CEG 3310 – Computer Organization

Lab 1 – Representations

Learning Objectives

- Understand how different data types (signed and unsigned integers, characters, strings, and floating point numbers) are represented in binary
- Learn the interface of the LC3 simulator and editor

Overview

You will be given an assembly language program that loads and prints certain values from memory. Your task is to change the binary values in memory to represent different values and types, as described below.

The Program

The program you will be given will behave as follows:

1. It will load the value found in memory at address x3500, and print it as a signed, 2's complement integer.
2. It will load the value found in memory at address x3501, and print it as an unsigned integer.
3. It will assume that there is a null-terminated string found in memory at address x3502. This string will be printed.
4. It will assume that there is a linked list starting at address x4000. The list nodes consist of two words. The first word is a signed 2's complement integer to be printed. The second word is a 16-bit pointer to the next list node. The list will be read, and each integer will be printed, until a null pointer is encountered.

As distributed, the program output will appear as follows:

```
Signed integer:  -5
Unsigned integer: 33281
String: Hi mom!
Linked list: 1, 2, 3, 4, 5
```

Assignment

Load the binary program into the simulator as demonstrated in the lab. Change the values in memory so that the program output matches the target output, below. Do not change the program, only the data. In other words, *you may only change the values in memory at address x3500 and higher*.

Demonstrate your modified program to the TA for credit. Your program output should appear as follows:

```
Signed integer:  -23
Unsigned integer: 35842
String: Do not talk about fight club.
Linked list: -2, -4, -6, -8, -10
```

Grading

This lab is worth 50 points, distributed as follows:

Task	Points
Successfully modify the signed integer value	10
Successfully modify the unsigned integer value	10
Successfully modify the null-terminated string	10
Successfully modify the linked list	10