicat...

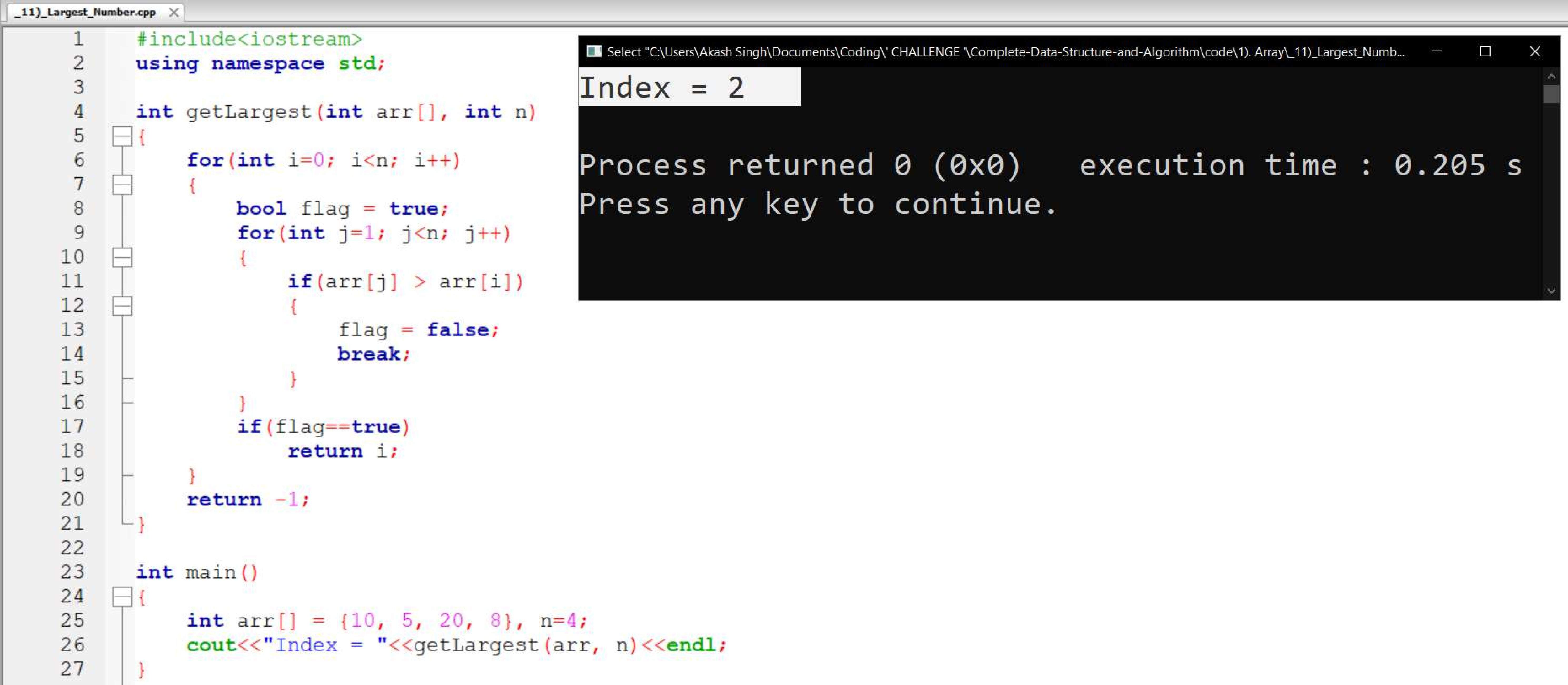
```cpp
#include<iostream>
using namespace std;

int remDups(int arr[], int n)
{
    int temp[n];
    temp[0] = arr[0];
    int res = 1;
    for(int i=0; i<n; i++)
    {
        if(temp[res-1] != arr[i])
        {
            temp[res] = arr[i];
            res++;
        }
    }
    for(int i=0; i<n; i++)
    {
        arr[i] = temp[i];
    }
    return res;
}

int main()
{
    int arr[] = {10, 20, 20, 30, 30, 30, 30}, n=7;
    cout<<"Before Removal Duplicates: ";
    for(int i=0; i<n; i++)
    {
        cout<<arr[i]<<"  ";
    }
    cout<<endl<<"Size = "<<n<<endl;

    int Res = remDups(arr, n);
    cout<<"After Removal Duplicates: ";
    for(int i=0; i<Res; i++)
    {
        cout<<arr[i]<<"  ";
    }
    cout<<endl<<"Size = "<<Res<<endl;
}
```

```
Before Removal Duplicates: 10  20  20  30  30  30  30
Size = 7
After Removal Duplicates: 10  20  30
Size = 3

Process returned 0 (0x0)   execution time : 0.170 s
Press any key to continue.
```


_10)_Remove_Duplicates_from_a_sorted_array.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\code\1). Array_1...

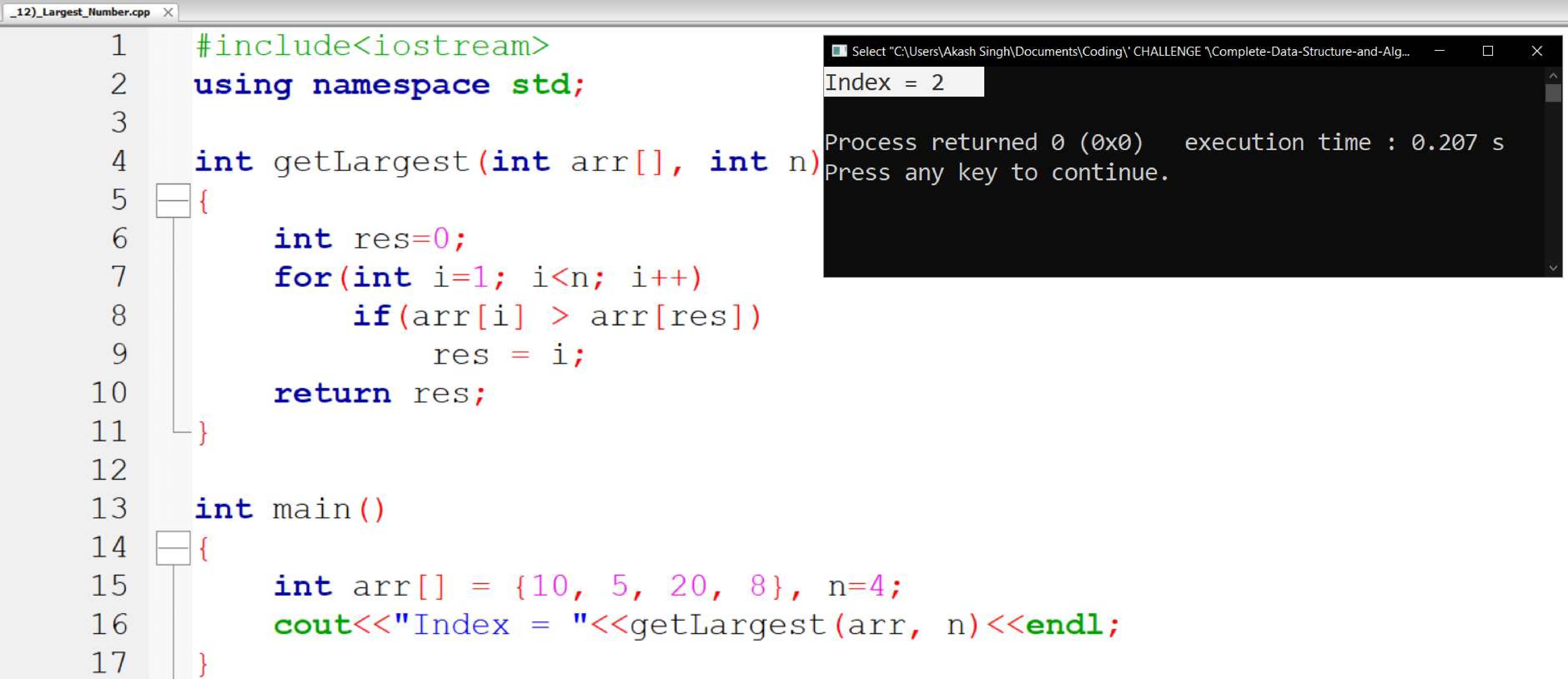
```cpp
#include<iostream>
using namespace std;

int remDups(int arr[], int n)
{
    int res = 1;
    for(int i=1; i<n; i++)
    {
        if(arr[i] != arr[res-1])
        {
            arr[res] = arr[i];
            res++;
        }
    }
    return res;
}

int main()
{
    int arr[] = {10, 20, 20, 30, 30, 30, 30}, n=7;
    cout<<"Before Removal Duplicates: ";
    for(int i=0; i<n; i++)
    {
        cout<<arr[i]<<"  ";
    }
    cout<<endl<<"Size = "<<n<<endl;

    int Res = remDups(arr, n);
    cout<<"After Removal Duplicates: ";
    for(int i=0; i<Res; i++)
    {
        cout<<arr[i]<<"  ";
    }
    cout<<endl<<"Size = "<<Res<<endl;
}
```

```
Before Removal Duplicates: 10  20  20  30  30  30  30
Size = 7
After Removal Duplicates: 10  20  30
Size = 3

Process returned 0 (0x0)   execution time : 0.123 s
Press any key to continue.
```


_11)_Largest_Number.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\code\1). Array_11)_Largest_Numb...

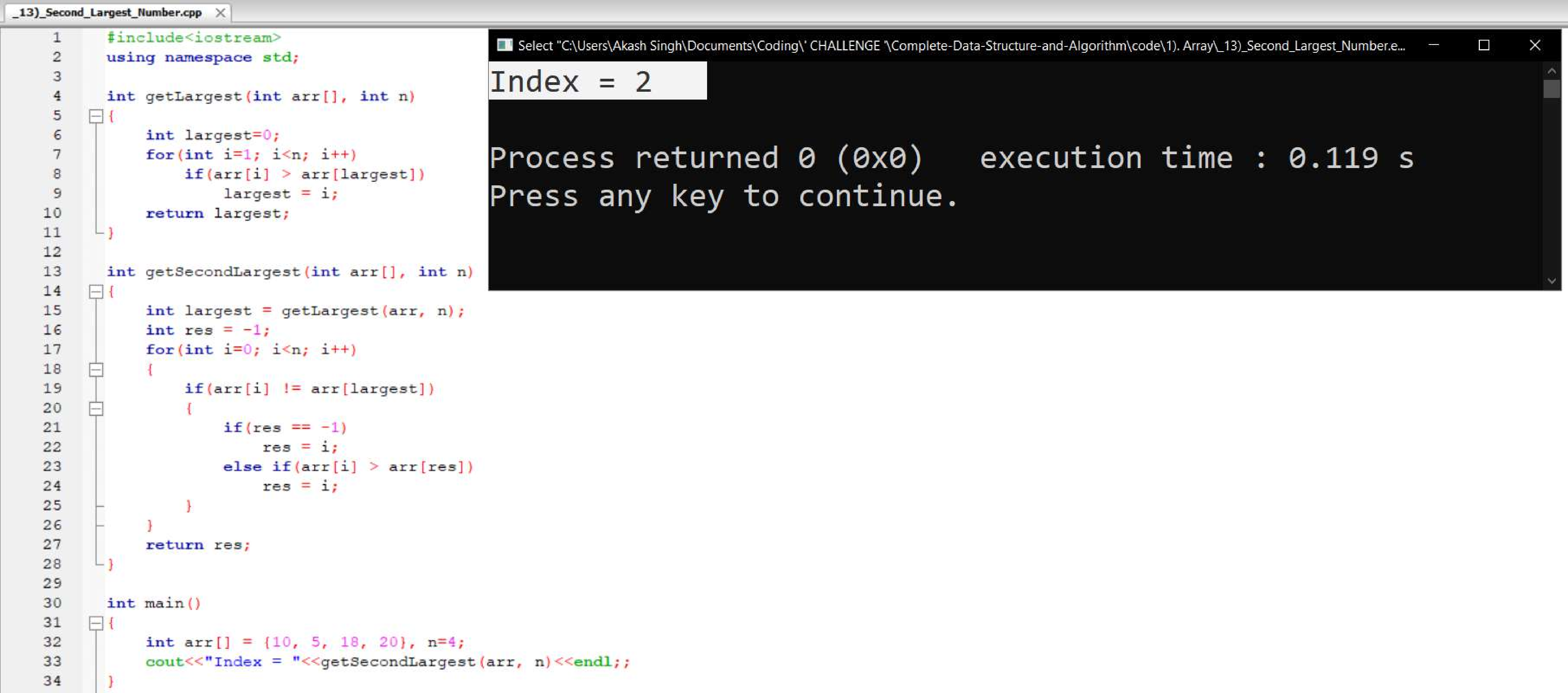
```cpp
#include<iostream>
using namespace std;

int getLargest(int arr[], int n)
{
    for(int i=0; i<n; i++)
    {
        bool flag = true;
        for(int j=1; j<n; j++)
        {
            if(arr[j] > arr[i])
            {
                flag = false;
                break;
            }
        }
        if(flag==true)
            return i;
    }
    return -1;
}

int main()
{
    int arr[] = {10, 5, 20, 8}, n=4;
    cout<<"Index = "<<getLargest(arr, n)<<endl;
}
```

```
Index = 2

Process returned 0 (0x0)   execution time : 0.205 s
Press any key to continue.
```


_12)_Largest_Number.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Alg...

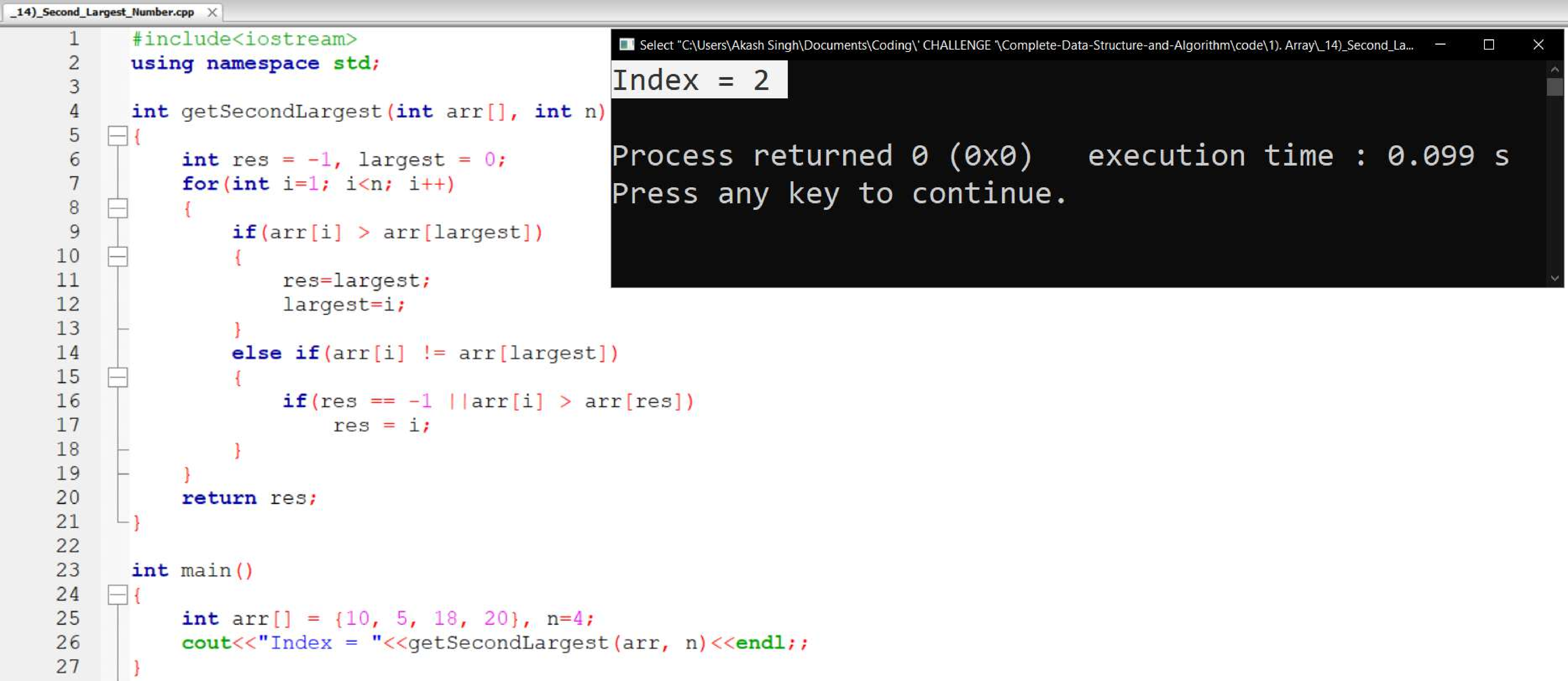
```cpp
#include<iostream>
using namespace std;

int getLargest(int arr[], int n)
{
    int res=0;
    for(int i=1; i<n; i++)
        if(arr[i] > arr[res])
            res = i;
    return res;
}

int main()
{
    int arr[] = {10, 5, 20, 8}, n=4;
    cout<<"Index = "<<getLargest(arr, n)<<endl;
}
```

```
Index = 2

Process returned 0 (0x0)   execution time : 0.207 s
Press any key to continue.
```


_13)_Second_Largest_Number.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\code\1). Array_13)_Second_Largest_Number.e...

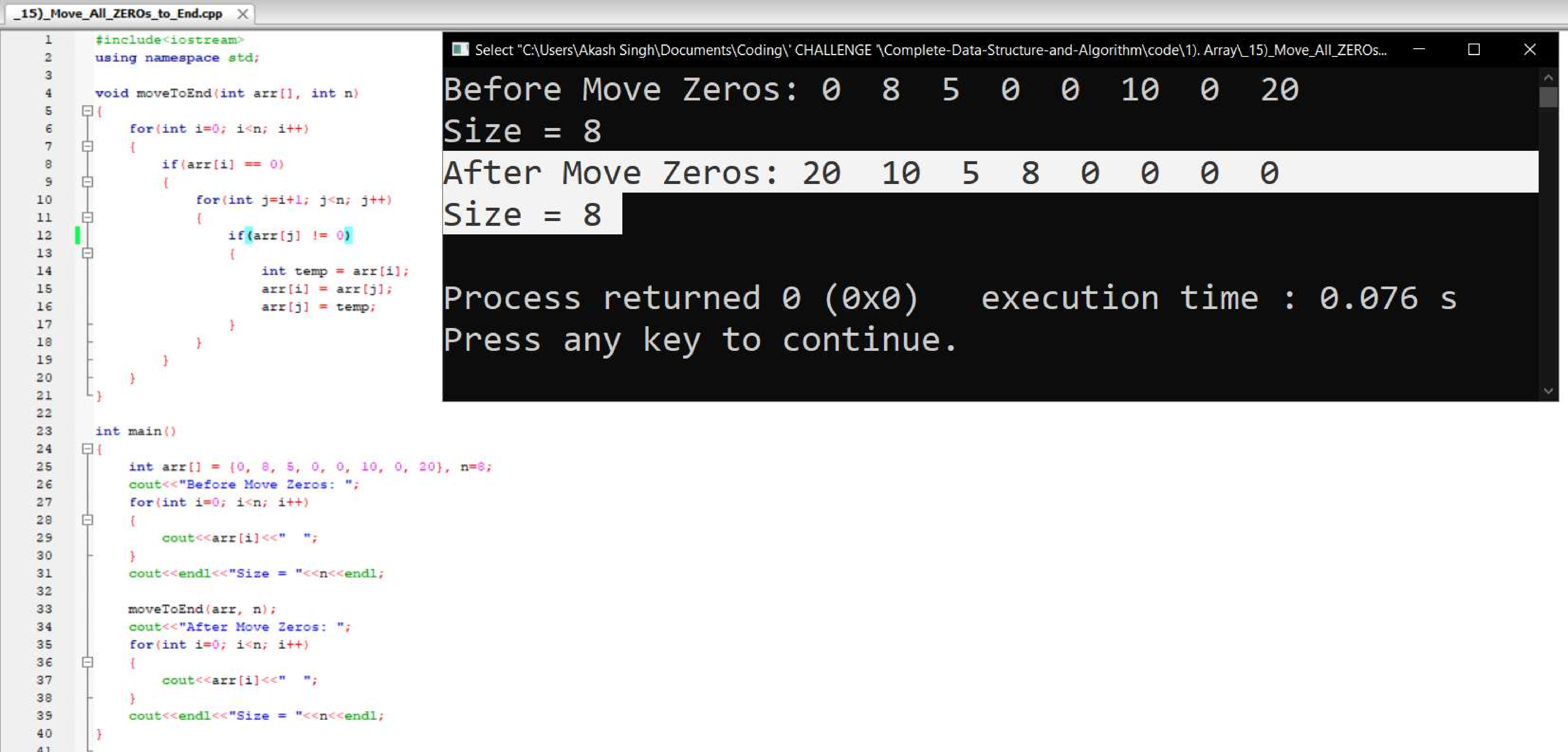
```cpp
#include<iostream>
using namespace std;

int getLargest(int arr[], int n)
{
    int largest=0;
    for(int i=1; i<n; i++)
        if(arr[i] > arr[largest])
            largest = i;
    return largest;
}

int getSecondLargest(int arr[], int n)
{
    int largest = getLargest(arr, n);
    int res = -1;
    for(int i=0; i<n; i++)
    {
        if(arr[i] != arr[largest])
        {
            if(res == -1)
                res = i;
            else if(arr[i] > arr[res])
                res = i;
        }
    }
    return res;
}

int main()
{
    int arr[] = {10, 5, 18, 20}, n=4;
    cout<<"Index = "<<getSecondLargest(arr, n)<<endl;;
}
```

```
Index = 2

Process returned 0 (0x0)   execution time : 0.119 s
Press any key to continue.
```


_14)_Second_Largest_Number.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\code\1). Array_14)_Second_La...

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

int getSecondLargest(int arr[], int n)
{
    int res = -1, largest = 0;
    for(int i=1; i<n; i++)
    {
        if(arr[i] > arr[largest])
        {
            res=largest;
            largest=i;
        }
        else if(arr[i] != arr[largest])
        {
            if(res == -1 ||arr[i] > arr[res])
                res = i;
        }
    }
    return res;
}

int main()
{
    int arr[] = {10, 5, 18, 20}, n=4;
    cout<<"Index = "<<getSecondLargest(arr, n)<<endl;;
}
```

```
Index = 2

Process returned 0 (0x0)   execution time : 0.099 s
Press any key to continue.
```

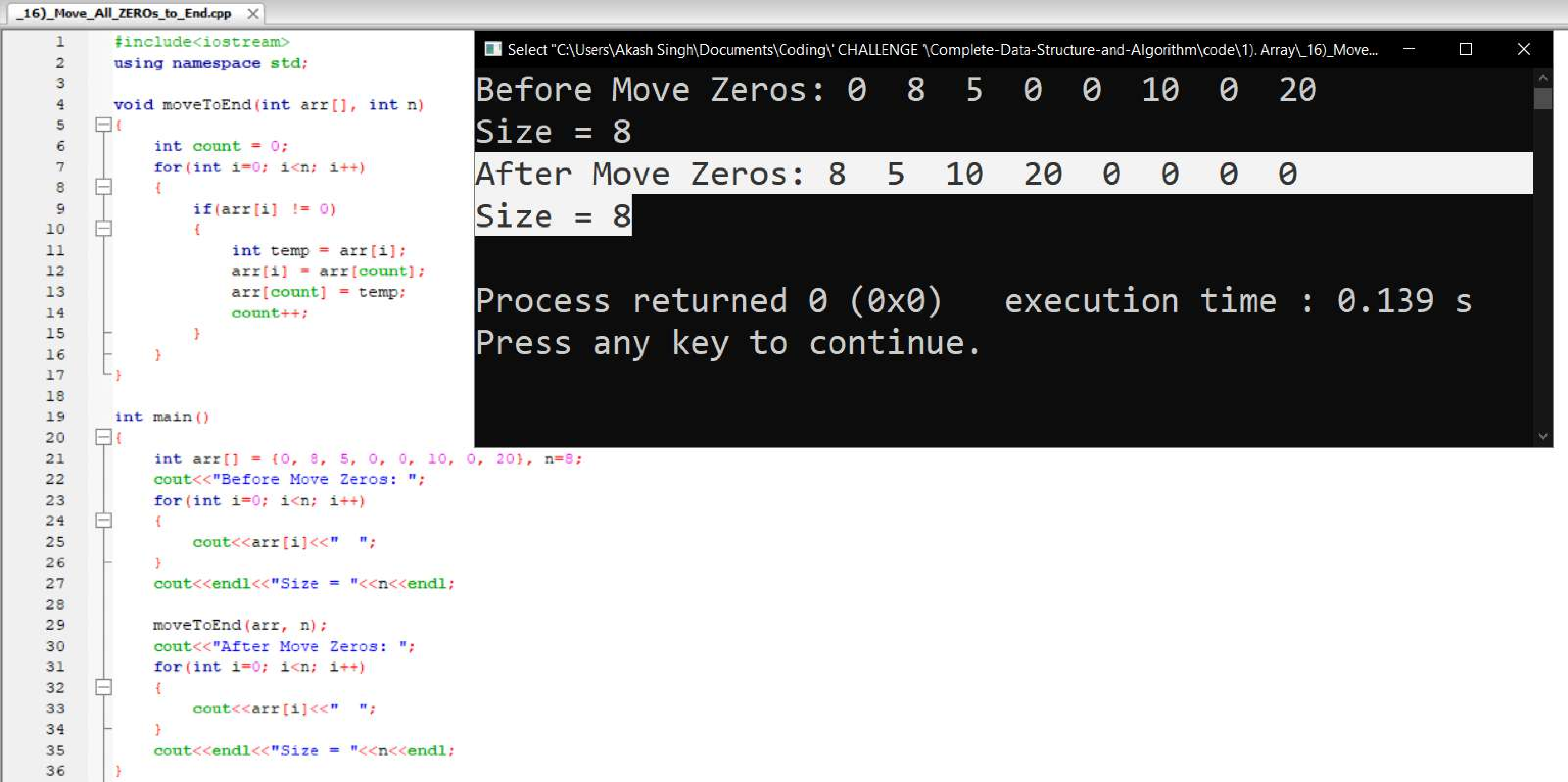


_15)_Move_All_ZEROs_to_End.cpp

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

void moveToEnd(int arr[], int n)
{
    for(int i=0; i<n; i++)
    {
        if(arr[i] == 0)
        {
            for(int j=i+1; j<n; j++)
            {
                if(arr[j] != 0)
                {
                    int temp = arr[i];
                    arr[i] = arr[j];
                    arr[j] = temp;
                }
            }
        }
    }
}

int main()
{
    int arr[] = {0, 8, 5, 0, 0, 10, 0, 20}, n=8;
    cout<<"Before Move Zeros: ";
    for(int i=0; i<n; i++)
    {
        cout<<arr[i]<<"  ";
    }
    cout<<endl<<"Size = "<<n<<endl;

    moveToEnd(arr, n);
    cout<<"After Move Zeros: ";
    for(int i=0; i<n; i++)
    {
        cout<<arr[i]<<"  ";
    }
    cout<<endl<<"Size = "<<n<<endl;
}
```

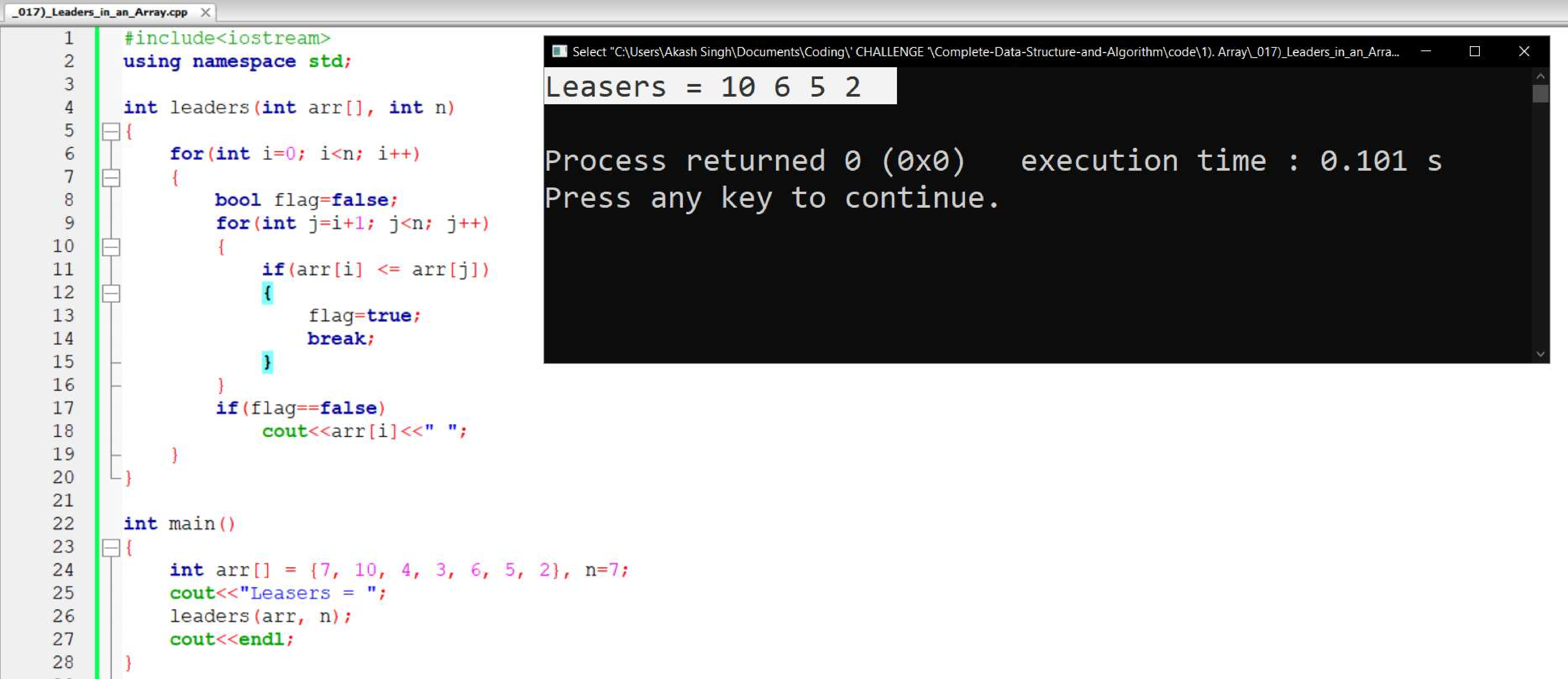
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\code\1). Array_15)_Move_All_ZEROs...

```
Before Move Zeros: 0  8  5  0  0  10  0  20
Size = 8
After Move Zeros: 20  10  5  8  0  0  0  0
Size = 8

Process returned 0 (0x0)   execution time : 0.076 s
Press any key to continue.
```


_16)_Move_All_ZEROs_to_End.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\code\1). Array_16)_Move...

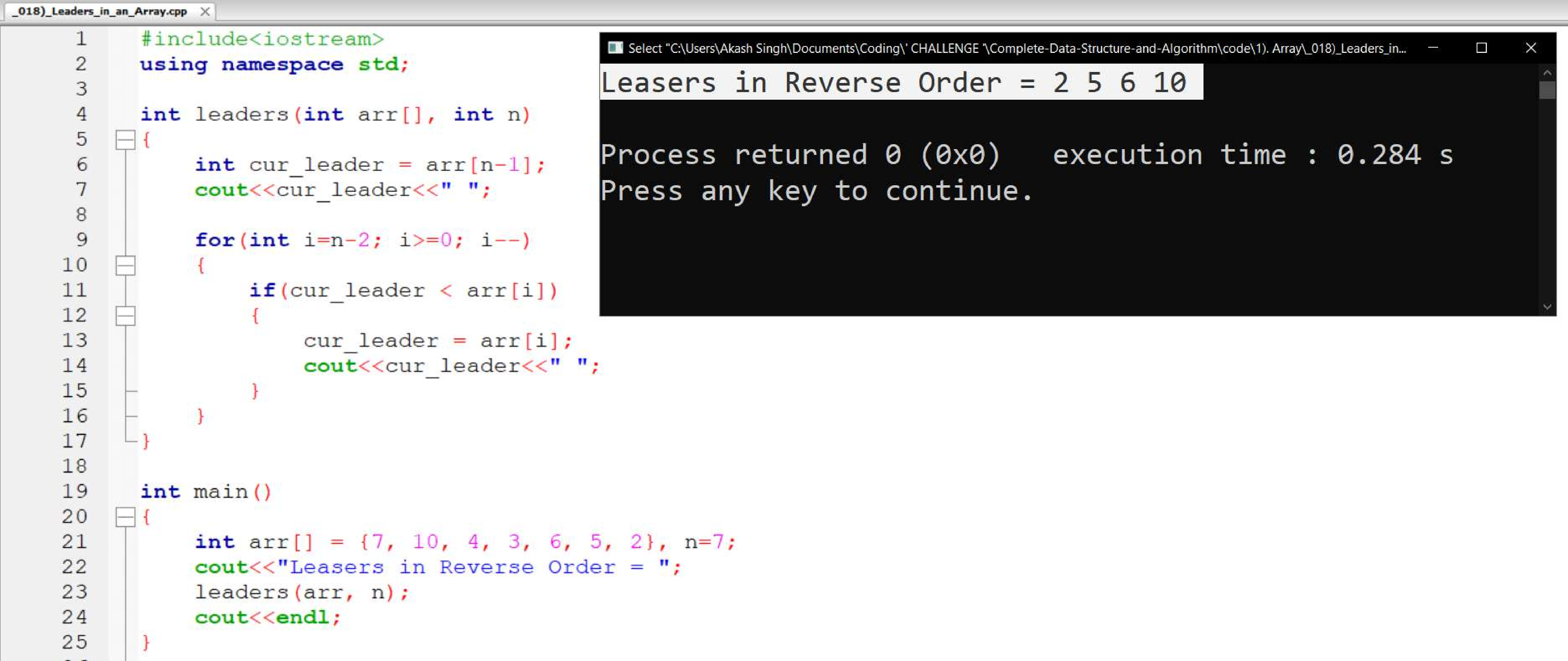
```cpp
#include<iostream>
using namespace std;

void moveToEnd(int arr[], int n)
{
    int count = 0;
    for(int i=0; i<n; i++)
    {
        if(arr[i] != 0)
        {
            int temp = arr[i];
            arr[i] = arr[count];
            arr[count] = temp;
            count++;
        }
    }
}

int main()
{
    int arr[] = {0, 8, 5, 0, 0, 10, 0, 20}, n=8;
    cout<<"Before Move Zeros: ";
    for(int i=0; i<n; i++)
    {
        cout<<arr[i]<<"  ";
    }
    cout<<endl<<"Size = "<<n<<endl;

    moveToEnd(arr, n);
    cout<<"After Move Zeros: ";
    for(int i=0; i<n; i++)
    {
        cout<<arr[i]<<"  ";
    }
    cout<<endl<<"Size = "<<n<<endl;
}
```

```
Before Move Zeros: 0  8  5  0  0  10  0  20
Size = 8
After Move Zeros: 8  5  10  20  0  0  0  0
Size = 8

Process returned 0 (0x0)   execution time : 0.139 s
Press any key to continue.
```


_017)_Leaders_in_an_Array.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\code\1). Array_017)_Leaders_in_an_Arra...

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

int leaders(int arr[], int n)
{
    for(int i=0; i<n; i++)
    {
        bool flag=false;
        for(int j=i+1; j<n; j++)
        {
            if(arr[i] <= arr[j])
            {
                flag=true;
                break;
            }
        }
        if(flag==false)
            cout<<arr[i]<<" ";
    }
}

int main()
{
    int arr[] = {7, 10, 4, 3, 6, 5, 2}, n=7;
    cout<<"Leasers = ";
    leaders(arr, n);
    cout<<endl;
}
```

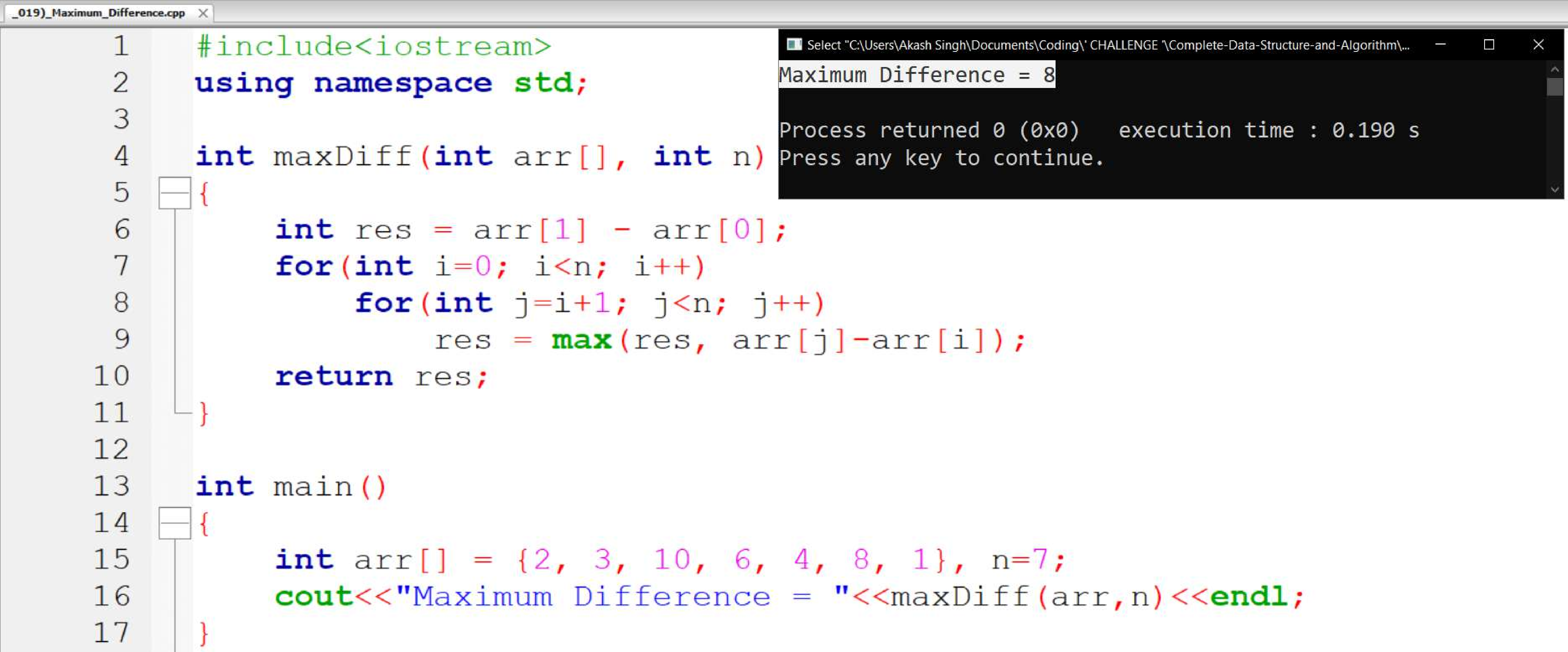
```
Leasers = 10 6 5 2

Process returned 0 (0x0)   execution time : 0.101 s
Press any key to continue.
```



_018)_Leaders_in_an_Array.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\code\1). Array_018)_Leaders_in...

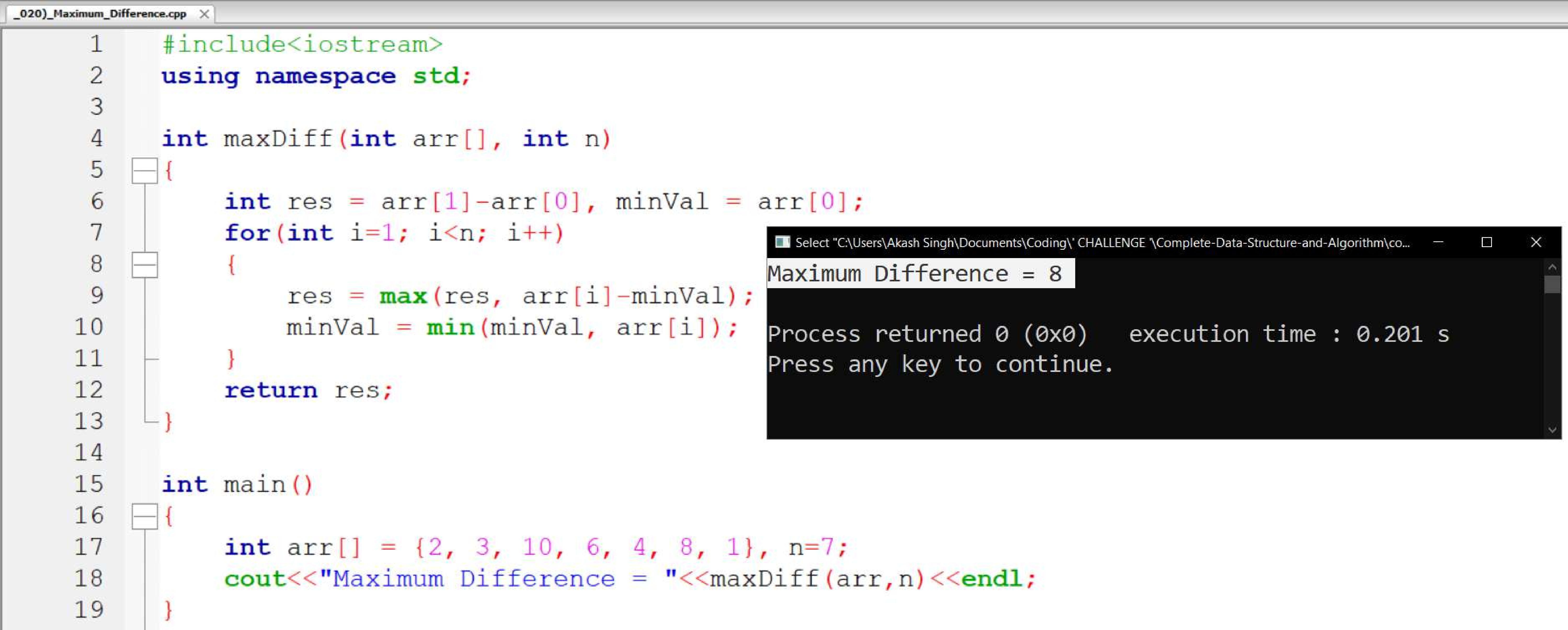
```cpp
#include<iostream>
using namespace std;

int leaders(int arr[], int n)
{
    int cur_leader = arr[n-1];
    cout<<cur_leader<<" ";

    for(int i=n-2; i>=0; i--)
    {
        if(cur_leader < arr[i])
        {
            cur_leader = arr[i];
            cout<<cur_leader<<" ";
        }
    }
}

int main()
{
    int arr[] = {7, 10, 4, 3, 6, 5, 2}, n=7;
    cout<<"Leasers in Reverse Order = ";
    leaders(arr, n);
    cout<<endl;
}
```

```
Leasers in Reverse Order = 2 5 6 10

Process returned 0 (0x0)   execution time : 0.284 s
Press any key to continue.
```


_019)_Maximum_Difference.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\...

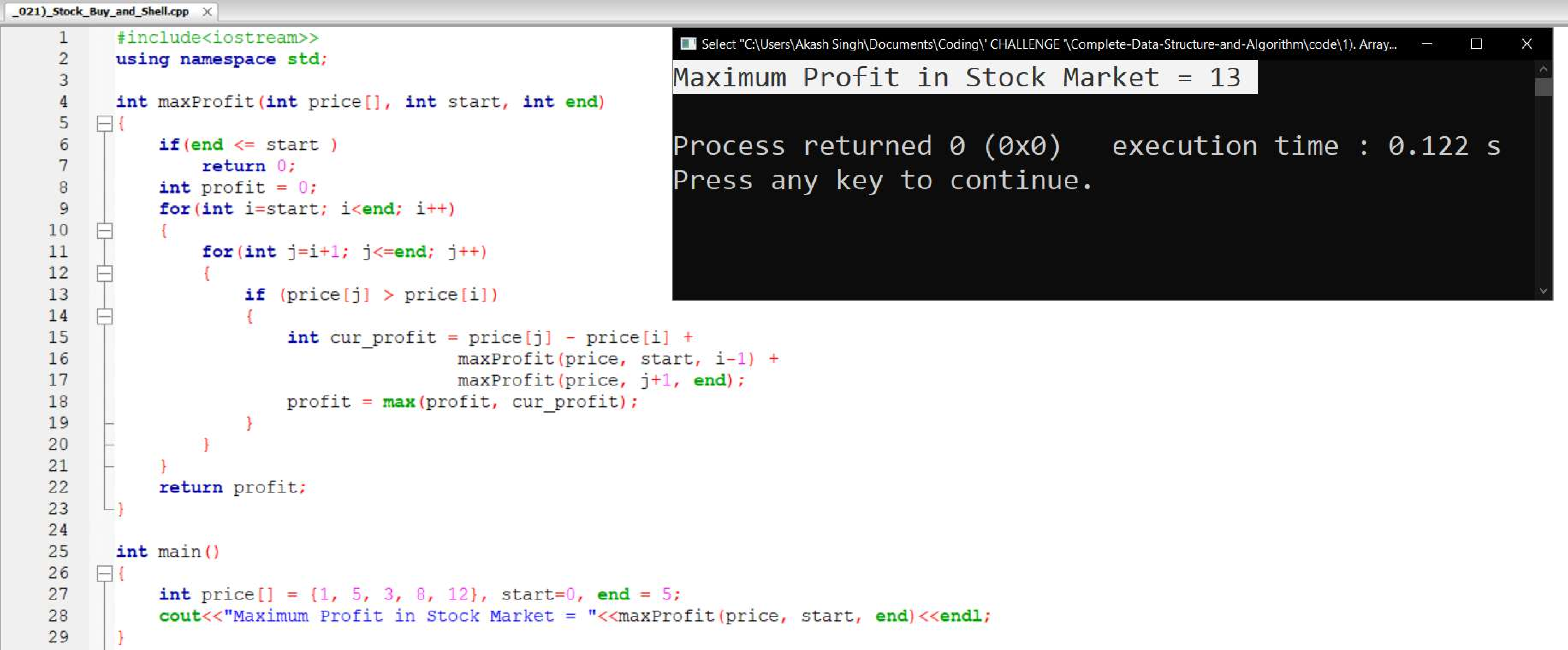
```cpp
#include<iostream>
using namespace std;

int maxDiff(int arr[], int n)
{
    int res = arr[1] - arr[0];
    for(int i=0; i<n; i++)
        for(int j=i+1; j<n; j++)
            res = max(res, arr[j]-arr[i]);
    return res;
}

int main()
{
    int arr[] = {2, 3, 10, 6, 4, 8, 1}, n=7;
    cout<<"Maximum Difference = "<<maxDiff(arr,n)<<endl;
}
```

```
Maximum Difference = 8

Process returned 0 (0x0)   execution time : 0.190 s
Press any key to continue.
```


_020)_Maximum_Difference.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\co...

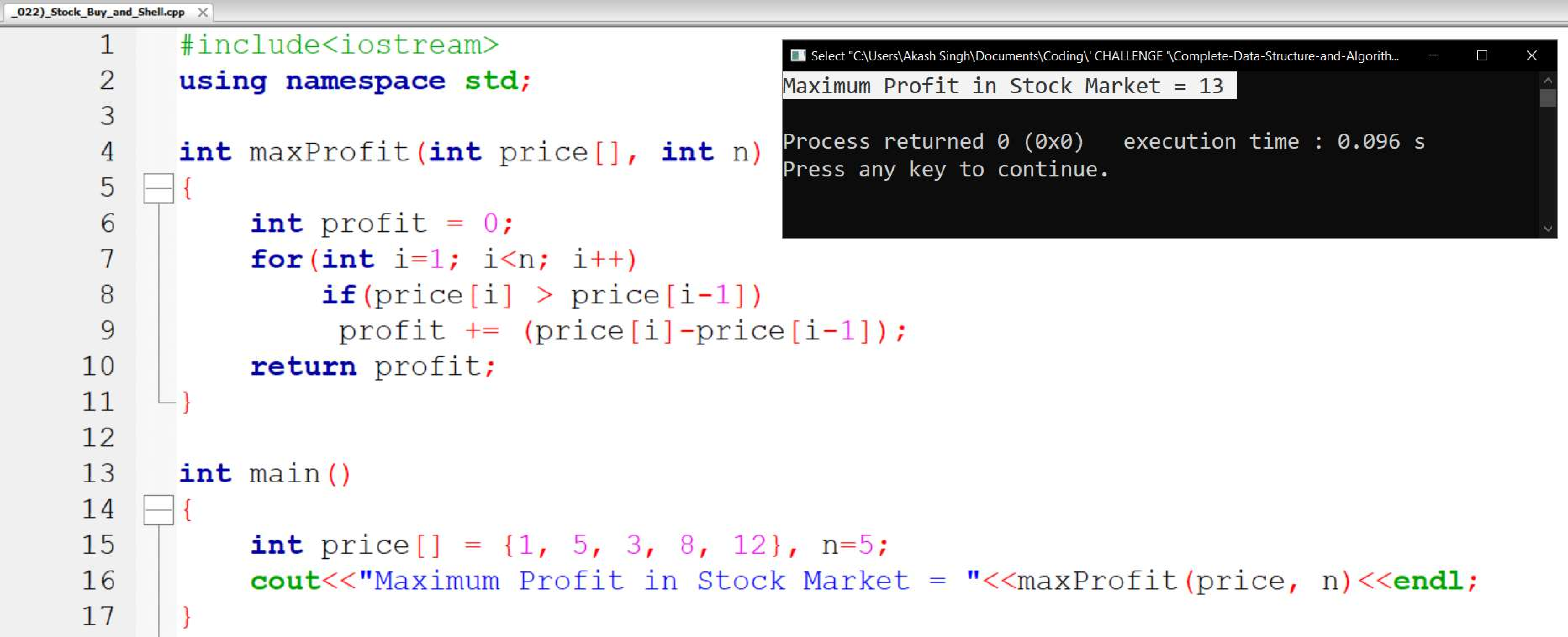
```cpp
#include<iostream>
using namespace std;

int maxDiff(int arr[], int n)
{
    int res = arr[1]-arr[0], minVal = arr[0];
    for(int i=1; i<n; i++)
    {
        res = max(res, arr[i]-minVal);
        minVal = min(minVal, arr[i]);
    }
    return res;
}

int main()
{
    int arr[] = {2, 3, 10, 6, 4, 8, 1}, n=7;
    cout<<"Maximum Difference = "<<maxDiff(arr,n)<<endl;
}
```

```
Maximum Difference = 8

Process returned 0 (0x0)   execution time : 0.201 s
Press any key to continue.
```


_021)_Stock_Buy_and_Shell.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\code\1). Array...

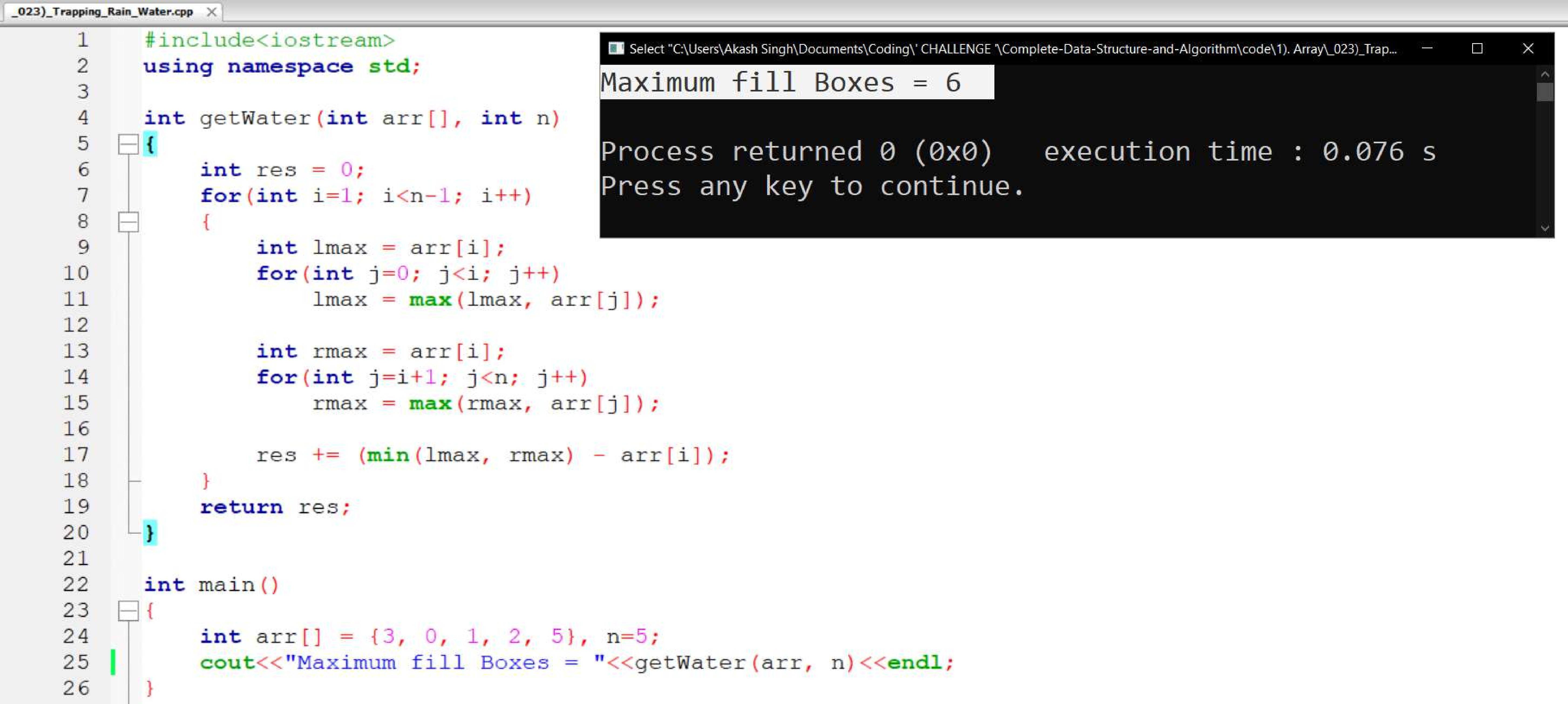
```cpp
#include<iostream>>
using namespace std;

int maxProfit(int price[], int start, int end)
{
    if(end <= start )
        return 0;
    int profit = 0;
    for(int i=start; i<end; i++)
    {
        for(int j=i+1; j<=end; j++)
        {
            if (price[j] > price[i])
            {
                int cur_profit = price[j] - price[i] +
                                 maxProfit(price, start, i-1) +
                                 maxProfit(price, j+1, end);
                profit = max(profit, cur_profit);
            }
        }
    }
    return profit;
}

int main()
{
    int price[] = {1, 5, 3, 8, 12}, start=0, end = 5;
    cout<<"Maximum Profit in Stock Market = "<<maxProfit(price, start, end)<<endl;
}
```

```
Maximum Profit in Stock Market = 13

Process returned 0 (0x0)   execution time : 0.122 s
Press any key to continue.
```


_022)_Stock_Buy_and_Shell.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorith...

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

int maxProfit(int price[], int n)
{
    int profit = 0;
    for(int i=1; i<n; i++)
        if(price[i] > price[i-1])
         profit += (price[i]-price[i-1]);
    return profit;
}

int main()
{
    int price[] = {1, 5, 3, 8, 12}, n=5;
    cout<<"Maximum Profit in Stock Market = "<<maxProfit(price, n)<<endl;
}
```

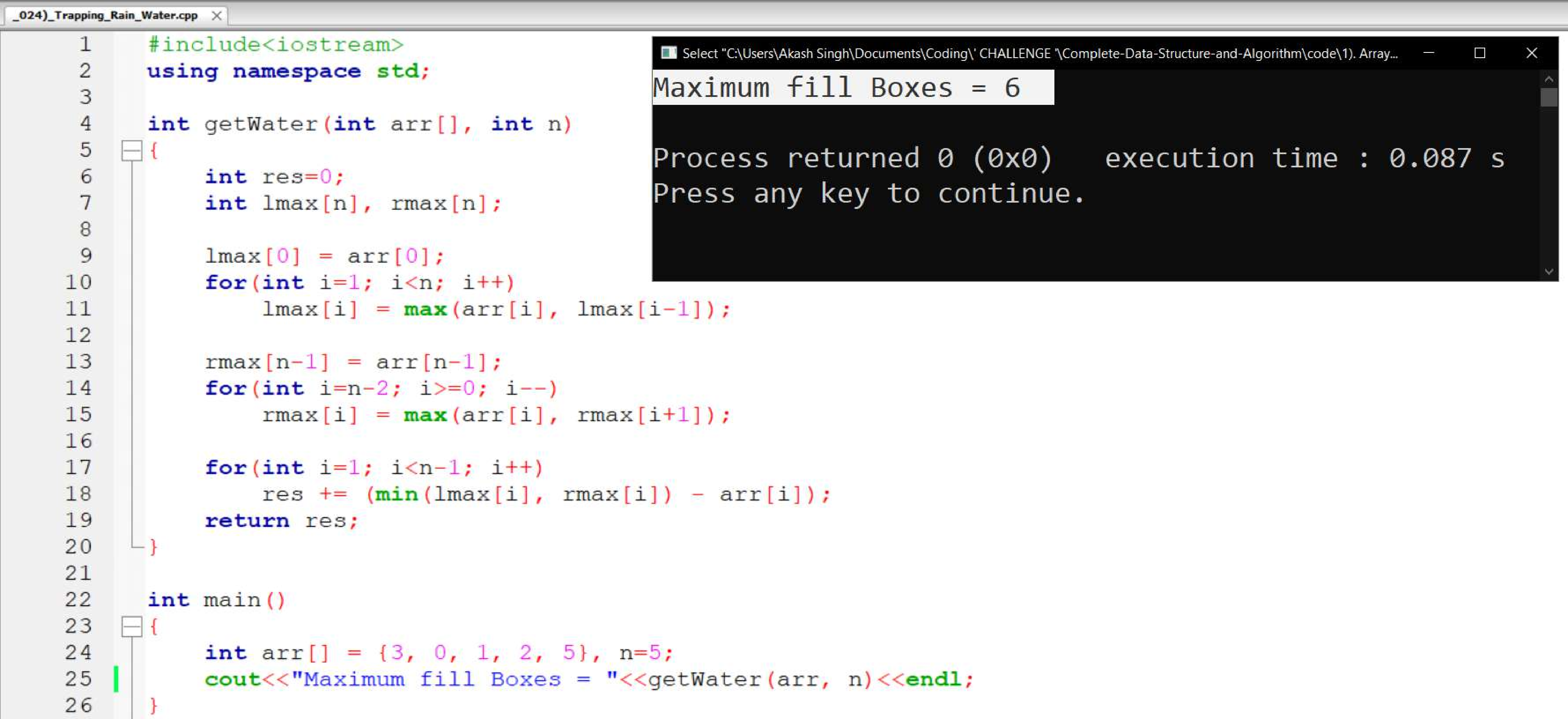
```
Maximum Profit in Stock Market = 13

Process returned 0 (0x0)   execution time : 0.096 s
Press any key to continue.
```



_023)_Trapping_Rain_Water.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\code\1). Array_023)_Trap...

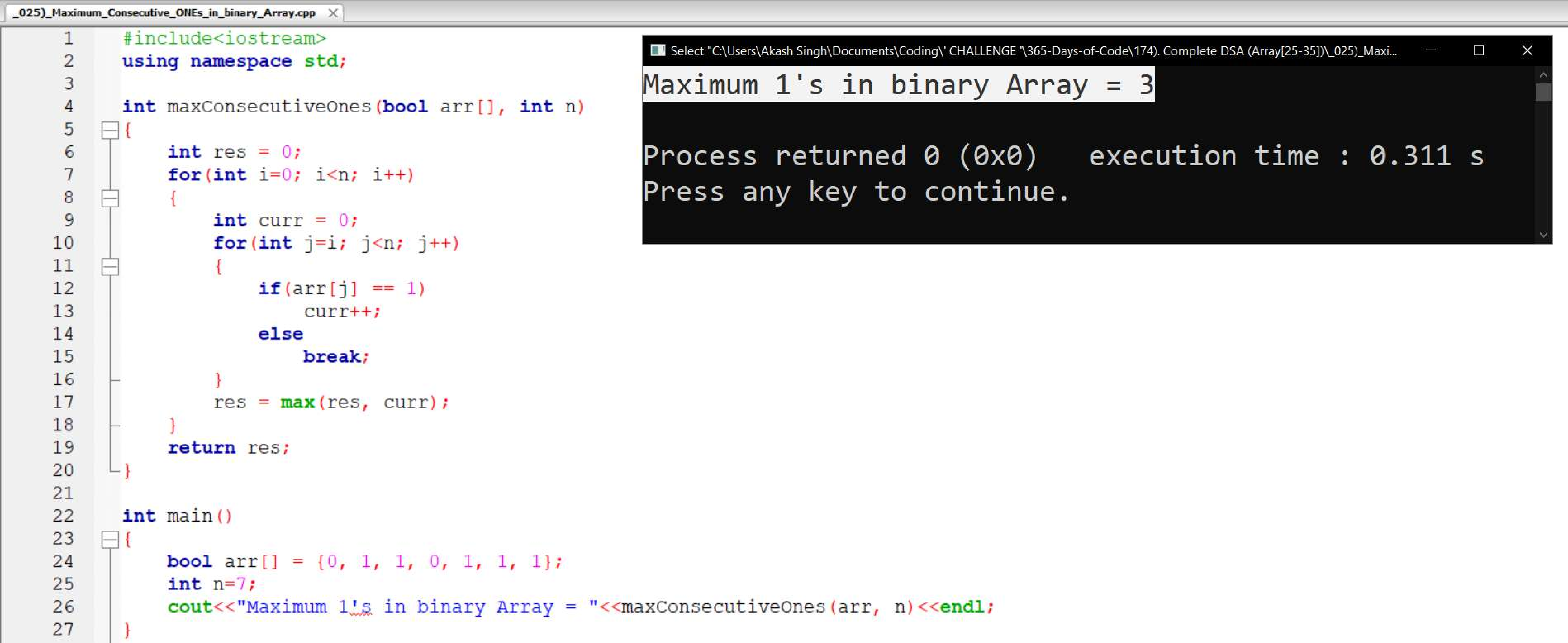
```cpp
#include<iostream>
using namespace std;

int getWater(int arr[], int n)
{
    int res = 0;
    for(int i=1; i<n-1; i++)
    {
        int lmax = arr[i];
        for(int j=0; j<i; j++)
            lmax = max(lmax, arr[j]);

        int rmax = arr[i];
        for(int j=i+1; j<n; j++)
            rmax = max(rmax, arr[j]);

        res += (min(lmax, rmax) - arr[i]);
    }
    return res;
}

int main()
{
    int arr[] = {3, 0, 1, 2, 5}, n=5;
    cout<<"Maximum fill Boxes = "<<getWater(arr, n)<<endl;
}
```

```
Maximum fill Boxes = 6

Process returned 0 (0x0)   execution time : 0.076 s
Press any key to continue.
```


_024)_Trapping_Rain_Water.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\Complete-Data-Structure-and-Algorithm\code\1). Array...

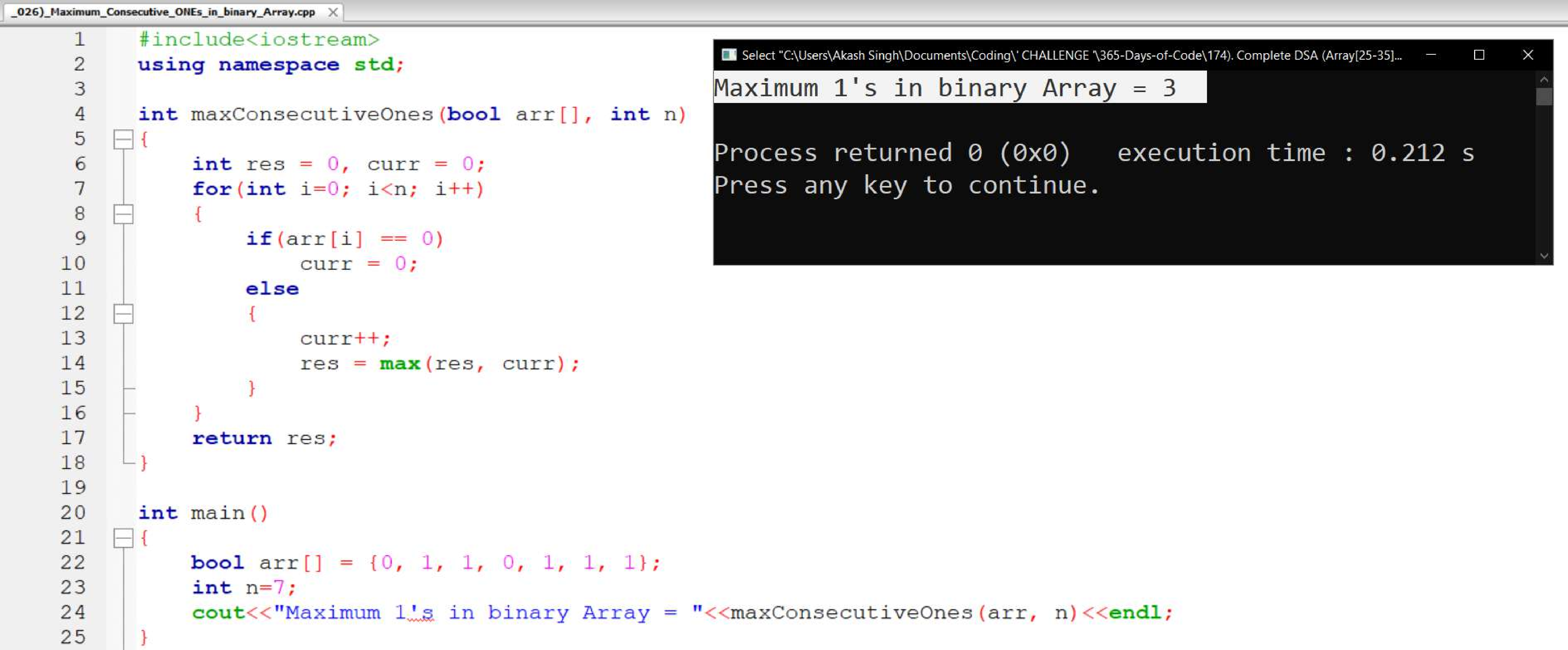
```cpp
#include<iostream>
using namespace std;

int getWater(int arr[], int n)
{
    int res=0;
    int lmax[n], rmax[n];

    lmax[0] = arr[0];
    for(int i=1; i<n; i++)
        lmax[i] = max(arr[i], lmax[i-1]);

    rmax[n-1] = arr[n-1];
    for(int i=n-2; i>=0; i--)
        rmax[i] = max(arr[i], rmax[i+1]);

    for(int i=1; i<n-1; i++)
        res += (min(lmax[i], rmax[i]) - arr[i]);
    return res;
}

int main()
{
    int arr[] = {3, 0, 1, 2, 5}, n=5;
    cout<<"Maximum fill Boxes = "<<getWater(arr, n)<<endl;
}
```

```
Maximum fill Boxes = 6

Process returned 0 (0x0)   execution time : 0.087 s
Press any key to continue.
```


_025)_Maximum_Consecutive_ONEs_in_binary_Array.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\174). Complete DSA (Array[25-35])_025)_Maxi...

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

int maxConsecutiveOnes(bool arr[], int n)
{
    int res = 0;
    for(int i=0; i<n; i++)
    {
        int curr = 0;
        for(int j=i; j<n; j++)
        {
            if(arr[j] == 1)
                curr++;
            else
                break;
        }
        res = max(res, curr);
    }
    return res;
}

int main()
{
    bool arr[] = {0, 1, 1, 0, 1, 1, 1};
    int n=7;
    cout<<"Maximum 1's in binary Array = "<<maxConsecutiveOnes(arr, n)<<endl;
}
```

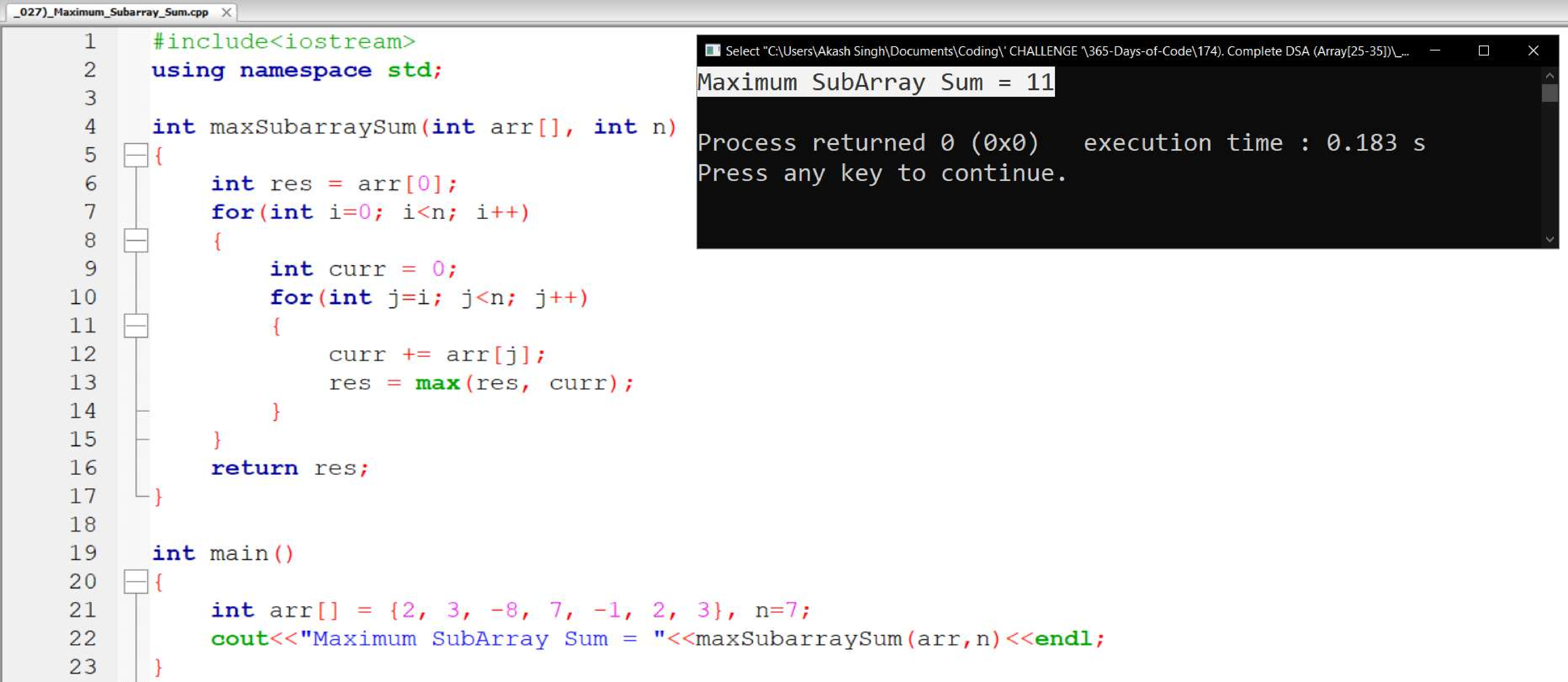
```
Maximum 1's in binary Array = 3

Process returned 0 (0x0)   execution time : 0.311 s
Press any key to continue.
```



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

int maxConsecutiveOnes(bool arr[], int n)
{
    int res = 0, curr = 0;
    for(int i=0; i<n; i++)
    {
        if(arr[i] == 0)
            curr = 0;
        else
        {
            curr++;
            res = max(res, curr);
        }
    }
    return res;
}

int main()
{
    bool arr[] = {0, 1, 1, 0, 1, 1, 1};
    int n=7;
    cout<<"Maximum 1's in binary Array = "<<maxConsecutiveOnes(arr, n)<<endl;
}
```

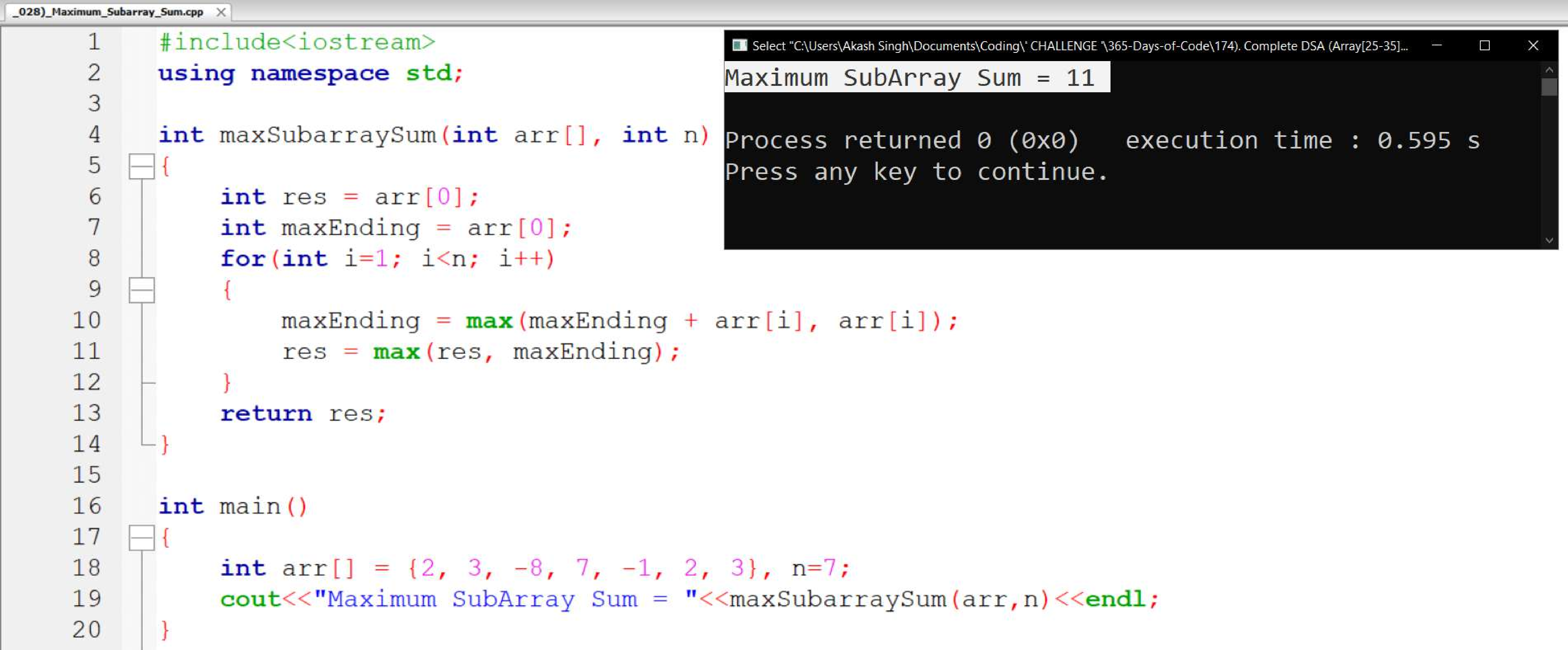
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\174). Complete DSA (Array[25-35]...

```
Maximum 1's in binary Array = 3

Process returned 0 (0x0)   execution time : 0.212 s
Press any key to continue.
```


_027)_Maximum_Subarray_Sum.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\174). Complete DSA (Array[25-35])_...

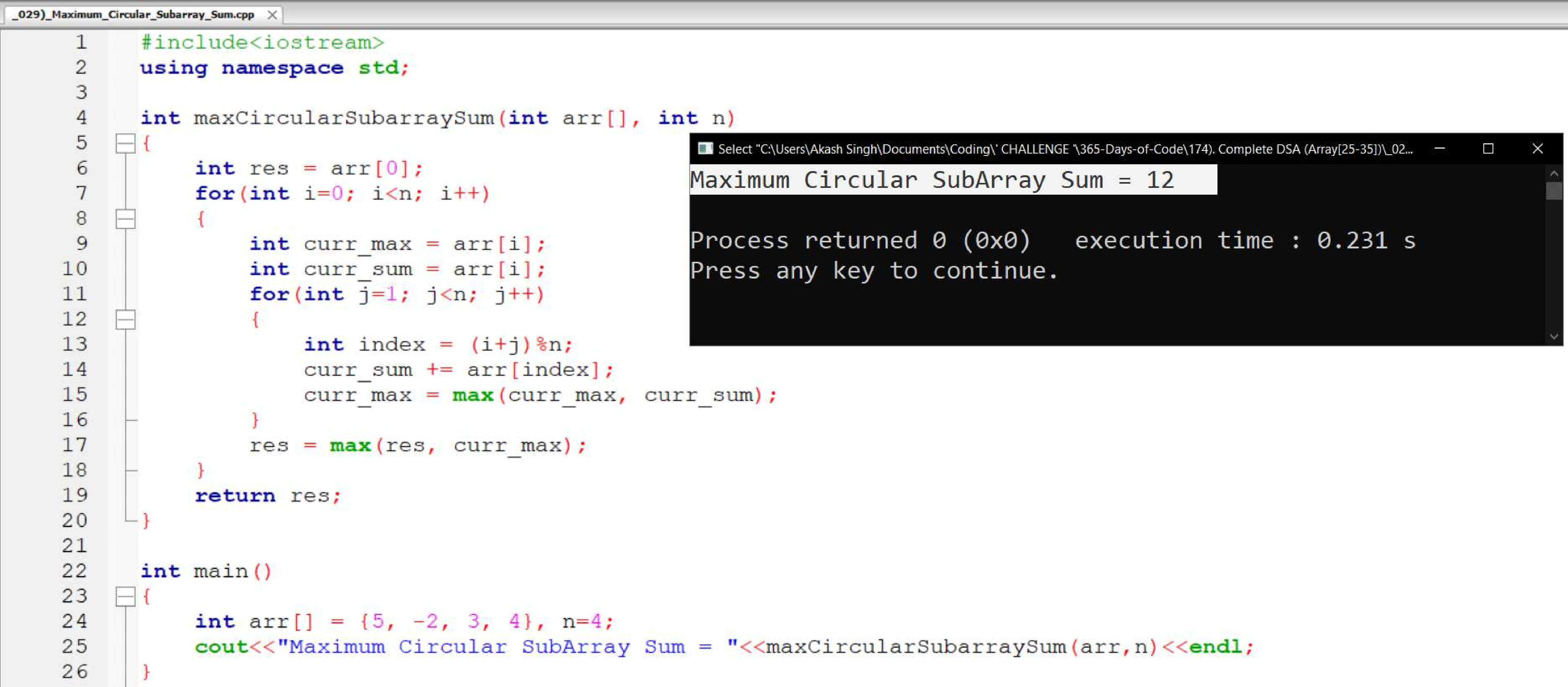
```cpp
#include<iostream>
using namespace std;

int maxSubarraySum(int arr[], int n)
{
    int res = arr[0];
    for(int i=0; i<n; i++)
    {
        int curr = 0;
        for(int j=i; j<n; j++)
        {
            curr += arr[j];
            res = max(res, curr);
        }
    }
    return res;
}

int main()
{
    int arr[] = {2, 3, -8, 7, -1, 2, 3}, n=7;
    cout<<"Maximum SubArray Sum = "<<maxSubarraySum(arr,n)<<endl;
}
```

```
Maximum SubArray Sum = 11

Process returned 0 (0x0)   execution time : 0.183 s
Press any key to continue.
```


_028)_Maximum_Subarray_Sum.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\174). Complete DSA (Array[25-35]...

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

int maxSubarraySum(int arr[], int n)
{
    int res = arr[0];
    int maxEnding = arr[0];
    for(int i=1; i<n; i++)
    {
        maxEnding = max(maxEnding + arr[i], arr[i]);
        res = max(res, maxEnding);
    }
    return res;
}

int main()
{
    int arr[] = {2, 3, -8, 7, -1, 2, 3}, n=7;
    cout<<"Maximum SubArray Sum = "<<maxSubarraySum(arr,n)<<endl;
}
```

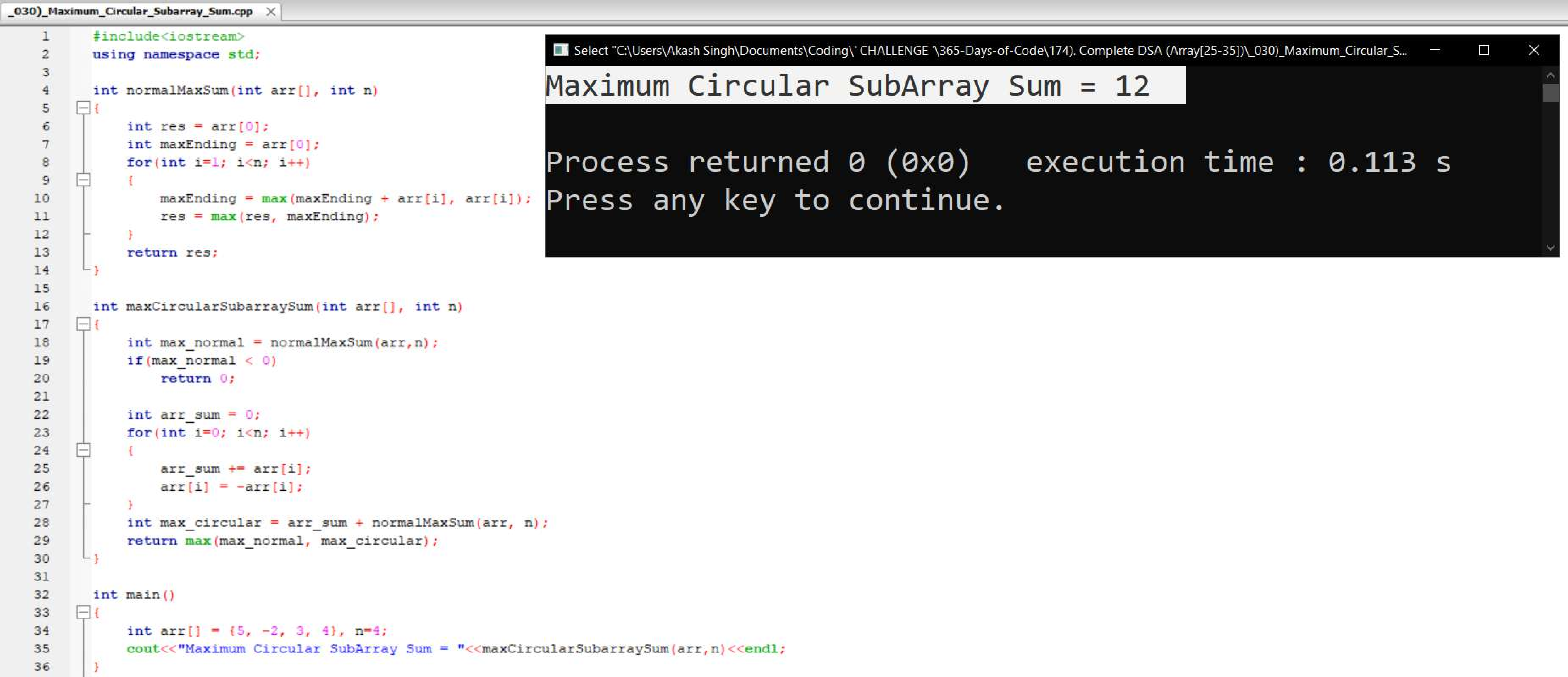
```
Maximum SubArray Sum = 11

Process returned 0 (0x0)   execution time : 0.595 s
Press any key to continue.
```



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

int maxCircularSubarraySum(int arr[], int n)
{
    int res = arr[0];
    for(int i=0; i<n; i++)
    {
        int curr_max = arr[i];
        int curr_sum = arr[i];
        for(int j=1; j<n; j++)
        {
            int index = (i+j)%n;
            curr_sum += arr[index];
            curr_max = max(curr_max, curr_sum);
        }
        res = max(res, curr_max);
    }
    return res;
}

int main()
{
    int arr[] = {5, -2, 3, 4}, n=4;
    cout<<"Maximum Circular SubArray Sum = "<<maxCircularSubarraySum(arr,n)<<endl;
}
```

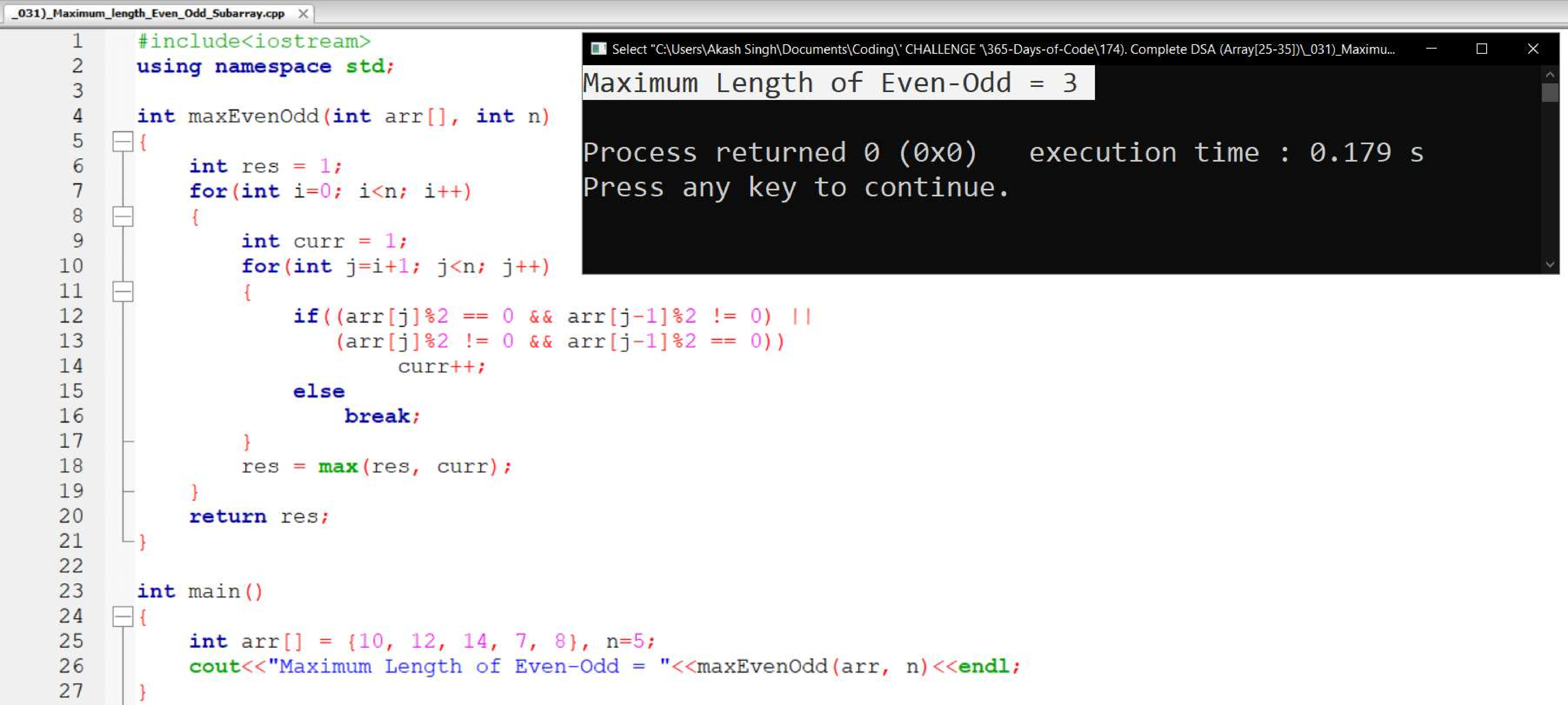
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\174). Complete DSA (Array[25-35])_02...

```
Maximum Circular SubArray Sum = 12

Process returned 0 (0x0)   execution time : 0.231 s
Press any key to continue.
```


_030)_Maximum_Circular_Subarray_Sum.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\174). Complete DSA (Array[25-35])_030)_Maximum_Circular_S...

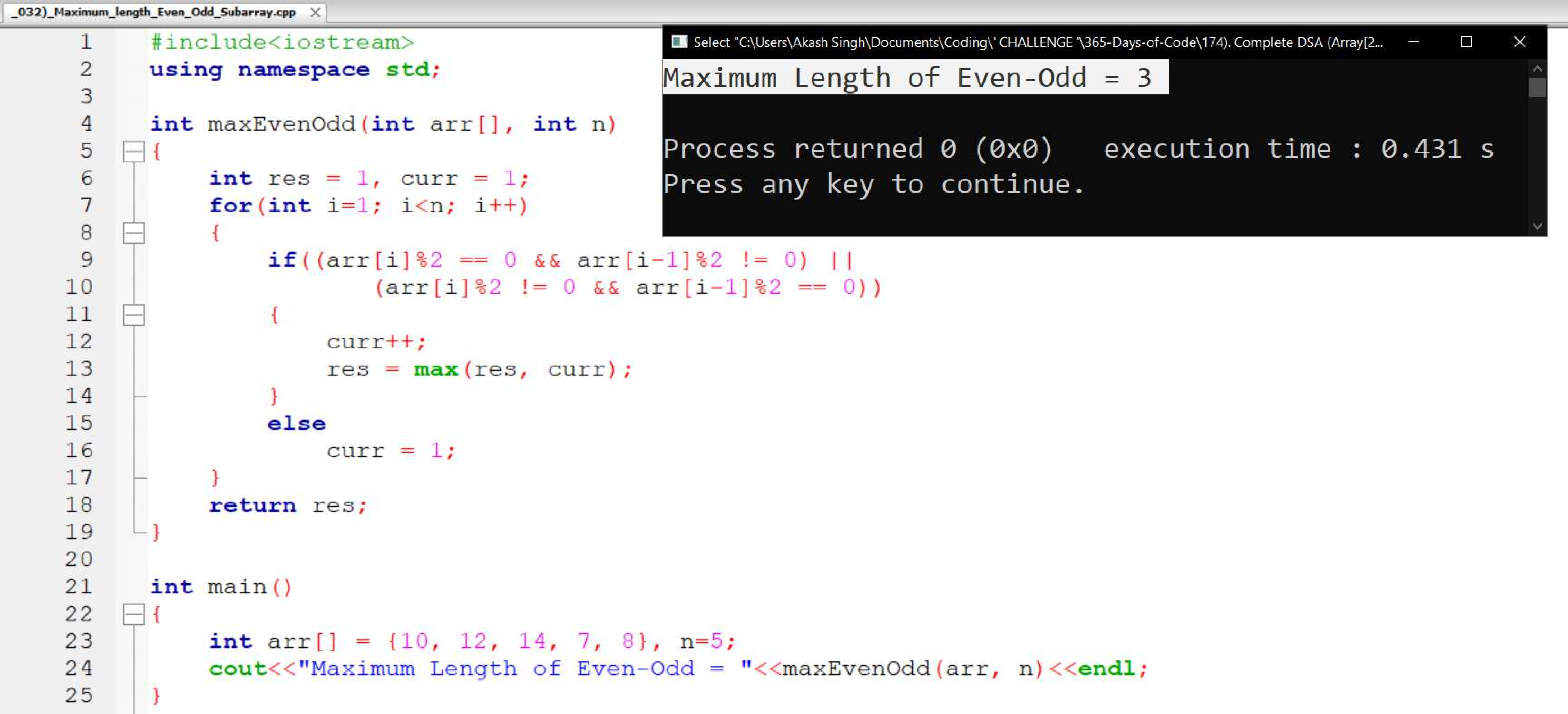
```cpp
#include<iostream>
using namespace std;

int normalMaxSum(int arr[], int n)
{
    int res = arr[0];
    int maxEnding = arr[0];
    for(int i=1; i<n; i++)
    {
        maxEnding = max(maxEnding + arr[i], arr[i]);
        res = max(res, maxEnding);
    }
    return res;
}

int maxCircularSubarraySum(int arr[], int n)
{
    int max_normal = normalMaxSum(arr,n);
    if(max_normal < 0)
        return 0;

    int arr_sum = 0;
    for(int i=0; i<n; i++)
    {
        arr_sum += arr[i];
        arr[i] = -arr[i];
    }
    int max_circular = arr_sum + normalMaxSum(arr, n);
    return max(max_normal, max_circular);
}

int main()
{
    int arr[] = {5, -2, 3, 4}, n=4;
    cout<<"Maximum Circular SubArray Sum = "<<maxCircularSubarraySum(arr,n)<<endl;
}
```

```
Maximum Circular SubArray Sum = 12

Process returned 0 (0x0)   execution time : 0.113 s
Press any key to continue.
```


_031)_Maximum_length_Even_Odd_Subarray.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\174). Complete DSA (Array[25-35])_031)_Maximu...

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

int maxEvenOdd(int arr[], int n)
{
    int res = 1;
    for(int i=0; i<n; i++)
    {
        int curr = 1;
        for(int j=i+1; j<n; j++)
        {
            if((arr[j]%2 == 0 && arr[j-1]%2 != 0) ||
               (arr[j]%2 != 0 && arr[j-1]%2 == 0))
                    curr++;
            else
                break;
        }
        res = max(res, curr);
    }
    return res;
}

int main()
{
    int arr[] = {10, 12, 14, 7, 8}, n=5;
    cout<<"Maximum Length of Even-Odd = "<<maxEvenOdd(arr, n)<<endl;
}
```

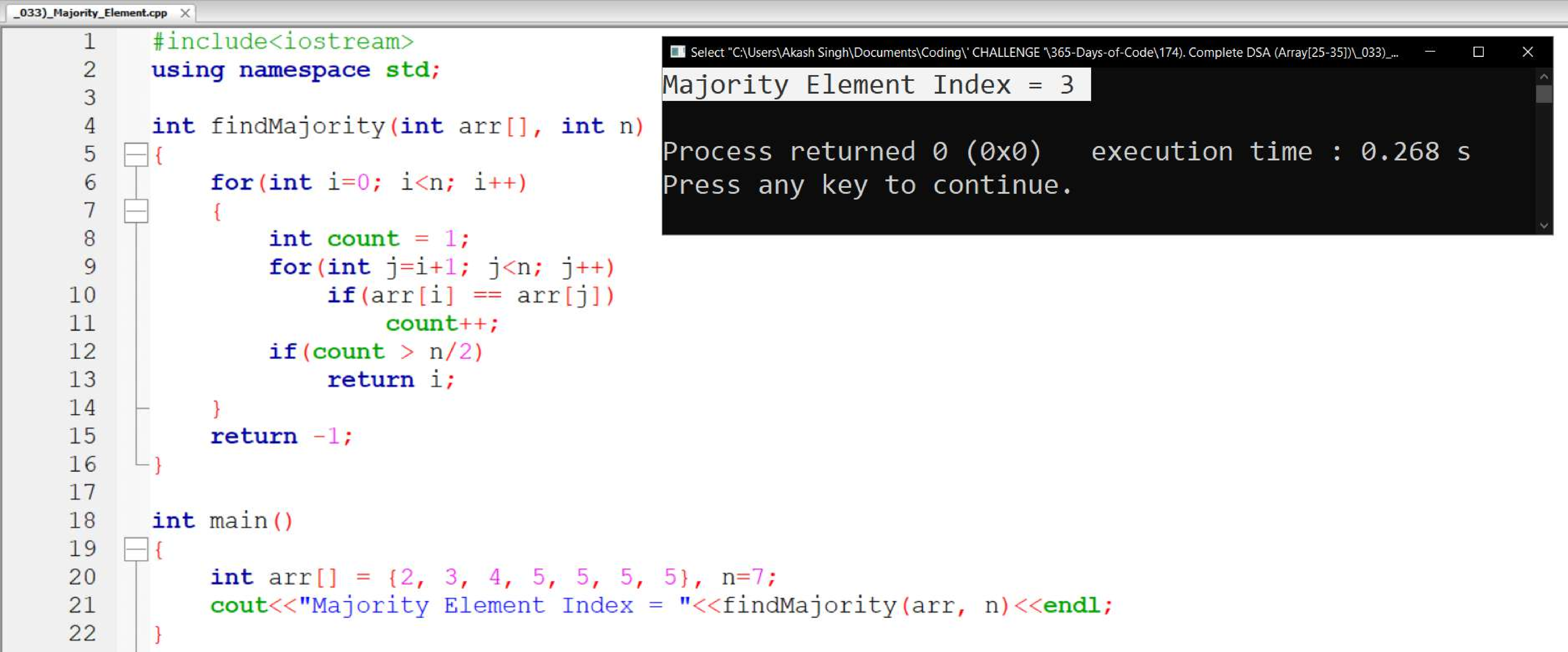
```
Maximum Length of Even-Odd = 3

Process returned 0 (0x0)   execution time : 0.179 s
Press any key to continue.
```



_032)_Maximum_length_Even_Odd_Subarray.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\174). Complete DSA (Array[2...

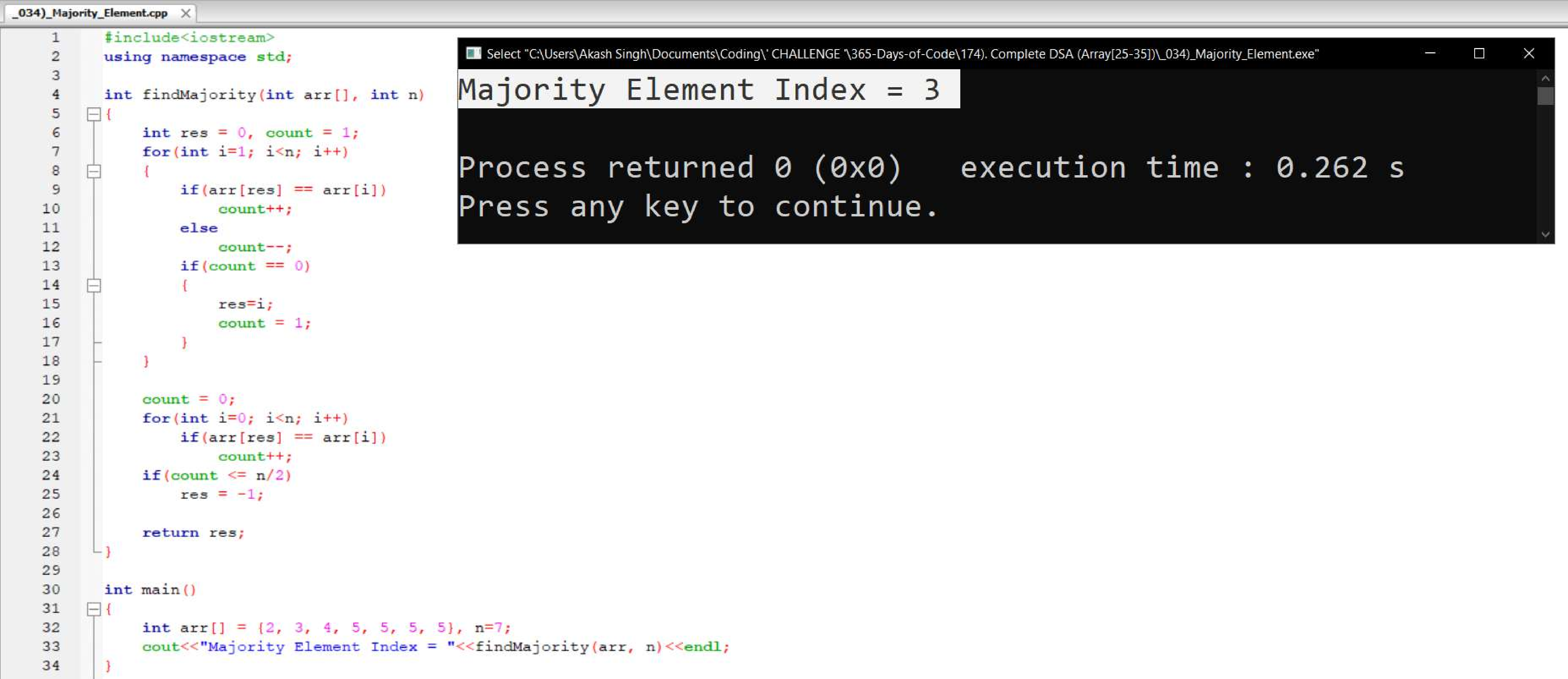
```cpp
#include<iostream>
using namespace std;

int maxEvenOdd(int arr[], int n)
{
    int res = 1, curr = 1;
    for(int i=1; i<n; i++)
    {
        if((arr[i]%2 == 0 && arr[i-1]%2 != 0) ||
                (arr[i]%2 != 0 && arr[i-1]%2 == 0))
        {
            curr++;
            res = max(res, curr);
        }
        else
            curr = 1;
    }
    return res;
}

int main()
{
    int arr[] = {10, 12, 14, 7, 8}, n=5;
    cout<<"Maximum Length of Even-Odd = "<<maxEvenOdd(arr, n)<<endl;
}
```

```
Maximum Length of Even-Odd = 3

Process returned 0 (0x0)   execution time : 0.431 s
Press any key to continue.
```


_033)_Majority_Element.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\174). Complete DSA (Array[25-35])_033)_...

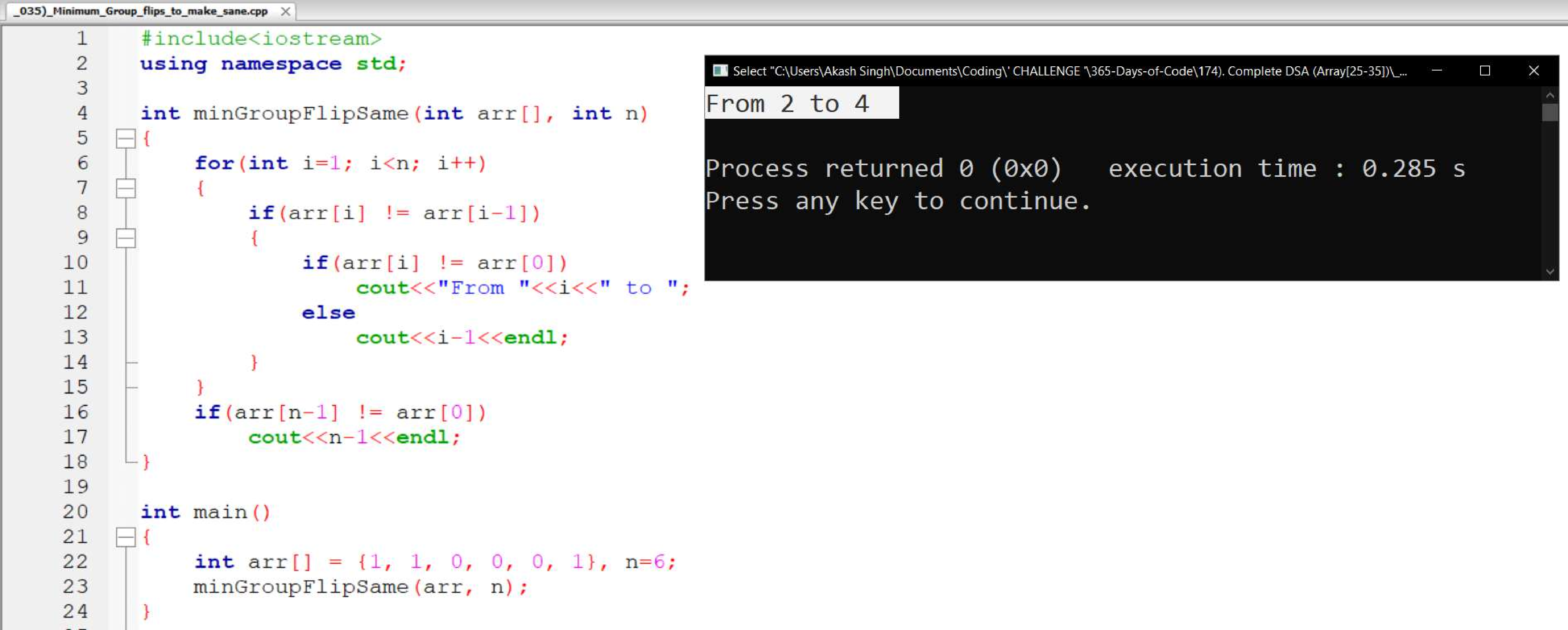
```cpp
#include<iostream>
using namespace std;

int findMajority(int arr[], int n)
{
    for(int i=0; i<n; i++)
    {
        int count = 1;
        for(int j=i+1; j<n; j++)
            if(arr[i] == arr[j])
                count++;
        if(count > n/2)
            return i;
    }
    return -1;
}

int main()
{
    int arr[] = {2, 3, 4, 5, 5, 5, 5}, n=7;
    cout<<"Majority Element Index = "<<findMajority(arr, n)<<endl;
}
```

```
Majority Element Index = 3

Process returned 0 (0x0)   execution time : 0.268 s
Press any key to continue.
```


_034)_Majority_Element.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\174). Complete DSA (Array[25-35])_034)_Majority_Element.exe"

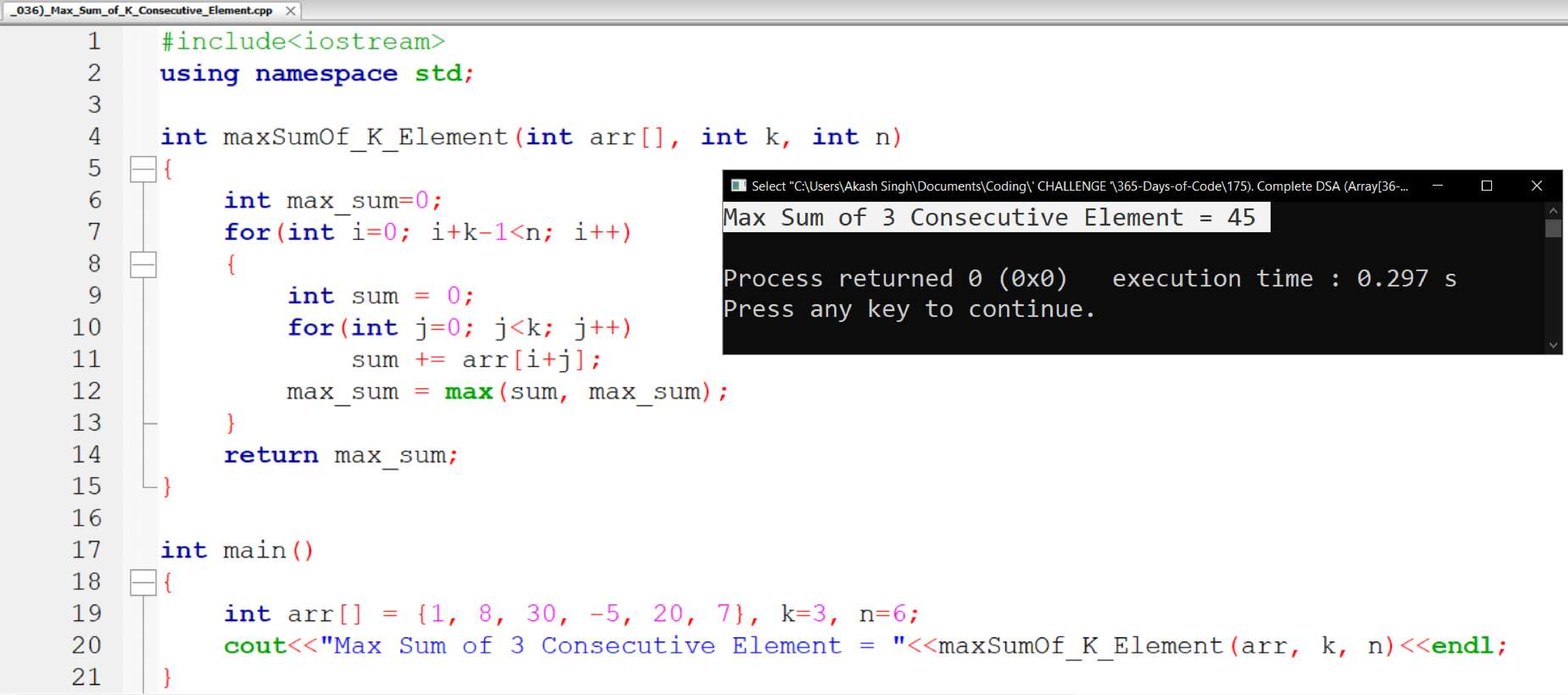
```cpp
#include<iostream>
using namespace std;

int findMajority(int arr[], int n)
{
    int res = 0, count = 1;
    for(int i=1; i<n; i++)
    {
        if(arr[res] == arr[i])
            count++;
        else
            count--;
        if(count == 0)
        {
            res=i;
            count = 1;
        }
    }

    count = 0;
    for(int i=0; i<n; i++)
        if(arr[res] == arr[i])
            count++;
    if(count <= n/2)
        res = -1;

    return res;
}

int main()
{
    int arr[] = {2, 3, 4, 5, 5, 5, 5}, n=7;
    cout<<"Majority Element Index = "<<findMajority(arr, n)<<endl;
}
```

```
Majority Element Index = 3

Process returned 0 (0x0)   execution time : 0.262 s
Press any key to continue.
```


_035)_Minimum_Group_flips_to_make_sane.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\174). Complete DSA (Array[25-35])_...

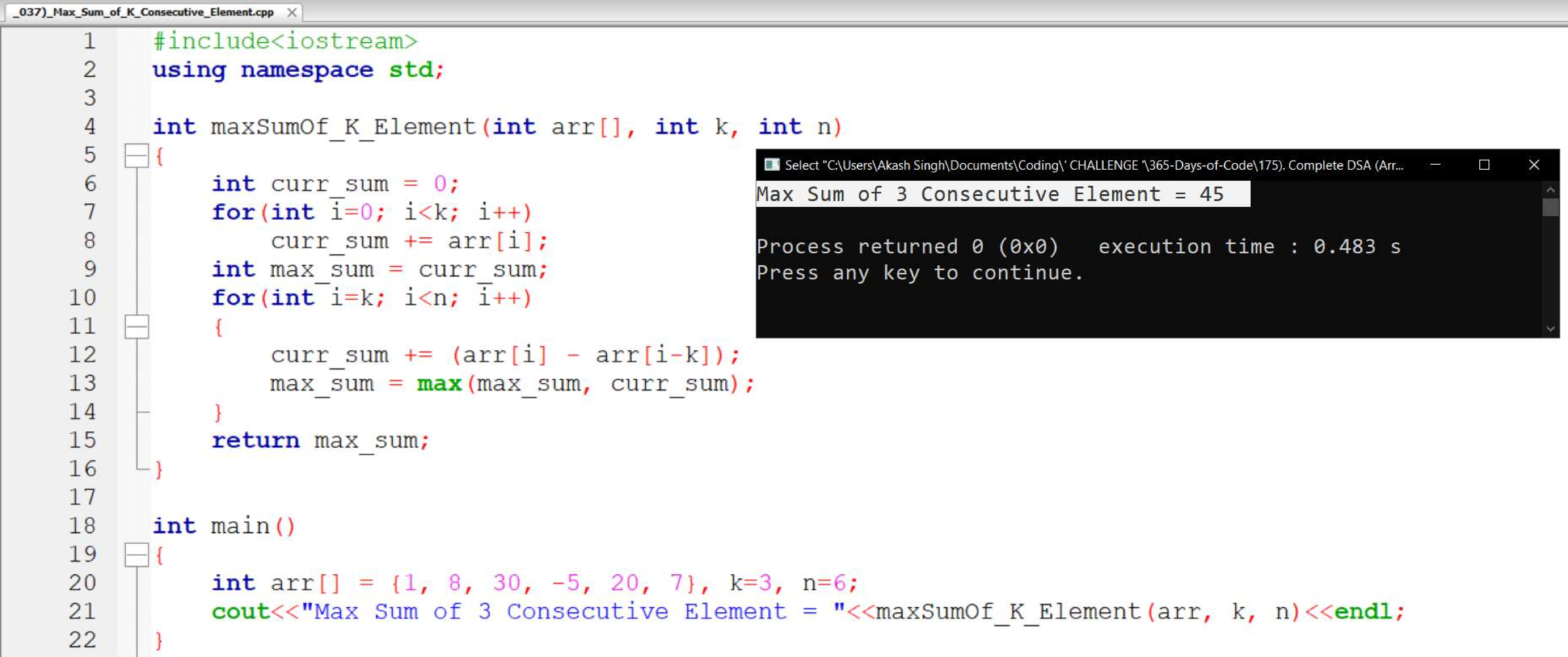
```cpp
#include<iostream>
using namespace std;

int minGroupFlipSame(int arr[], int n)
{
    for(int i=1; i<n; i++)
    {
        if(arr[i] != arr[i-1])
        {
            if(arr[i] != arr[0])
                cout<<"From "<<i<<" to ";
            else
                cout<<i-1<<endl;
        }
    }
    if(arr[n-1] != arr[0])
        cout<<n-1<<endl;
}

int main()
{
    int arr[] = {1, 1, 0, 0, 0, 1}, n=6;
    minGroupFlipSame(arr, n);
}
```

```
From 2 to 4

Process returned 0 (0x0)   execution time : 0.285 s
Press any key to continue.
```


_036)_Max_Sum_of_K_Consecutive_Element.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\175). Complete DSA (Array[36-...

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

int maxSumOf_K_Element(int arr[], int k, int n)
{
    int max_sum=0;
    for(int i=0; i+k-1<n; i++)
    {
        int sum = 0;
        for(int j=0; j<k; j++)
            sum += arr[i+j];
        max_sum = max(sum, max_sum);
    }
    return max_sum;
}

int main()
{
    int arr[] = {1, 8, 30, -5, 20, 7}, k=3, n=6;
    cout<<"Max Sum of 3 Consecutive Element = "<<maxSumOf_K_Element(arr, k, n)<<endl;
}
```

```
Max Sum of 3 Consecutive Element = 45

Process returned 0 (0x0)   execution time : 0.297 s
Press any key to continue.
```



_037)_Max_Sum_of_K_Consecutive_Element.cpp

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

int maxSumOf_K_Element(int arr[], int k, int n)
{
    int curr_sum = 0;
    for(int i=0; i<k; i++)
        curr_sum += arr[i];
    int max_sum = curr_sum;
    for(int i=k; i<n; i++)
    {
        curr_sum += (arr[i] - arr[i-k]);
        max_sum = max(max_sum, curr_sum);
    }
    return max_sum;
}

int main()
{
    int arr[] = {1, 8, 30, -5, 20, 7}, k=3, n=6;
    cout<<"Max Sum of 3 Consecutive Element = "<<maxSumOf_K_Element(arr, k, n)<<endl;
}
```

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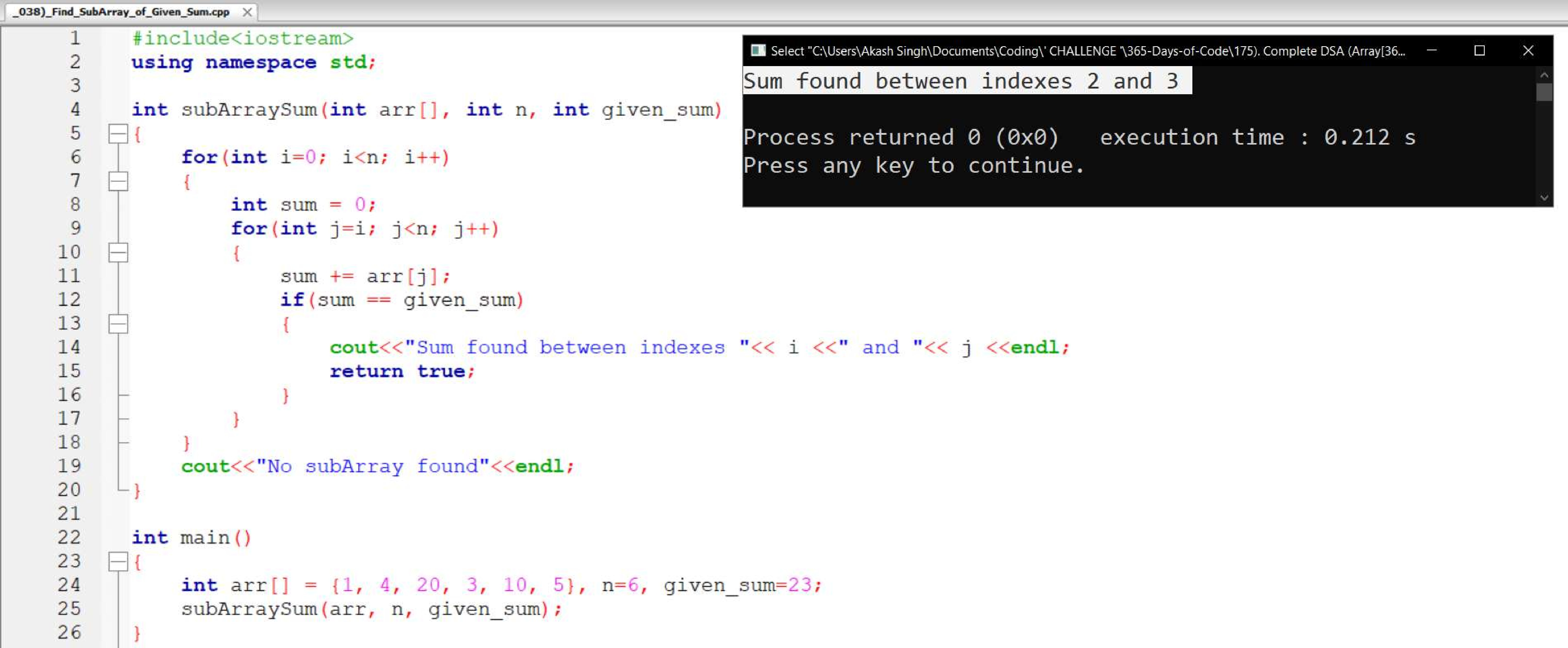
```
Max Sum of 3 Consecutive Element = 45

Process returned 0 (0x0)   execution time : 0.483 s
Press any key to continue.
```


_038)_Find_SubArray_of_Given_Sum.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\175). Complete DSA (Array[36...

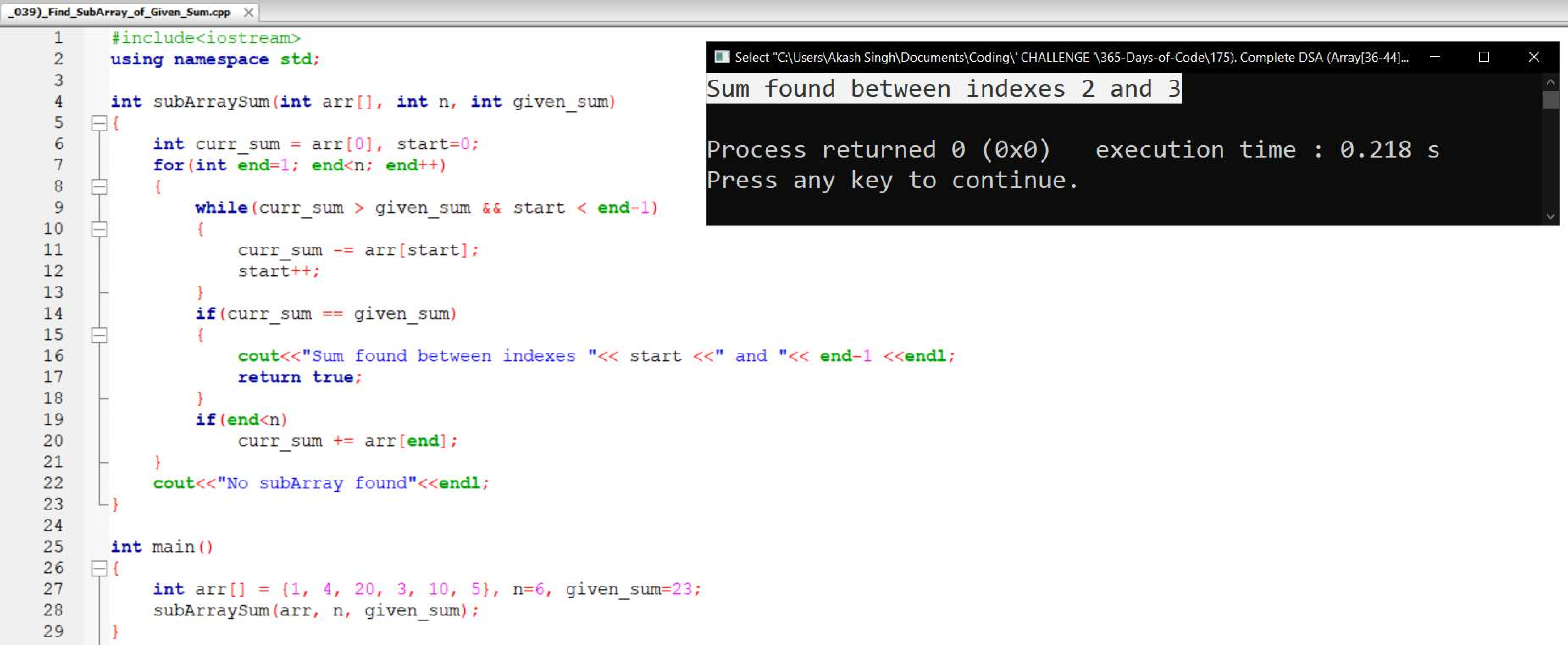
```cpp
#include<iostream>
using namespace std;

int subArraySum(int arr[], int n, int given_sum)
{
    for(int i=0; i<n; i++)
    {
        int sum = 0;
        for(int j=i; j<n; j++)
        {
            sum += arr[j];
            if(sum == given_sum)
            {
                cout<<"Sum found between indexes "<< i <<" and "<< j <<endl;
                return true;
            }
        }
    }
    cout<<"No subArray found"<<endl;
}

int main()
{
    int arr[] = {1, 4, 20, 3, 10, 5}, n=6, given_sum=23;
    subArraySum(arr, n, given_sum);
}
```

```
Sum found between indexes 2 and 3

Process returned 0 (0x0)   execution time : 0.212 s
Press any key to continue.
```


_039)_Find_SubArray_of_Given_Sum.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\175). Complete DSA (Array[36-44]...

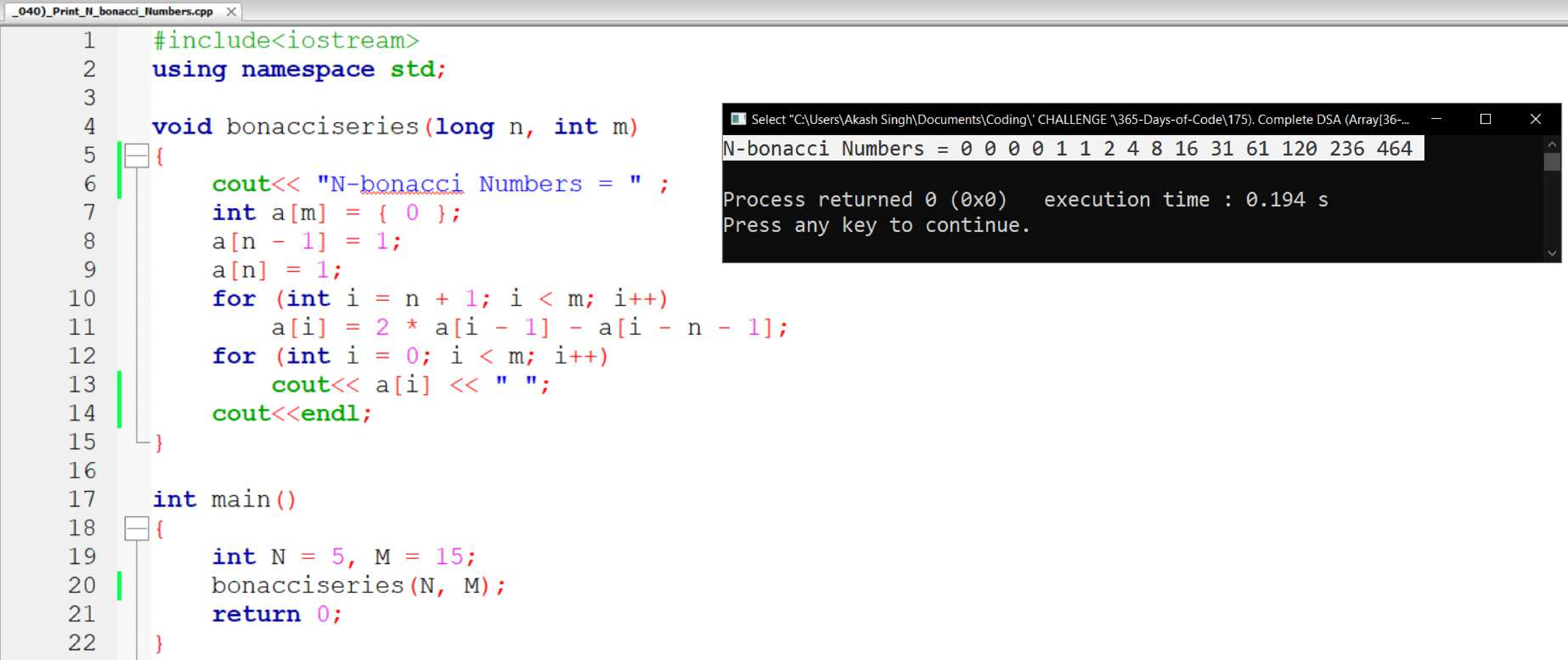
```cpp
#include<iostream>
using namespace std;

int subArraySum(int arr[], int n, int given_sum)
{
    int curr_sum = arr[0], start=0;
    for(int end=1; end<n; end++)
    {
        while(curr_sum > given_sum && start < end-1)
        {
            curr_sum -= arr[start];
            start++;
        }
        if(curr_sum == given_sum)
        {
            cout<<"Sum found between indexes "<< start <<" and "<< end-1 <<endl;
            return true;
        }
        if(end<n)
            curr_sum += arr[end];
    }
    cout<<"No subArray found"<<endl;
}

int main()
{
    int arr[] = {1, 4, 20, 3, 10, 5}, n=6, given_sum=23;
    subArraySum(arr, n, given_sum);
}
```

```
Sum found between indexes 2 and 3

Process returned 0 (0x0)   execution time : 0.218 s
Press any key to continue.
```


_040)_Print_N_bonacci_Numbers.cpp
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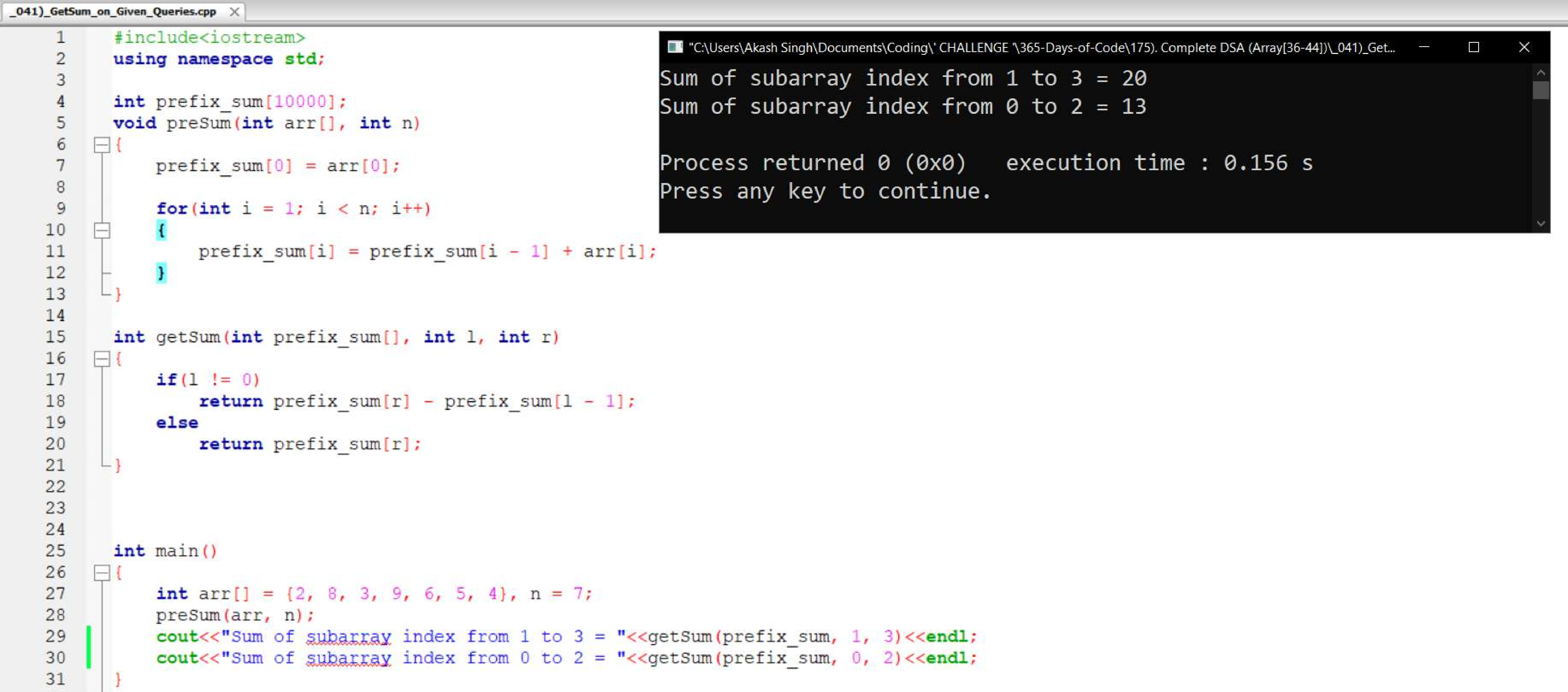
```cpp
#include<iostream>
using namespace std;

void bonacciseries(long n, int m)
{
    cout<< "N-bonacci Numbers = " ;
    int a[m] = { 0 };
    a[n - 1] = 1;
    a[n] = 1;
    for (int i = n + 1; i < m; i++)
        a[i] = 2 * a[i - 1] - a[i - n - 1];
    for (int i = 0; i < m; i++)
        cout<< a[i] << " ";
    cout<<endl;
}

int main()
{
    int N = 5, M = 15;
    bonacciseries(N, M);
    return 0;
}
```

```
N-bonacci Numbers = 0 0 0 0 1 1 2 4 8 16 31 61 120 236 464

Process returned 0 (0x0)   execution time : 0.194 s
Press any key to continue.
```



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

int prefix_sum[10000];
void preSum(int arr[], int n)
{
    prefix_sum[0] = arr[0];

    for(int i = 1; i < n; i++)
    {
        prefix_sum[i] = prefix_sum[i - 1] + arr[i];
    }
}

int getSum(int prefix_sum[], int l, int r)
{
    if(l != 0)
        return prefix_sum[r] - prefix_sum[l - 1];
    else
        return prefix_sum[r];
}



int main()
{
    int arr[] = {2, 8, 3, 9, 6, 5, 4}, n = 7;
    preSum(arr, n);
    cout<<"Sum of subarray index from 1 to 3 = "<<getSum(prefix_sum, 1, 3)<<endl;
    cout<<"Sum of subarray index from 0 to 2 = "<<getSum(prefix_sum, 0, 2)<<endl;
}
```

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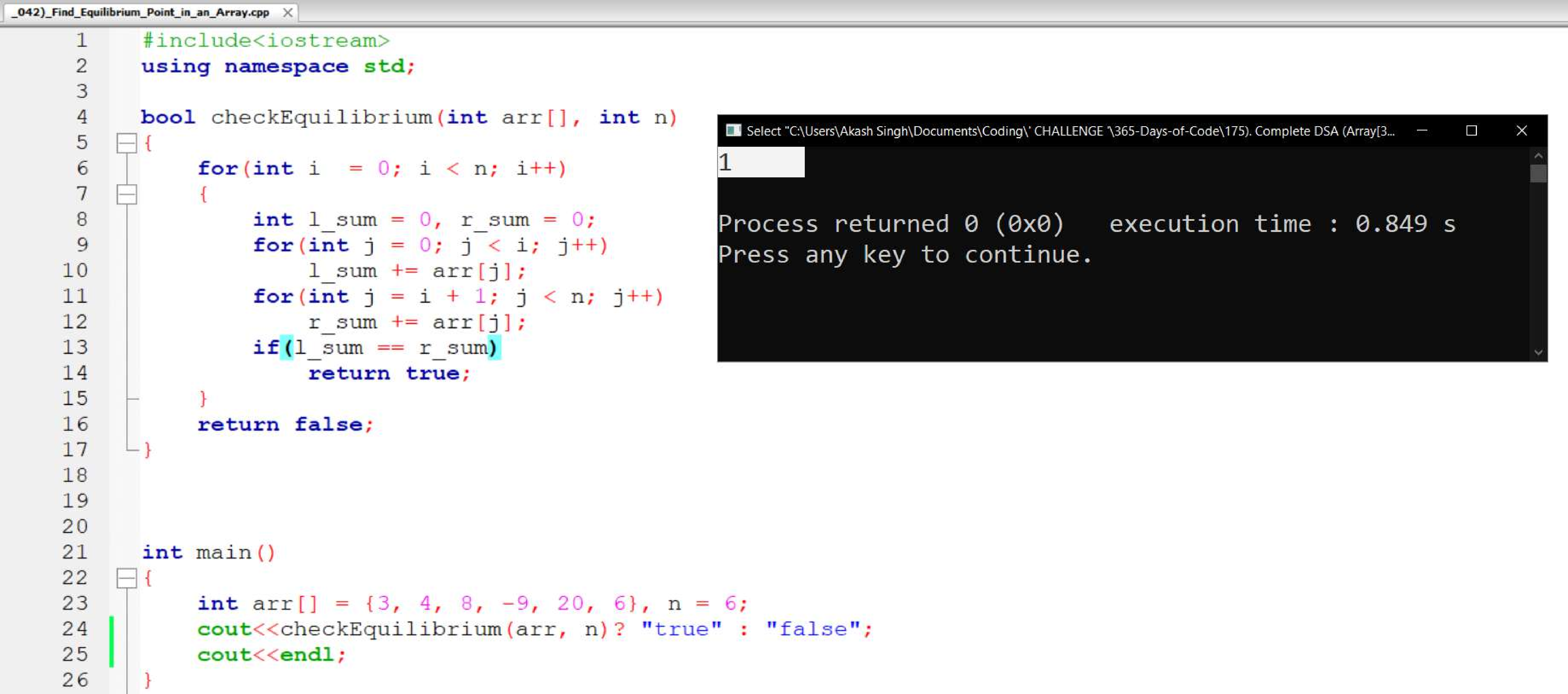
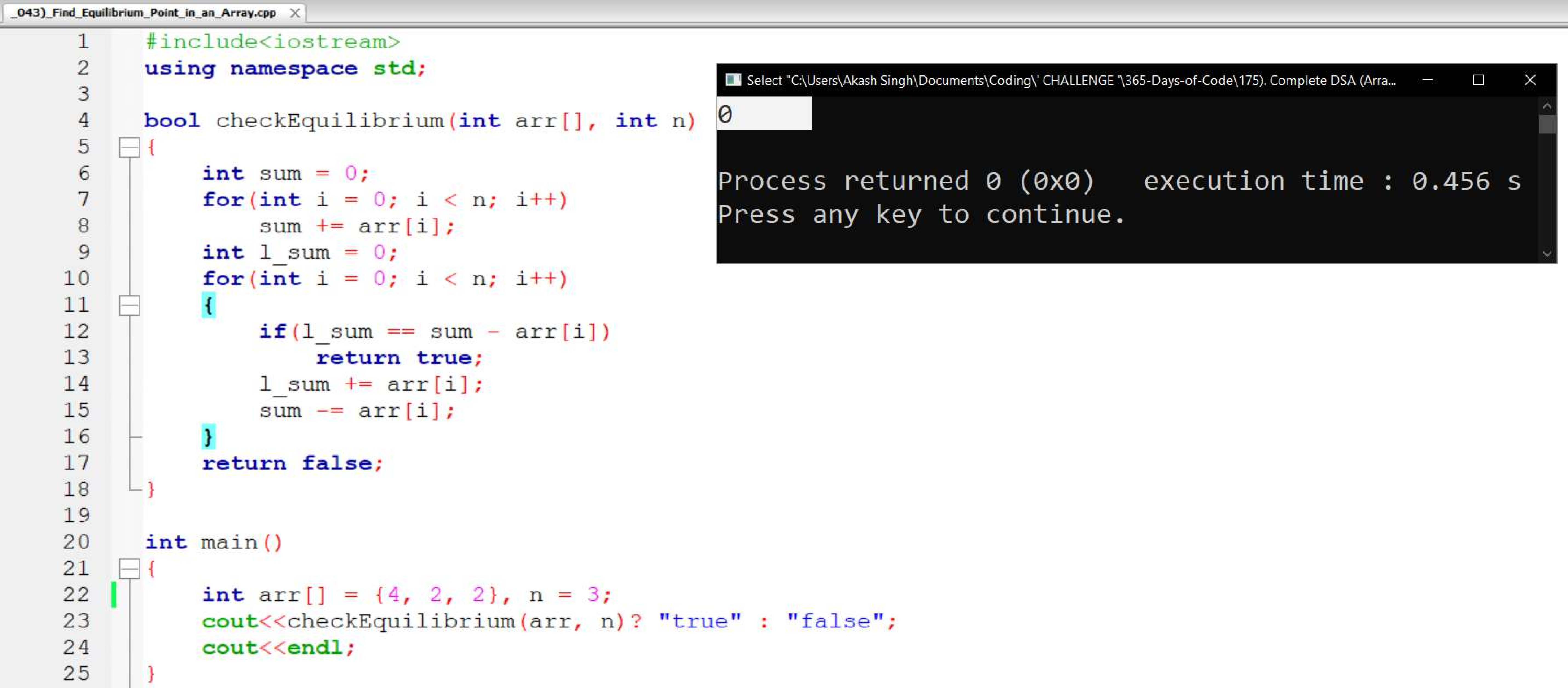
```
Sum of subarray index from 1 to 3 = 20
Sum of subarray index from 0 to 2 = 13

Process returned 0 (0x0)   execution time : 0.156 s
Press any key to continue.
```


_042)_Find_Equilibrium_Point_in_an_Array.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\175). Complete DSA (Array[3...

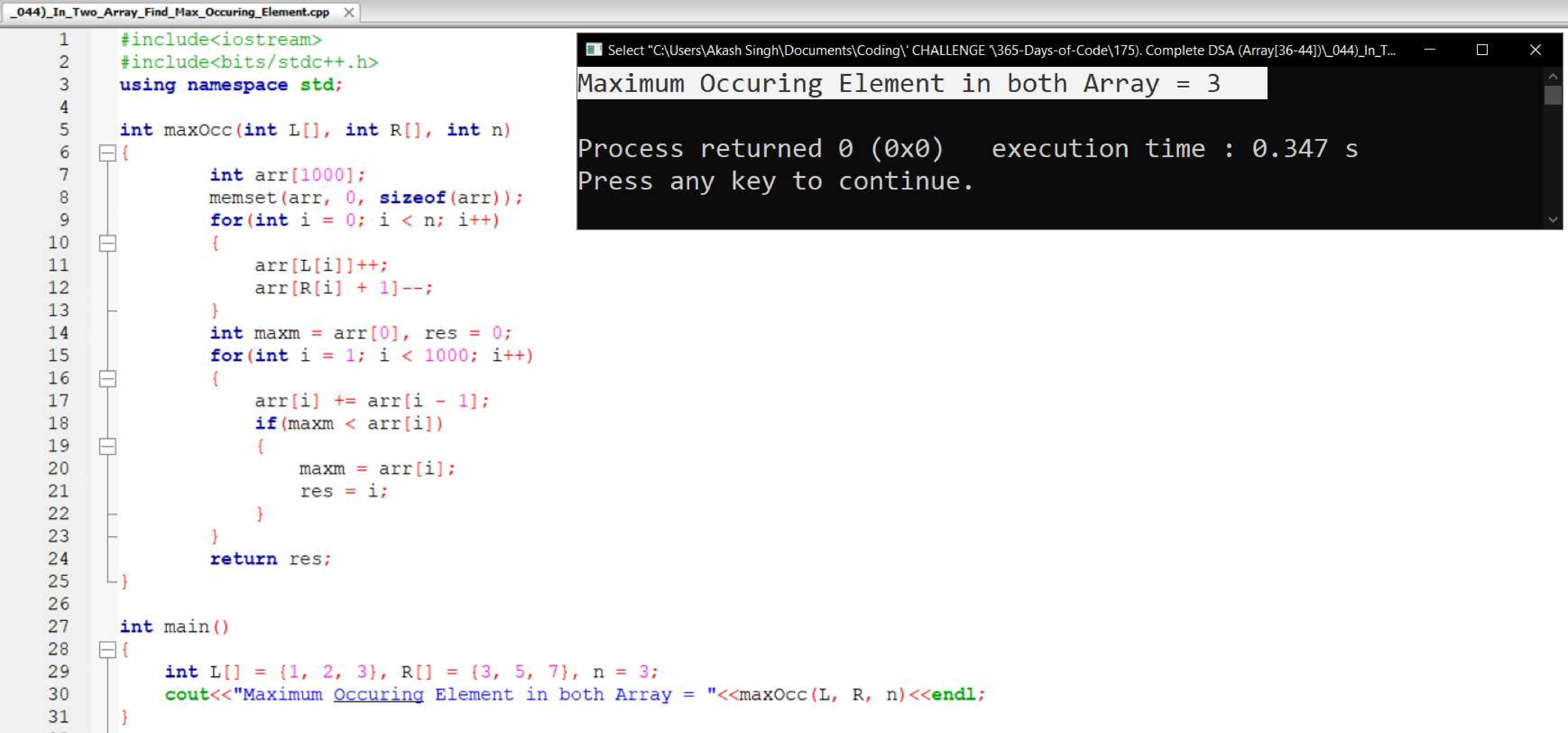
```cpp
#include<iostream>
using namespace std;

bool checkEquilibrium(int arr[], int n)
{
    for(int i  = 0; i < n; i++)
    {
        int l_sum = 0, r_sum = 0;
        for(int j = 0; j < i; j++)
            l_sum += arr[j];
        for(int j = i + 1; j < n; j++)
            r_sum += arr[j];
        if(l_sum == r_sum)
            return true;
    }
    return false;
}



int main()
{
    int arr[] = {3, 4, 8, -9, 20, 6}, n = 6;
    cout<<checkEquilibrium(arr, n)? "true" : "false";
    cout<<endl;
}
```

```
1

Process returned 0 (0x0)   execution time : 0.849 s
Press any key to continue.
```


_043)_Find_Equilibrium_Point_in_an_Array.cpp
Select "C:\Users\Akash Singh\Documents\Coding\' CHALLENGE '\365-Days-of-Code\175). Complete DSA (Arra...

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

bool checkEquilibrium(int arr[], int n)
{
    int sum = 0;
    for(int i = 0; i < n; i++)
        sum += arr[i];
    int l_sum = 0;
    for(int i = 0; i < n; i++)
    {
        if(l_sum == sum - arr[i])
            return true;
        l_sum += arr[i];
        sum -= arr[i];
    }
    return false;
}

int main()
{
    int arr[] = {4, 2, 2}, n = 3;
    cout<<checkEquilibrium(arr, n)? "true" : "false";
    cout<<endl;
}
```

```
0

Process returned 0 (0x0)   execution time : 0.456 s
Press any key to continue.
```



_044)_In_Two_Array_Find_Max_Occuring_Element.cpp

```cpp
#include<iostream>
#include<bits/stdc++.h>
using namespace std;

int maxOcc(int L[], int R[], int n)
{
        int arr[1000];
        memset(arr, 0, sizeof(arr));
        for(int i = 0; i < n; i++)
        {
            arr[L[i]]++;
            arr[R[i] + 1]--;
        }
        int maxm = arr[0], res = 0;
        for(int i = 1; i < 1000; i++)
        {
            arr[i] += arr[i - 1];
            if(maxm < arr[i])
            {
                maxm = arr[i];
                res = i;
            }
        }
        return res;
}

int main()
{
    int L[] = {1, 2, 3}, R[] = {3, 5, 7}, n = 3;
    cout<<"Maximum Occuring Element in both Array = "<<maxOcc(L, R, n)<<endl;
}
```

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```
Maximum Occuring Element in both Array = 3

Process returned 0 (0x0)   execution time : 0.347 s
Press any key to continue.
```