Exercise 3

Due 12/5/2017

1 Introduction

This exercise implements a simple desktop calculator. It uses the LR(1) parsing scheme on top of FLEX. You need not perform the actual computation, but rather say whether it is a valid arithmetic computation. For instance, $4 + 5 * 6$ is valid, and $6 - 4 * (8$ is *not* valid.

2 Algorithm Outline

The applied shift reduce LR(1) algorithm was discussed thoroughly in class. It can be roughly described as having two modules: the state transition diagram which you have to write as a two dimensional table, and the stack which accommodates the relevant history of encountered tokens, reduced variables and states. At each step the state at the top of the stack, and the next token ahead imply an action which can be one of the following: shift, reduce, accept or error. Suppose, for sake of explanation, that state 7 is currently at the top of the stack, and the next token ahead is $+$.

If TABLE[7][+] = "s3" then it means the algorithm should perform a shift action, push the element $(+, 3)$ on top of the stack, and read the next token from the input.

If TABLE[7][+] = "r6" then it means the algorithm should perform a reduce action for rule 6, pop from the stack as many elements as the length of the right hand side of rule 6, and push the left hand side variable of rule 6 (together with the next state) to the top of the stack.

If TABLE[7][+] = "" (the empty string) then it means the algorithm should print some kind of error message and terminate.

If TABLE[7][+] = "a" (accept) then it means the input is correct.

3   Input

The input for this exercise is a single text file that contains the arithmetic expression.

4   Output

The output is a single text file that should contain a single word: either OK when the expression is valid, or FAIL otherwise.

5   Submission Guidelines

The code for this exercise resides as usual in subdirectory EX3. The file Table.c should be the only file you change. Please submit your exercise in your GitHub repository under COMPILATION/EX3, and have a makefile there to build a runnable program called calc. To avoid the pollution of EX3, please remove all *.o files once the target is built. The next paragraph describes the execution of calc.

Execution parameters   calc recevies 2 input file names:

Input.txt
Output.txt