

ECE220 Computer Systems and Programming

Lab 1

1 After this week's lectures, you should be able to...

1. Write programs using the LC-3 instruction set¹ that involve memory operations, arithmetic/logical operations, and control instructions.
2. Describe how the LC-3 architecture performs memory-mapped I/O and write programs that can read input from keyboard and print output to screen.

2 After today's lab, you should be able to...

1. Write a program that performs bitwise left shift on a number.
2. Read a flowchart and implement its corresponding program.
3. Retrieve and submit MPs/Labs using Git

3 Exercises

1. Left shifting a number by 1 bit is equivalent to performing what operation on this number?

Add itself (x2)

2. Given a number in R1, extract the highest 4 bits of R1 into R2. For example:

R1 0110 1100 0111 0101

R2 0000 0000 0000 0110

Hint 1: In 2's complement, the highest bit of a negative number is 1. The highest bit of a positive number or zero is 0.

Hint 2: Use left shift to turn the second highest bit to be the highest bit.

If R1 is negative (MSB=1), R2 add 1, else R2 add 0

Then left shift R1 and R2 1 bit

Loop the above 4 times

¹ECE120 Lab 11 and 13 resources can be found on our course Wiki under "Resources->Learning Tools and Tutorials".