Dept. of Computer Science and Engineering
IIT Delhi
COL216 : Assignment 2
II Semester 2020-2021

Release date: 24 February 2021
Submission deadline: 11:55 pm, 02 March 2021

General Instructions
1. You will use QtSpim Simulator that was installed in Assignment 0 for this Assignment.
2. The assignment will be done individually or in groups of 2. Only one member of each group should submit the assignment on Moodle.
3. Each group member should understand the problem and contribute equally to the solution. Demos (online/phone) would be held for all the lab assignments.
4. You will be awarded marks according to your design, implementation, and testing strategy. Extensive testing is expected as part of the assignment.
5. Adopting any unfair means will lead to -MAX marks (MAX=10 for this assignment).

Submission instructions
- Prepare a small write-up (1-2 pages) on the approach taken to solve the problem along with test cases you have considered.
- Explain the testing strategy.
- Zip the document along with the code file and submit at the Moodle submission link.

Problem Statement:
Write a MIPS Assembly Program for evaluating an expression in postfix format.

Input: Postfix expression with constant integer operands in the range 0-9 and operators +, -, and *.

A C++ program to convert the expression to postfix expression is uploaded on Moodle.
Input to C++ program is an infix expression.
Example:
Input to C++ Program: 3+2*5 (->infix expression)
Output of C++ Program: 325*+ (-> Postfix expression)

The postfix expression can be accepted as a string input to the assembly program at run time.
Example: “325*+” (without the quotes).

Example execution for the above expression, using a stack structure:
3 -> push onto the stack. Stack contents: 3
2 -> push onto the stack. Stack contents: 3 2
5 -> push onto the stack. Stack contents: 3 2 5
* -> pop the top 2 stack elements, perform the multiplication, then push the result onto the stack. Stack contents: 3 10
+ -> pop the top 2 stack elements, perform the addition, then push the result onto the stack. Stack contents: 13

Reference for ASCII character to int conversion:
https://stackoverflow.com/questions/15940331/convert-string-of-ascii-digits-to-int-in-mips-assembler

Refer pages 96-97 in the MIPS manual below for reading string/char input:
http://www.egr.unlv.edu/~ed/MIPStextSMv11.pdf

Output: Print the result of the expression.

Other instructions:
Please refer to this document for help on MIPS Assembly language and QtSpim.
http://www.egr.unlv.edu/~ed/MIPStextSMv11.pdf

Please post your doubts on Piazza and we will revert as soon as possible.

MAX marks = 10. Breakup of marks:

1M : For proper inputs reading (inputs can be taken from keyboard)
1M : For printing the correct result
3M : Approach & Code
3M : Test cases
1M : Document
1M : Questions/Viva

Late Penalty: Same as in Assignment 1.