DOMAIN WINTER WINNING CAMP

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1. Push operation in stack

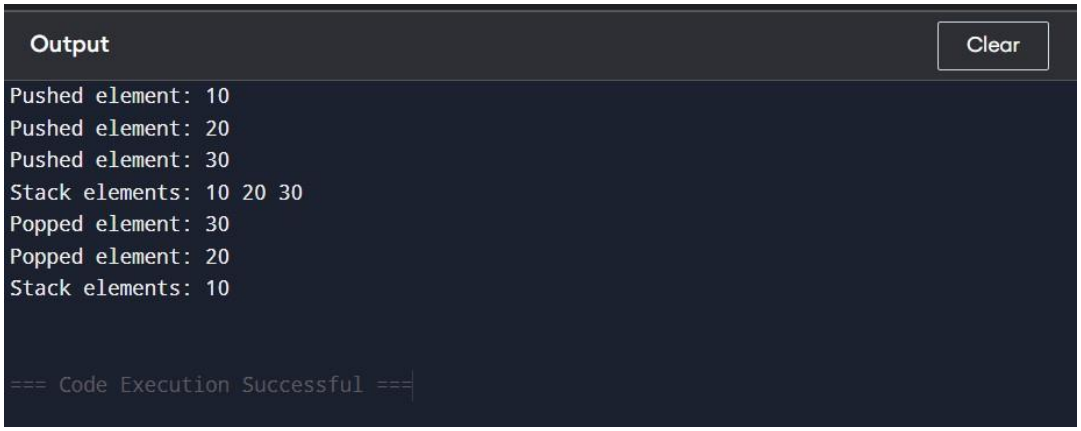
```
#include <iostream>
using namespace std;

const int maxsize=100;

class Stack{
private:     int
arr[maxsize];
   int top;

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

void push(int x){     if(top==maxsize-
1){
       cout<<"Stack overflow"<<endl;
return;
   }
   top = top + 1;
   arr[top] = x;
   cout<<"pushed elements: "<<x<<endl;
}

void display(){     if(top==-
1){
       cout<<"Stack underflow"<<endl;
return;
   }
   cout<<"Stack elements: ";
for(int i=0;i<=top;i++){
       cout<<arr[i]<<" ";
   }
   cout<<endl;
```

```
}
};

int main() {
    Stack s;
    s.push(1);
    s.push(2);

    s.display();

    return 0; }
```

2. Pop operation in stack

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

const int maxSize = 100;

class Stack {
private:     int
arr[maxSize];
    int top;

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

    void push(int x) {         if (top ==
maxSize - 1) {             cout << "Stack
Overflow!" << endl;             return;
        }         top =
top + 1;
        arr[top] = x;
        cout << "Pushed element: " << x << endl;
    }
```

```
    void pop() {
if (top == -1) {
            cout << "Stack Underflow!" << endl;
return;
        }
        cout << "Popped element: " << arr[top] << endl;
top = top - 1;
    }

    void display() {
if (top == -1) {
            cout << "Stack is empty!" << endl;
return;
        }
        cout << "Stack elements: ";
for (int i = 0; i <= top; i++) {
            cout << arr[i] << " ";
        }
        cout << endl;
    }
};

int main() {
    Stack s;
    s.push(10);
    s.push(20);
    s.push(30);
    s.display();
    s.pop();
    s.pop();
    s.display();
return 0; }
```



3. Stack implementation using linked list

```
#include <iostream>
```

```
using namespace std;

struct Node{
   int data;
   Node* next;
};

class Stack{
private:    Node*
top;     public:
Stack(){
top=nullptr;
   }
void push(int x){    Node*
newNode= new Node();
newNode->data=x;    newNode-
>next=top;
   top=newNode;
}

void pop(){    if(top==nullptr){
cout<<"Stack underflow"<<endl;
      return;
   }
   Node* temp=top;
top=top->next;    delete
temp;
}

void peek() {    if
(top != nullptr) {
      cout << "Top element: " << top->data << endl;
   }
   else {
      cout << "Stack is empty" << endl;
   }
} bool isEmpty() {
return top == nullptr;
}

void display(){    Node*
temp=top;
while(temp!=nullptr){
cout<<temp->data<<" ";
      temp=temp->next;
   }
```

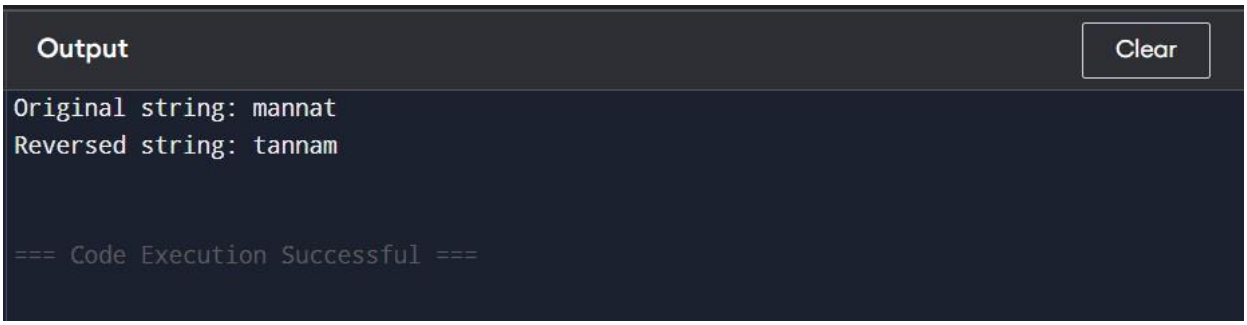
```
    cout<<endl;
    }
};

int main() {
Stack s;
    cout<<"Stack after pushing: ";
s.push(1);
    s.push(2);
    s.push(3);
    s.display();
cout<<endl;

    cout<<"Stack after poping: ";
s.pop();
    s.pop();
    s.display();
cout<<endl;

    cout << "Peek operation: ";
s.peek();
    cout<<endl;

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

    return 0; }
```

```
Output                                                    Clear
Pushed element: 10
Pushed element: 20
Pushed element: 30
Stack elements: 10 20 30
Popped element: 30
Popped element: 20
Stack elements: 10


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

4. Reverse a string using stack

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

```
class Stack { private:     static
const int maxsize = 100;     char
stack[maxsize];
   int top;

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

   void push(char ch) {         if (top
== maxsize - 1) return;         top =
top + 1;         stack[top] = ch;
   }

   char pop() {         if (top
== -1) return '\0';         char
ch = stack[top];         top =
top - 1;         return ch;
   }

   bool isEmpty() {
return top == -1;
   }
};

void reverseString(char str[]) {
Stack s;     int i = 0;

   while (str[i] != '\0') {
s.push(str[i]);         i++;
}
    i = 0;     while
(!s.isEmpty()) {
str[i++] = s.pop();
   }
}

int main() {     char str[]
= "mannat";
   cout << "Original string: " << str << endl;
reverseString(str);
   cout << "Reversed string: " << str << endl;
return 0; }
```



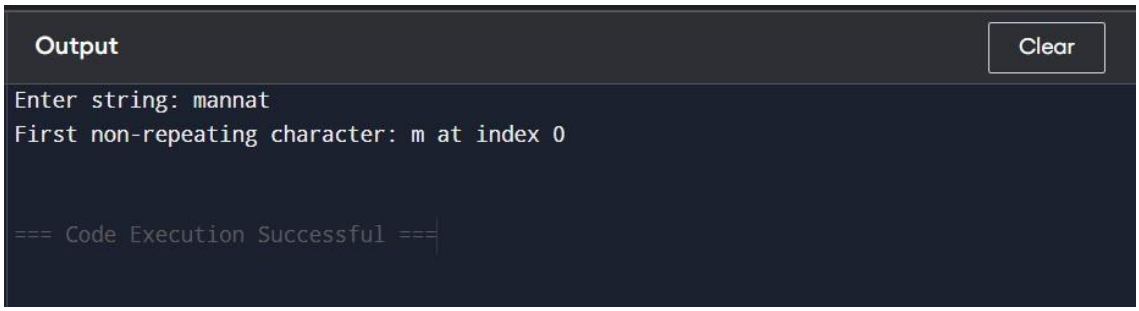
5. Print Multiplication Table of a Number

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

class Stack { private:
   queue<int> q1, q2;

public:
   void push(int x) {
      q2.push(x);

      while (!q1.empty()) {
q2.push(q1.front());
         q1.pop();
      }

      swap(q1, q2);
   }

   void pop() {
if (q1.empty()) {
         cout << "Stack is empty\n";
return;
      }
      q1.pop();
   }

   int top() {       if (q1.empty()) {
cout << "Stack is empty\n";
         return -1;
      }       return
q1.front();
   }
```

```
    bool isEmpty() {
return q1.empty();
    }

    void display() {        if (q1.empty()) {
cout << "Stack is empty" << endl;
return;
        }

        queue<int> temp = q1;
while (!temp.empty()) {
cout << temp.front() << " ";
            temp.pop();
        }
        cout << endl;
    }
};

int main() {
Stack stack;

    stack.push(10);
stack.push(20);     stack.push(30);

    cout << "Stack elements: ";
stack.display();

    cout << "Top element: " << stack.top() << endl;
    stack.pop();

    cout << "Stack after pop: ";
stack.display();

    cout << "After poping all: ";
stack.pop();     stack.pop();
stack.pop();

    return 0; }
```

6. Given a string, find the first non-repeating character and its index. If no such character exists, return -1.

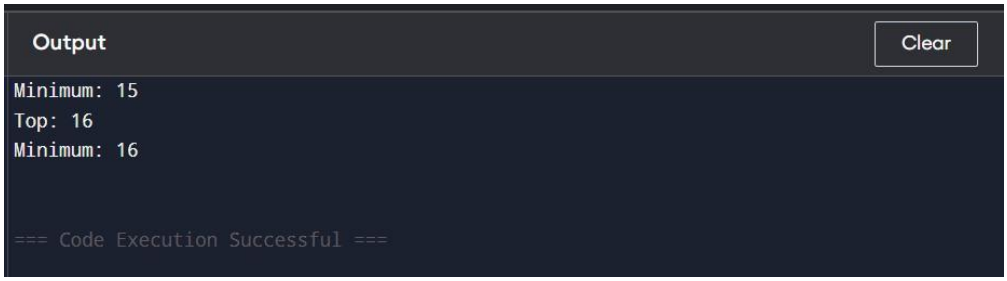
```
#include <iostream> #include
<string>
using namespace std;

pair<char, int> firstNonRepeatingChar(const string& str) {
int freq[26] = {0};      for (char c : str) {         freq[c -
'a']++;
    }
    for (int i = 0; i < str.length(); i++) {
if (freq[str[i] - 'a'] == 1) {
return {str[i], i};
        }
}
    return {'-', -1};
}

int main() {
    cout<<"Enter string: ";
    string input;
cin >> input;
    pair<char, int> result = firstNonRepeatingChar(input);
if (result.second != -1) {
        cout << "First non-repeating character: " << result.first << " at index " << result.second <<
endl;
    } else {
        cout << "No non-repeating character found." << endl;
    }
return 0; }
```



7. Minimum stack value

```
#include <iostream>
#include <stack>

using namespace std;

class MinStack {
private:
stack<int> s;
    stack<int> minStack;

public:
    void push(int val) {        s.push(val);        if
(minStack.empty() || val <= minStack.top()) {
minStack.push(val);
        }
    }

    void pop() {
        if (s.top() == minStack.top()) {
minStack.pop();
        }
        s.pop();
    }

    int top() {
return s.top();
    }

    int getMin() {
        return minStack.top();
    }
};

int main() {
MinStack minStack;
```

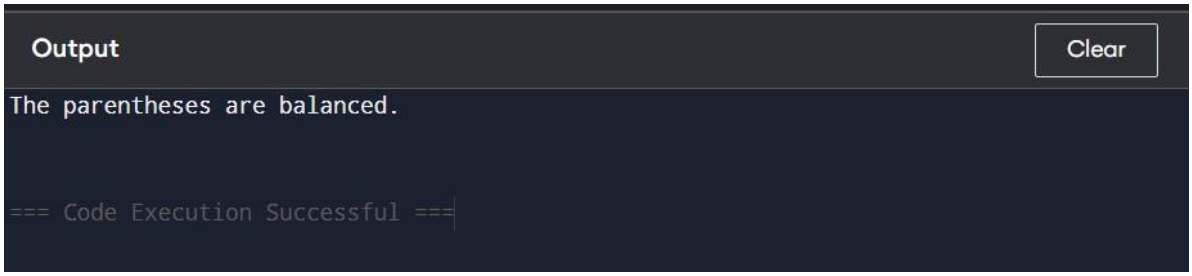
```
    int values[] = {19, 18, 29, 16, 15};

    for (int val : values) {
        minStack.push(val);
    }

    cout << "Minimum: " << minStack.getMin() << endl;

    minStack.pop();
    cout << "Top: " << minStack.top() << endl;
    cout << "Minimum: " << minStack.getMin() << endl;

    return 0;
}
```



8. Balance the number of parenthesis using stack

```
#include <iostream>
#include <stack>
#include <string>

using namespace std;

bool isBalanced(const string& expression) {
    stack<char> s;     for (char
ch : expression) {         if (ch
== '(') {             s.push(ch);
} else if (ch == ')') {
if (s.empty()) {
return false;
            }
            s.pop();
        }
    }
    return s.empty();
}
```

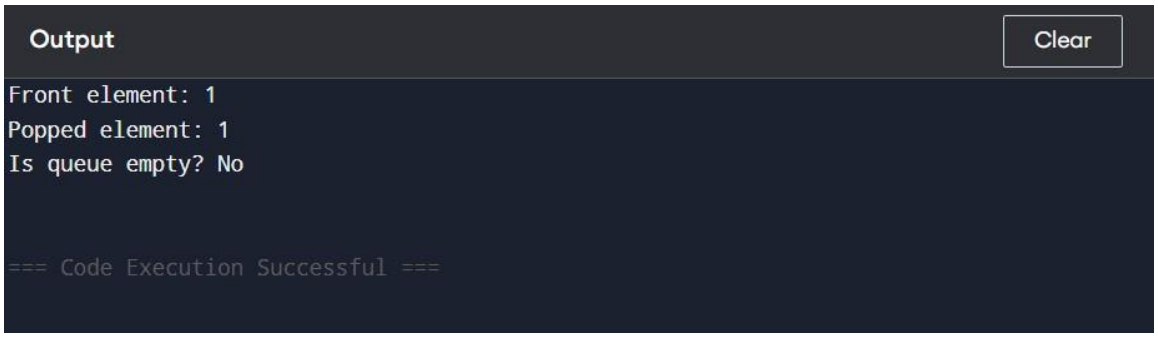
```
int main() {
   string expression = "((19+18)*(29-16))/(15)";
if (isBalanced(expression)) {
      cout << "The parentheses are balanced." << endl;
   } else {
      cout << "The parentheses are not balanced." << endl;
   }
return 0;
}
```



9. Implement a first in first out (FIFO) queue using only two stacks. The implemented queue should support all the functions of a normal queue (push, peek, pop, and empty).
Implement the MyQueue class:
void push(int x) Pushes element x to the back of the queue.
int pop() Removes the element from the front of the queue and returns it.
int peek() Returns the element at the front of the queue. boolean empty()
Returns true if the queue is empty, false otherwise.

```
#include <iostream>
#include <stack>

using namespace std;

class MyQueue { private:
   stack<int> stack1;
stack<int> stack2;

public:    void
push(int x) {
stack1.push(x);
   }

   int pop() {
      if (stack2.empty()) {
while (!stack1.empty()) {
stack2.push(stack1.top());
            stack1.pop();
         }
```

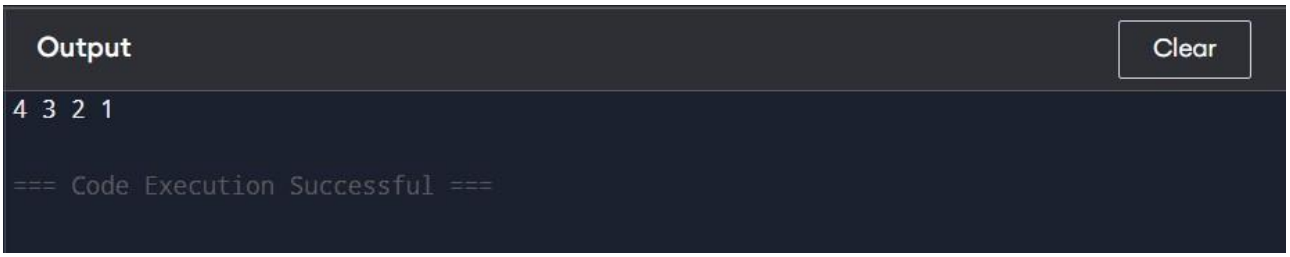
```
        }
        int front = stack2.top();
stack2.pop();
        return front;
    }

    int peek() {        if
(stack2.empty()) {            while
(!stack1.empty()) {
stack2.push(stack1.top());
                stack1.pop();
            }
        }
        return stack2.top();
    }

    bool empty() {
        return stack1.empty() && stack2.empty();
    }
};

int main() {
    MyQueue queue;

    queue.push(1);
queue.push(2);     queue.push(3);

    cout << "Front element: " << queue.peek() << endl;
cout << "Popped element: " << queue.pop() << endl;
    cout << "Is queue empty? " << (queue.empty() ? "Yes" : "No") << endl;

    return 0; }
```



10. Given a queue, write a recursive function to reverse it. .

```
#include <iostream>
```

```
#include <queue>

using namespace std;

void reverseQueue(queue<int>& q) {
if (q.empty()) {        return;
    }

    int front = q.front();
q.pop();     reverseQueue(q);
q.push(front);
}

int main() {
    queue<int> q;

    q.push(1);
    q.push(2);
    q.push(3);
    q.push(4);

    reverseQueue(q);

    while (!q.empty()) {
cout << q.front() << " ";
q.pop();
    }

    return 0; }
```



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