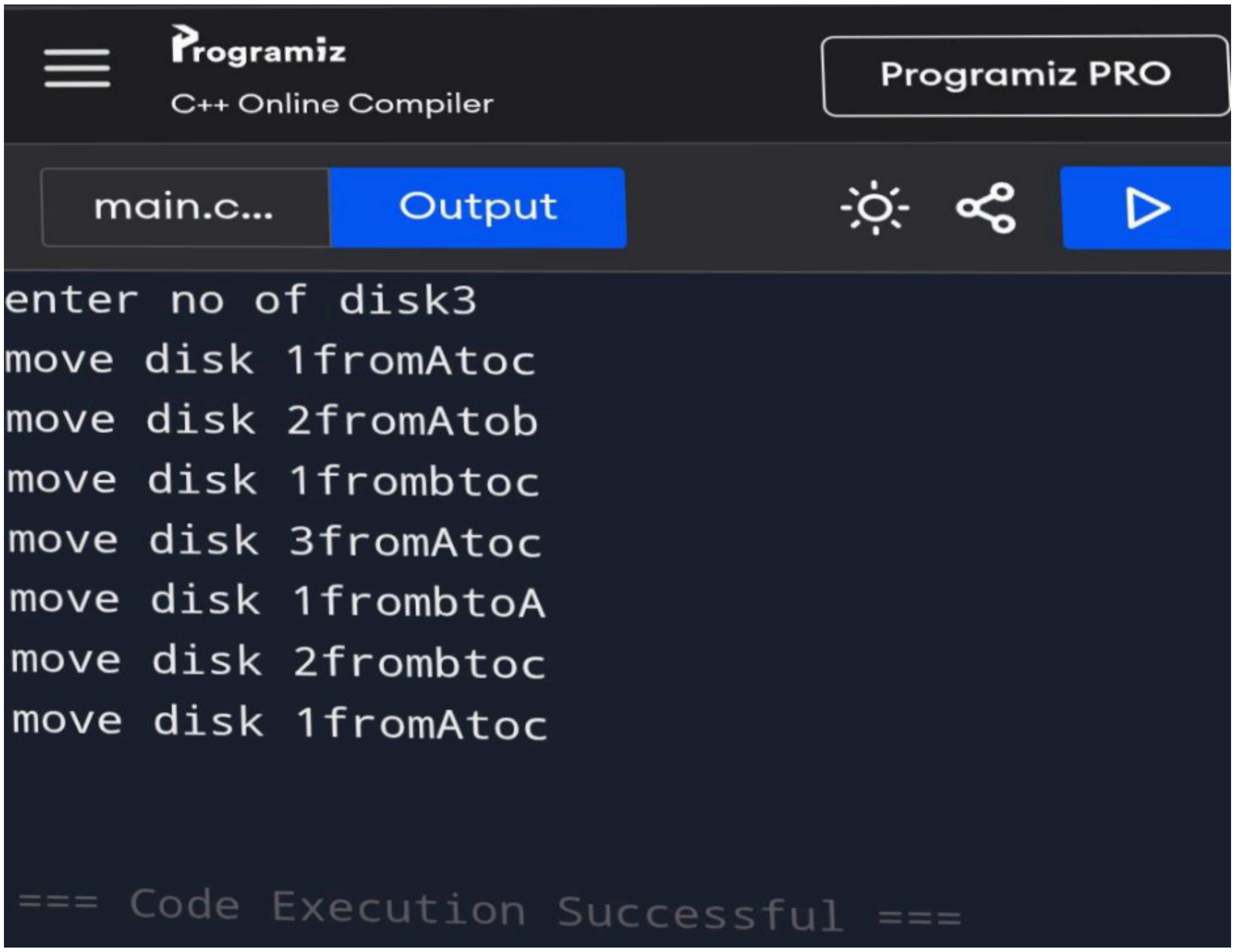
Non recursive TOH

```
#include <iostream>

#include<stack>

#include <cmath>


Using namespace std;

Void movedisk(char from,char to,stack<int>&src,stack<int>&des){

   If(src.empty() && des.empty())

   Return;

     If(src.empty()){

        Int disk=des.top();

        Des.pop();

        Src.push(disk);

        Cout<<”move disk “<<disk<<”from”<<to<<”to”<<from<<endl;

     }else if(des.empty()){

        Int disk=src.top();

        Src.pop();

        Des.push(disk);

        Cout<<”move disk “<<disk<<”from”<<from<<”to”<<to<<endl;

     }

     Else if(src.top()>des.top()){

        Int disk=des.top();

        Des.pop();

        Src.push(disk);

        Cout<<”move disk “<<disk<<”from”<<from<<”to”<<to<<endl;
```

```
      }else{
         Int disk=src.top();
         Src.pop();
         Des.push(disk);
         Cout<<”move disk “<<disk<<”from”<<from<<”to”<<to<<endl;
      }









}
Int main() {
Int n;
Cout<<”enter no of disk”;
Cin>> n;
Stack<int>src,aux,des;
Int totalmoves=pow(2,n)-1;
For(int i=n;i>=1;i--){
   Src.push(i);
}
Char s=’A’,a=’b’,d=’c’;
If(n%2==0){
   Swap(a,d);
}
```

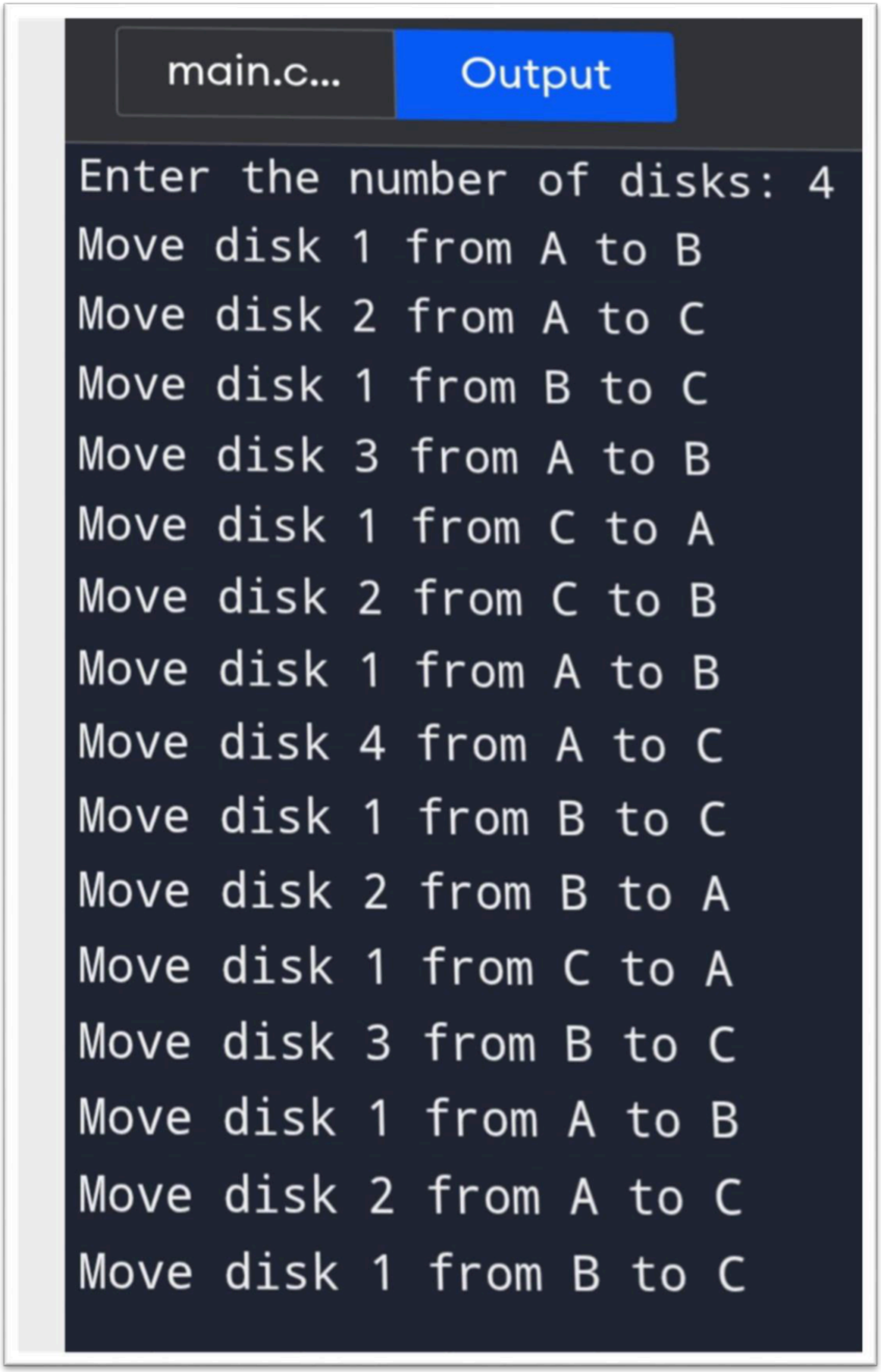
```
For(int i=1;i<=totalmoves;i++){
   If(i%3==1){
     Movedisk(s,d,src,des);
   }else if(i%3==2){
     Movedisk(s,a,src,aux);
   }else {
     Movedisk(a,d,aux,des);
   }
}u
   Return 0;
}
```



```
enter no of disk3
move disk 1fromAtoc
move disk 2fromAtob
move disk 1frombtoc
move disk 3fromAtoc
move disk 1frombtoA
move disk 2frombtoc
move disk 1fromAtoc


=== Code Execution Successful ===
```

Recursive TOH

```
#include <iostream>



Void towerOfHanoi(int n, char source, char destination, char auxiliary) {


    If (n == 1) {
        Std::cout << “Move disk 1 from “ << source << “ to “ << destination << std::endl;

        Return;

    }




    towerOfHanoi(n – 1, source, auxiliary, destination);


 std::cout << “Move disk “ << n << “ from “ << source << “ to “ << destination << std::endl;



    towerOfHanoi(n – 1, auxiliary, destination, source);

}


Int main() {

    Int num_disks;

    Std::cout << “Enter the number of disks: “;

    Std::cin >> num_disks;

    towerOfHanoi(num_disks, ‘A’, ‘C’, ‘B’);


    return 0;

}
```



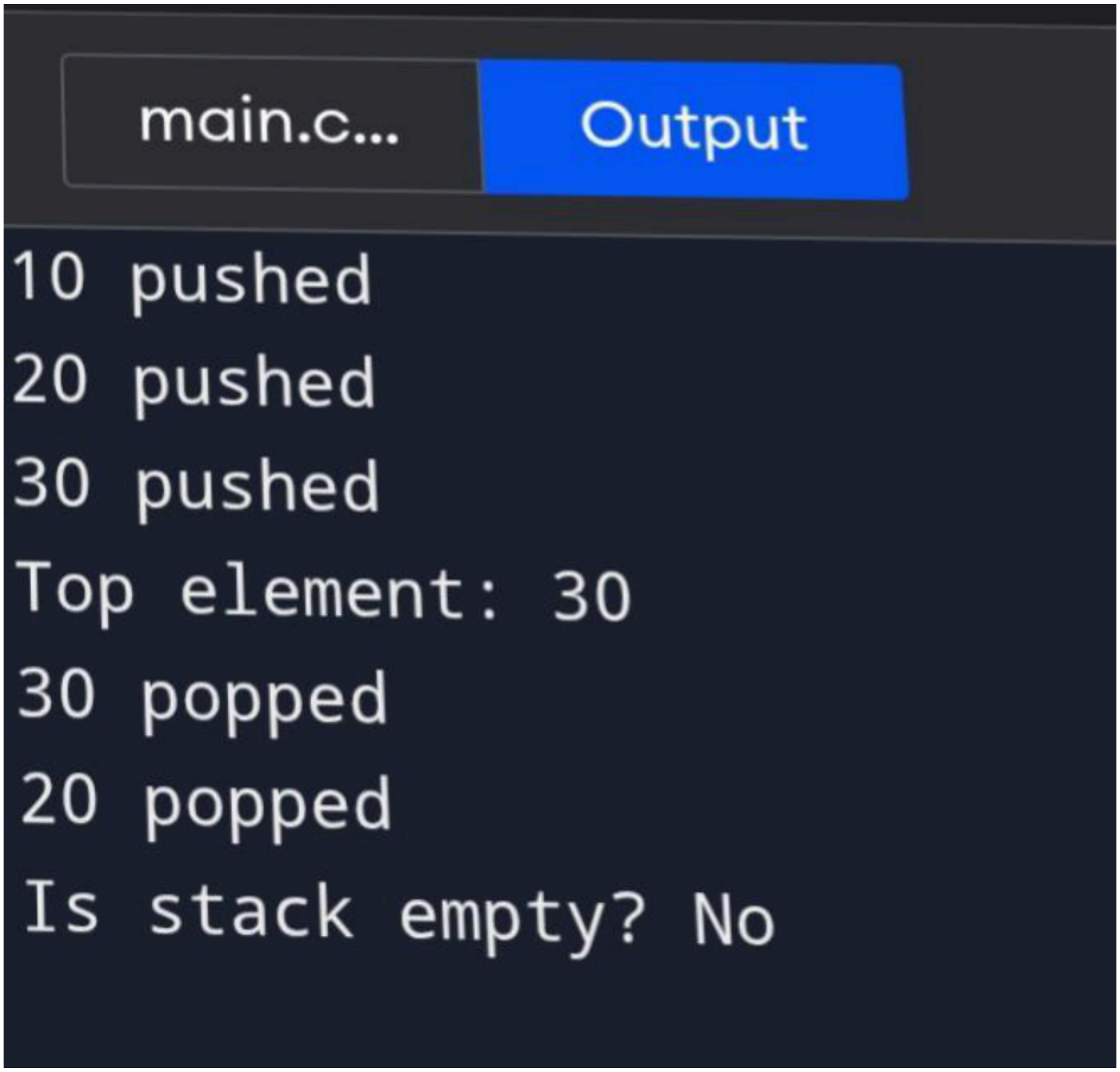
```
Enter the number of disks: 4
Move disk 1 from A to B
Move disk 2 from A to C
Move disk 1 from B to C
Move disk 3 from A to B
Move disk 1 from C to A
Move disk 2 from C to B
Move disk 1 from A to B
Move disk 4 from A to C
Move disk 1 from B to C
Move disk 2 from B to A
Move disk 1 from C to A
Move disk 3 from B to C
Move disk 1 from A to B
Move disk 2 from A to C
Move disk 1 from B to C
```

Stack implementation

```
#include <iostream>
using namespace std;
#define MAX 5 // Maximum size of stack

class Stack {
   int arr[MAX];
   int top;

public:
   Stack() { top = -1; }

   // Push operation
   void push(int x) {
      if (top == MAX - 1) {
         cout << "Stack Overflow\n";
         return;
      }
      arr[++top] = x;
      cout << x << " pushed\n";
   }
```

```
    }

    // Pop operation
    void pop() {
        if (top == -1) {
            cout << "Stack Underflow\n";
            return;
        }
        cout << arr[top--] << " popped\n";
    }

    // Peek operation
    int peek() {
        if (top == -1) {
            cout << "Stack is Empty\n";
            return -1;
        }
        return arr[top];
    }

    // Check empty
    bool isEmpty() {
        return (top == -1);
    }
};
```

```
int main() {
    Stack s;
    s.push(10);
    s.push(20);
    s.push(30);

    cout << "Top element: " << s.peek() << endl;

    s.pop();
    s.pop();

    cout << "Is stack empty? " << (s.isEmpty() ? "Yes" : "No") << endl;

    return 0;
}
```



```
10 pushed
20 pushed
30 pushed
Top element: 30
30 popped
20 popped
Is stack empty? No
```