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/************************************ASSIGNMENT 6************************************
In any language program mostly syntax error occurs due to unbalancing delimiter such as
(), {}, []. Write a program using stack to check whether a given expression is well
parenthesized or not.
*************************************************************************************/
#include <stdio.h>
#include <stdlib.h>


#define SIZE 100


char stack[SIZE];
int top = -1;


// Push function
void push(char ch) {
  if (top == SIZE - 1) {
      printf("Stack Overflow\n");
      exit(1);
  }else{

  stack[++top] = ch;
     }
}


// Pop function
char pop() {
  if (top == -1) {
     // return '\0';  // Return null character if stack is empty
      return -1;
  }

     return stack[top--];
}


// Function to check matching pair
int isMatchingPair(char opening, char closing) {
  return (opening == '(' && closing == ')') ||
         (opening == '{' && closing == '}') ||
         (opening == '[' && closing == ']');
}


// Function to check if expression is balanced
int isBalanced(char* expr) {
  for (int i = 0; expr[i] != '\0'; i++) {
      char ch = expr[i];
     if (ch == '(' || ch == '{' || ch == '[') {
        push(ch);
     } else if (ch == ')' || ch == '}' || ch == ']') {
        char popped = pop();
        if (!isMatchingPair(popped, ch)) {
           return 0; // Not balanced
        }
     }
  }


  return top == -1; // Stack should be empty if balanced
}


int main() {
  char expr[SIZE];


  printf("Enter an expression: ");
  scanf("%s", expr);


  if (isBalanced(expr)) {
     printf("The expression is well parenthesized (Balanced).\n");
  } else {
     printf("The expression is NOT well parenthesized (Unbalanced).\n");
  }


  return 0;
}
/
*********************************************OUTPUT**************************************************
***********
student@student-OptiPlex-3000:~$ ./a6
Enter an expression: {[()]}
The expression is well parenthesized (Balanced).
student@student-OptiPlex-3000:~$ ./a6
Enter an expression: {[(])}
The expression is NOT well parenthesized (Unbalanced).
***************************************************************************************************/
```