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## **Day 4**

### **1. Balanced Parentheses**

#### **Question:**

Given a string *s* consisting of characters (, ), {, }, [, and ], determine if the string is balanced. A string is balanced if:

1. Every opening bracket has a corresponding closing bracket.
2. Brackets are closed in the correct order.

Return "YES" if the string is balanced, otherwise "NO".

#### **Input**

#### **Format:**

The first line contains an integer *n*, the number of test cases. Each of the next *n* lines contains a string *s*.

#### **Output**

#### **Format:**

For each test case, print "YES" or "NO" based on whether the string is balanced.

#### **Code:**

```
#include <iostream>

#include <stack>

#include <string>

using namespace std;

bool isBalanced(string s) {
    stack<char> st;
    for (char c : s) {
        if (c == '(' || c == '{' || c == '[') {
            st.push(c);
        } else {
```

```

        if (st.empty()) return false;
        if ((c == ')' && st.top() != '(') ||
            (c == '}' && st.top() != '{') ||
            (c == ']' && st.top() != '[')) return false;
        st.pop();
    }
}
return st.empty();
}

int main() {
    int n;
    cin >> n;
    while (n-- > 0) {
        string s;
        cin >> s;
        cout << (isBalanced(s) ? "YES" : "NO") << endl;
    }
    return 0;
}

```

**Output:**

```

YES
NO
YES

```

#### 4. Evaluate Reverse Polish Notation

**Question:**

You are given an array of strings representing an arithmetic expression in Reverse Polish Notation (RPN). Evaluate the expression and return the result.

The valid operators are +, -, \*, and /. Each operand can be an integer or another expression.

- Division between two integers should truncate toward zero.
- It is guaranteed that the input is always a valid RPN expression.

Examples:

- Input: ["2", "1", "+", "3", "\*"] → Output: 9  
(Explanation: ((2 + 1) \* 3))
- Input: ["4", "13", "5", "/", "+"] → Output: 6  
(Explanation: (4 + (13 / 5)))

**Code:**

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

```
int evalRPN(vector<string>& tokens) {
    stack<int> st;
    for (string& token : tokens) {
        if (token == "+" || token == "-" || token == "*" || token == "/") {
            int b = st.top(); st.pop();
            int a = st.top(); st.pop();
            if (token == "+") st.push(a + b);
            else if (token == "-") st.push(a - b);
```

```

        else if (token == "*") st.push(a * b);
        else st.push(a / b);
    } else {
        st.push(stoi(token));
    }
}
return st.top();
}

int main() {
    vector<string> tokens1 = {"2", "1", "+", "3", "*"};
    vector<string> tokens2 = {"4", "13", "5", "/", "+"};
    vector<string> tokens3 = {"10", "6", "9", "3", "+", "-11", "*", "/", "*", "17", "+",
"5", "+"};

    cout << evalRPN(tokens1) << endl; // Output: 9
    cout << evalRPN(tokens2) << endl; // Output: 6
    cout << evalRPN(tokens3) << endl; // Output: 22
    return 0;
}

```

Output:

```

9
6
22
...Program finished with exit code 0

```

### 3. FIFO Queue Using Two Stacks

**Question:**

Implement a queue using two stacks. The queue should support the following operations:

1. Push: Add an element to the end of the queue.
2. Pop: Remove the element from the front of the queue.
3. Peek: Return the front element of the queue.
4. Empty: Return whether the queue is empty or not.

**Code:**

```
#include <iostream>

#include <stack>

using namespace std;

class MyQueue {
    stack<int> stack1, stack2;

    void transfer() {
        while (!stack1.empty()) {
            stack2.push(stack1.top());
            stack1.pop();
        }
    }

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

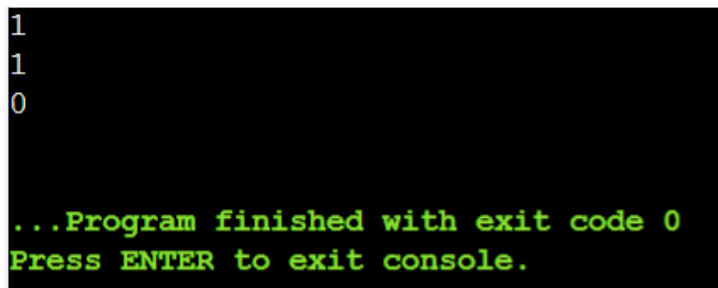
```
int pop() {  
    if (stack2.empty()) transfer();  
    int top = stack2.top();  
    stack2.pop();  
    return top;  
}
```

```
int peek() {  
    if (stack2.empty()) transfer();  
    return stack2.top();  
}
```

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

```
int main() {  
    MyQueue q;  
    q.push(1);  
    q.push(2);  
    cout << q.peek() << endl; // Output: 1  
    cout << q.pop() << endl; // Output: 1  
    cout << q.empty() << endl; // Output: 0  
    return 0;  
}
```

Output:



```
1
1
0

...Program finished with exit code 0
Press ENTER to exit console.
```

#### 4. Simple Text Editor

##### Question:

You need to implement a simple text editor that performs the following operations:

1. **Append:** Add a string  $w$  to the end of the current text.
2. **Delete:** Remove the last  $k$  characters from the current text.
3. **Print:** Print the  $k$ -th character of the text (1-based index).
4. **Undo:** Revert the text to the state it was in before the last append or delete operation.

You will be given a sequence of operations to perform, and your task is to implement these efficiently.

##### Output:

```
#include <iostream>

#include <stack>

#include <string>

using namespace std;

int main() {
    stack<string> history;
    string s = "";
    int q;
```

```
cin >> q;

while (q--){
    int type;
    cin >> type;
    if (type == 1) { // append
        string w;
        cin >> w;
        history.push(s);
        s += w;
    } else if (type == 2) { // delete
        int k;
        cin >> k;
        history.push(s);
        s.erase(s.size() - k);
    } else if (type == 3) { // print
        int k;
        cin >> k;
        cout << s[k - 1] << endl;
    } else if (type == 4) { // undo
        s = history.top();
        history.pop();
    }
}

return 0;
}
```



Output:

```
8
1 abc
3 3
c
2 3
1 xy
3 2
y
4
4
3 1
a

...Program finished with exit code 0
Press ENTER to exit console.
```

### 5.Question:

Given a string *s*, find the first non-repeating character in it and return its index. If it does not exist, return -1.

### Code:

```
#include <iostream>

#include <string>

#include <unordered_map>

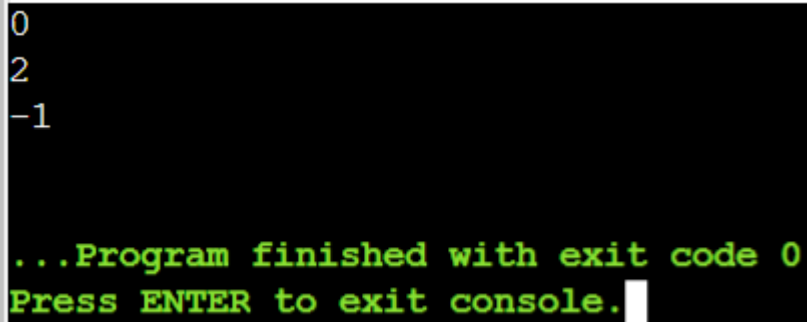
using namespace std;

int firstUniqueChar(string s) {
    unordered_map<char, int> freq;
    for (char c : s) freq[c]++;
    for (int i = 0; i < s.size(); i++) {
        if (freq[s[i]] == 1) return i;
    }
    return -1;
}
```

```
}  
    return -1;  
}
```

```
int main() {  
    cout << firstUniqueChar("leetcode") << endl;    // Output: 0  
    cout << firstUniqueChar("loveleetcode") << endl; // Output: 2  
    cout << firstUniqueChar("aabb") << endl;        // Output: -1  
    return 0;  
}
```

Output:



A screenshot of a console window with a black background and green text. The output shows three lines of numbers: 0, 2, and -1, each on a new line. Below these, a message reads "...Program finished with exit code 0" followed by "Press ENTER to exit console." with a white cursor block at the end.

```
0  
2  
-1  
  
...Program finished with exit code 0  
Press ENTER to exit console.
```