Lab 2: Assembly Calculator

Assigned: Nov. 10, 2021
Due: Dec. 05, 2021

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1 Introduction

This is the second lab about the LC-3 Simulator Assembly in this semester. In this lab, you are suppose to complete the calculator introduced in the textbook and then extend it with tow new operations. A brief report is also required to explain how you implement this calculator. The details of the problems and submission instruction are described in the next section.

2 Calculator Completion

A detailed example of a calculator is already described in Chap.10.5. It currently supports addition and multiplication operations with a maximum number range of $[-999, 999]$. Comprehend the design and implementation of the calculator first, and then implement the final version of the calculator and testify its correctness. The sample code from the textbook can be found in this lab supplementary file.

3 Operation Extension

In this lab, you need further extend the calculator introduced in the textbook with two new operations. You should implement the operations and explain your design in the report.

3.1 Modular Operation

Now a new modular operation becomes necessary according to the practice. For example, 15 mod 4 = 3 and -2 mod 3 = 1. Please implement such an operation on the basis of the calculator you have built and show the correctness. You can use the ASCII code of "x0025" or "%" to represent the modular operation like "a % b = c" for "a mod b = c". Here we have $0 \leq c < b$.

3.2 XOR Operation

We now consider further equip the calculator with a logical operation XOR with a binary base. You can use the ASCII code of "x0040" or "@" to represent the XOR operation.

Note that you can use any algorithm to implement the operations without considering the algorithm complexity in the above two tasks. But do not forget to check the validity of the input operands before the calculation.

Please submit the following two items to the Canvas: **1) a assembly code program** in a file named **lab2.asm**, and **2) a brief report** named **lab2.doc /.pdf /.md** including necessary explanations and runtime screenshots of your work. You may just upload the two files independently without compression.