CDA 3103
Homework 4: MARIE Learns Arithmetic
Assigned: March 3, 2014
Submission Deadline: March 14, 2014, 11:59pm

While there are open online solutions that can help you complete much of this assignment, it is encouraged that you do this on your own. This will help you best prepare for your exams and help you understand the internals of a computer while it executes a program.

Problem 1. Write a subroutine in MARIE assembly that multiplies two values where the arguments for this subroutine are two pointers (each pointer pointing to a value). The routine, *multiply (a, b)*, performs *a x *b where a's value is the address storing the value being multiplied (*a uses a's contents to retrieve the value being multiplied), and b's value is the address storing the value being multiplied (*b uses b's contents to retrieve the value being multiplied).

Here are some requirements for your submission:

- Your submitted program must call a subroutine to perform the multiplication and return to the calling code to output the answer.
- Your program cannot use the following three MARIE instructions (*you may use any other instruction other than these three*): Load, Add, and Store
- Comment your code. 80% or more of your code should be commented. Show me that you understand what the code is doing.
- When submitting your code, you should hardcode a=2 and b=7. However, your program should still work correctly if we change the value of a and b.
- You must use the variable names a and b.
- Make your code clean and easy to read. Points may be deducted for code that is ugly or difficult to read.
- *Hint: You may wish to write the program by using any instruction and without using a subroutine for partial credit. Then, you can add in a subroutine, and then you can take away the forbidden instructions and use other instructions in your final submission.*

Problem 2. Some questions follow:

1. Where is the result stored when *multiply (a, b)* performs this computation?

2. How is this program similar or different to a Java method that would take two integers and multiply them? How do you think that Java passes arguments? *For help, look up the use of pass-by-value or pass-by-reference.*

Submission Requirements

- Your solutions must be in a single file with a file name **yourname-hw4**
- Your file should contain: Your MARIE source code with comments (your program should compile and run as written) and answers to Problem 2 questions
- No handwritten code or scanned handwritten code will be accepted.
- Acceptable file formats are: text with an 11-point monospaced font
    - Unacceptable file formats: PDF, .doc, .docx, .rtf, etc. (anything that isn't a plain old text file)
- *Only submissions in the designated location on Canvas are graded. Submissions in any other form will be ignored. To avoid submission issues, it is strongly recommended that you submit your work at least 24 hours before the submission deadline.*