COP-4338 System Programming

Programming Assignment 1:
Intro to C Programming

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In this assignment, you will write a program that checks the input string to see if it is made of balanced parentheses. Balanced parentheses means that each opening symbol has a corresponding closing symbol and the pairs of parentheses are properly nested.

1 Program Input Commands

There are three valid commands for your program:

- *quit*: ends the program.
- *check STR* ↵ : where *STR* represents any string that user wants to enter to check whether it is balanced or not. Please note that *STR* cannot contain a new line character.
- *pair* o_0,c_0 o_1,c_1 o_2,c_2 ... o_n,c_n ↵ : where each pair of symbols o_i,c_i represents an opening symbol/character (o_i) and its corresponding closing symbol/character (c_i). By default, the program only checks the balance of parentheses. But, for example, in order to check the balance of strings made of parentheses, brackets and curly brackets (braces), the user needs to enter the following command: *pair (,) [,] {,}* ↵ . In this command, we assume that no duplicate symbols are entered by the user, each opening symbol and its corresponding symbol are separated by only a single comma, and any two adjacent pairs are separated by a single white space character. Also, the program needs to reject the usage of comma, new-line, tab, and white-space characters as an opening or closing symbol. Finally, you can assume that user does not enter more than 50 pairs in each pair command.

2 Functions of Your Program

Your program may use different functions. However, it must have the following three functions in separate files:

- **int main()**: The main function which must be stored in balance_checker.c file.

- **int check(char str[])**: The check function returns 1 if the input str contains a balanced string and returns 0 otherwise. Please note that this function works with the most-recently given list of pairs and ignores all other characters in the input string. This function must be stored in check.c file. Also, make sure to use a stack to check the balance of opening and closing symbols in this function.

- **void pair(char list[])**: The pair function, which needs to be stored in pair.c file, gets the list of opening and closing symbols, the way entered by the user, and stores them in two external char arrays called opening_symobls and closing_symbols. These arrays need to be external so that they can be accessible by the check function stored in check.c file. Also, these arrays must be defined as oversize arrays of capacity equal to 51. To show their true size, you can place a NULL character after the last symbol they store. For example, if list is "*(,) [,] {,}*", then the arrays look like this:

index	0	1	2	3	4	5	6	...	50
opening_symbols	(	[	{	NULL	?	?	?	...	?
closing_symbols	)	]	}	NULL	?	?	?	...	?

3 Submissions

You need to submit a *.zip* file compressing the followings:

- balance_checker.c
- check.c
- pair.c
- other .c files (if you have any)
- balance.h
- makefile which organizes the compilation process of your program. **Use the word "balance" to name the executable of your program.**
- snapshot of gdb program running the main function of your program line-by-line (.jpg or .png files only)