**; LC-3 Program**

**; Course: CSE 313 Machine Orginization**

**; Section: 02**

**; Term: Spring 14**

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**; Lab4: Fibonacci Number**

**; Description:**

**; This program implements the finacci sequence.**

**; The program will compute the nth fibonacci number Fn, and**

**; the greatest fibonacci number FN that can be represented**

**; in 16 bit twos complement format. If Fn**

**; becomes to large, it won't be able to be represented in**

**; 16 bits, and an overflow will occur, in which the bits**

**; overlap the sign bit causing the value to become a negative.**

**;**

**; The input will be an integer,n, found at location x3100.**

**; The ouput will be found at x3101, x3102, and x3103. Fn**

**; will be stored in location x3101. The Nth number will be**

**; stored in x3102. The FN will be stored in x3103.**

.ORIG x3000

; Get and initialize registers.

LEA R1, xFF

LDR R1, R1, #0 ; Input n

ADD R2, R2, #0 ; Initlize other data values

ADD R3, R3, #1 ; R2 and R3 are used to store n-1 and n-2

ADD R4, R4, #0 ; R4 is used to store n

ADD R5, R5, #0 ; R5 is used as the counter the current number

ADD R1, R1, x-2 ; Check if N is < 2

BRnz nth\_FIB\_FOUND ; If T do not enter loop

FIND\_nth\_FIB

; Find the nth fib.

NOT R6, R1

ADD R6, R6, #1 ; Compare the counter against N

ADD R6, R6, R5 ; subtract the counter from N

BRz nth\_FIB\_FOUND ; continue loop if counter not eq to N

ADD R4, R2, R3 ; Compute next fib number

ADD R5, R5, #1 ; Increment the counter

ADD R2, R3, #0 ; Set R2 = R3

ADD R3, R4, #0 ; Set R3 = R4

BR FIND\_nth\_FIB

nth\_FIB\_FOUND

; The nth fib found. Store the value.

STI R4, Fn ; Store nth fibonacci number

FIND\_LARGEST\_FIB

; Find the largest Fib.

ADD R5, R5, #1 ; Increment the counter

ADD R4, R2, R3 ; Compute next fib number

BRn LARGEST\_FOUND ; If negative occurred there was an overflow

ADD R2, R3, #0 ; Set R2 = R3

ADD R3, R4, #0 ; Set R3 = R4

BR FIND\_LARGEST\_FIB

LARGEST\_FOUND

; The largest Fib found. Store the values.

STI R5, N ; Store the counter

STI R3, FN ; Store the Nth fibonacci number

HALT

; The storage locations for values

Fn .FILL x3101 ; The nth fib

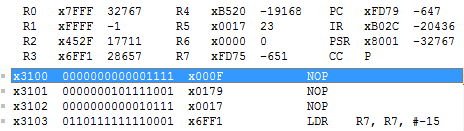
N .FILL x3102 ; The counter for Nth fib

FN .FILL X3103 ; The Nth fib

.END

Test Cases

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