

Assignment No.5

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TITLE:-

Write a program using a stack for push, pop, peek, and isEmpty operations. Write isBalanced() Function that Iterates through the input expression, Pushes opening brackets onto the stack. For closing brackets, it checks the top of the stack for a matching opening bracket. Ensures that all opening brackets are matched by the end of the traversal. Main Function: Accepts a string expression from the user. Uses isBalanced() to determine if the parentheses in the expression are balanced.

CODE:-

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

#define MAX 100 // maximum size of stack

// Custom stack implementation
class Stack {
char arr[MAX];
int top;
public:
Stack() { top = -1; }

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

void push(char c) {
if (!isFull()) {
```

```

arr[++top] = c;
}
}

char pop() {
if (!isEmpty()) {
return arr[top--];
}
return '\0'; // return null char if empty
}

char peek() {
if (!isEmpty()) {
return arr[top];
}
return '\0';
};

// Function to check if brackets are balanced
bool isBalanced(string expr) {
Stack s;

for (char ch : expr) {
if (ch == '(' || ch == '{' || ch == '[') {
s.push(ch);
}
else if (ch == ')' || ch == '}' || ch == ']') {
if (s.isEmpty()) return false;

char top = s.pop();
if ((ch == ')' && top != '(') ||
(ch == '}' && top != '{') ||
(ch == ']' && top != '[')) {
return false;
}
}
}
return s.isEmpty();
}

int main() {
string expression;
cout << "Enter an expression: ";

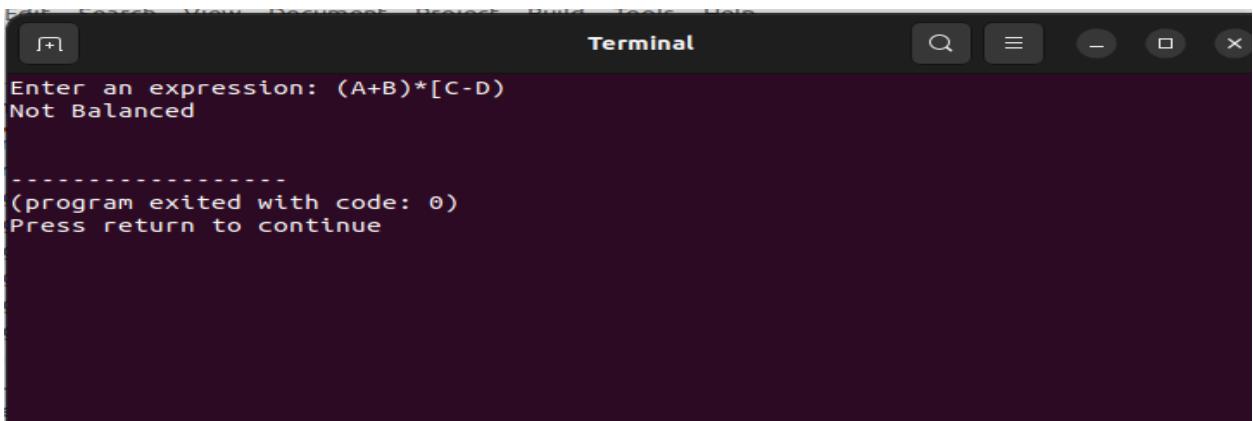
```

```
cin >> expression;

if (isBalanced(expression))
cout << "Balanced Expression " << endl;
else
cout << "Not Balanced " << endl;

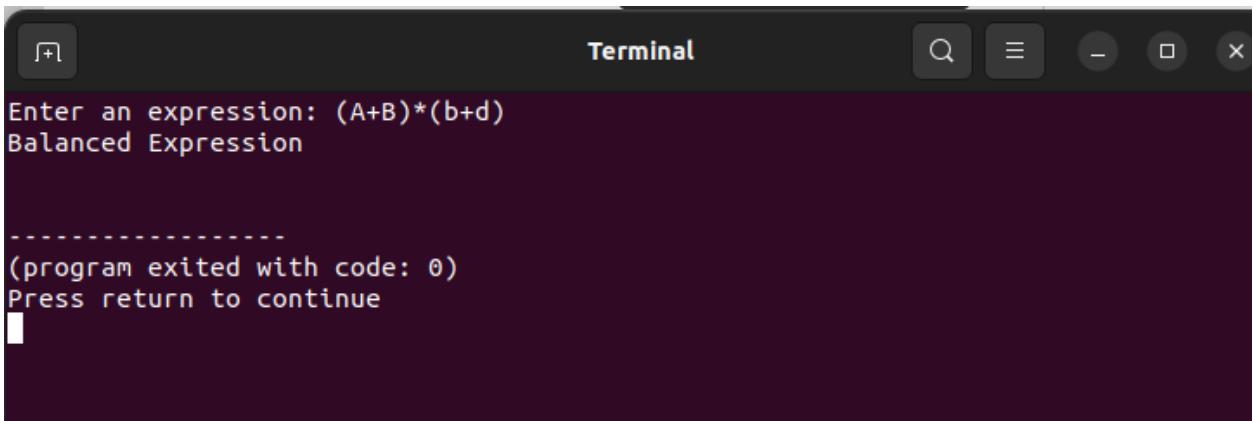
return 0;
}
```

OUTPUT :



A screenshot of a dark-themed terminal window titled "Terminal". The window has standard OS X-style title bar buttons (red, green, blue) and a search bar. The terminal itself shows the following text:
Enter an expression: (A+B)*[C-D)
Not Balanced

(program exited with code: 0)
Press return to continue



A screenshot of a dark-themed terminal window titled "Terminal". The window has standard OS X-style title bar buttons (red, green, blue) and a search bar. The terminal itself shows the following text:
Enter an expression: (A+B)*(b+d)
Balanced Expression

(program exited with code: 0)
Press return to continue