# CS 61 - Programming Assignment 01

## Objective

The purpose of this assignment is to familiarize students with the basics of LC3 assembly language programming, the SIMPL simulator, and rudimentary debugging

## Your Tasks

Implement the LC3 program from the picture below.

**Note**: This is similar to the program in Lab 01 that used a DO-WHILE loop to multiply two numbers together.

Once you have the program coded and saved to the **provided template** "assn1.asm", return to the terminal and load the program into the SIMPL simulator by typing:

```
simpl assn1.asm
```

When the simulator opens, place a ***breakpoint*** at the beginning of the DO-WHILE loop by right-mouse-clicking that line of code and selecting "Mark as Breakpoint".

Lastly, create a table of values for ***each*** register for

- Before the loop
- Each iteration of the loop
- At the end of the program's execution

Record the table as a block of comments beneath your header and above the actual LC3 code.

Feel free to steal the format of the table below. Obviously, replace each "x" in the table with the actual value of the register :)

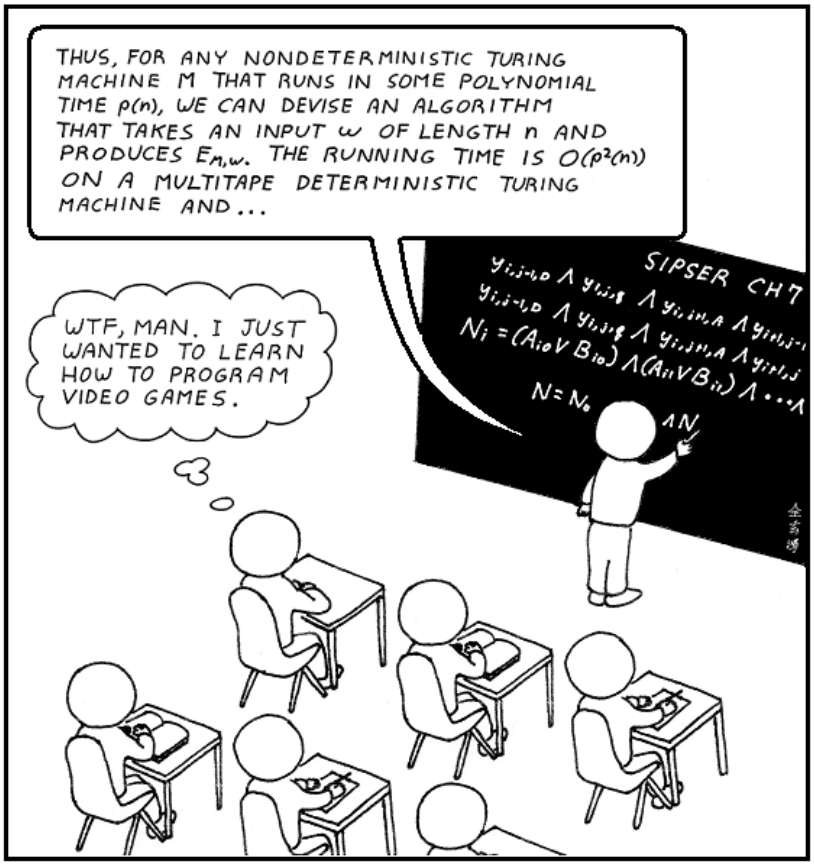
The following program performs the action: R3 <-- 6 * 12 (i.e. multiply 6 by 12 and write the result into Register 3) using a DO-WHILE loop:

```
;-------------------------------------------------------
; Name: Hayao Miyazaki
; Login: hayam
; Email address: hayam@cs.ucr.edu
; Assignment: assn1
; Lab Section: <021 or 022>
; TA: Sean Foley
;
; I attest that this code was totally given
; to me and that I didn't come up with
; any of it  =P
;-------------------------------------------------

; ------------------------------------------------------------------------------
; REG VALUES      R0  R1  R2  R3  R4  R5  R6  R7
; ------------------------------------------------------------------------------
; Pre-loop        x   x   x   x   x   x   x   x
; Iteration 01    x   x   x   x   x   x   x   x
; Iteration 02    x   x   x   x   x   x   x   x
; ...
; Iteration n     x   x   x   x   x   x   x   x
; End of program  x   x   x   x   x   x   x   x
; ------------------------------------------------------------------------------

.ORIG x3000                         ; Program begins here
;-----------------
; Instructions
;-----------------
LD   R1,  DEC_6                     ; R1 <-- 6
LD   R2,  DEC_12                    ; R2 <-- 12
LD   R3,  DEC_0                     ; R3 <-- 0

DO_WHILE    ADD R3,  R3,  R2        ; R3 <-- R3 + R2
            ADD R1,  R1,  #-1       ; R1 <-- R1 - 1
            BRp DO_WHILE            ; if ( LMR > 0 ) goto DO_WHILE

HALT                                ; Terminate the program
;---------
; Data
;---------
DEC_0   .FILL    #0         ; Put the value 0 into memory here
DEC_6   .FILL    #6         ; Put the value 6 into memory here
DEC_12  .FILL    #12        ; Put the value 12 into memory here

.END
```

**Uh…help?**

- Beginner's Guide to Linux/Unix
    - http://www.ee.surrey.ac.uk/Teaching/Unix/index.html

**Comics??!Sweet!!!**




Source: http://tweets2blog.files.wordpress.com/2009/11/computer_science_major.png?w=561&h=595

**Submission Instructions**

Submit to iLearn for testing, feedback and grading. Some feedback will be sent via E-mail.

**Rubric**

- This assignment will be graded very leniently. You will be informed of any mistakes, but unless you actually leave things out, you probably won't lose any points.
- Using the provided template is **required**.