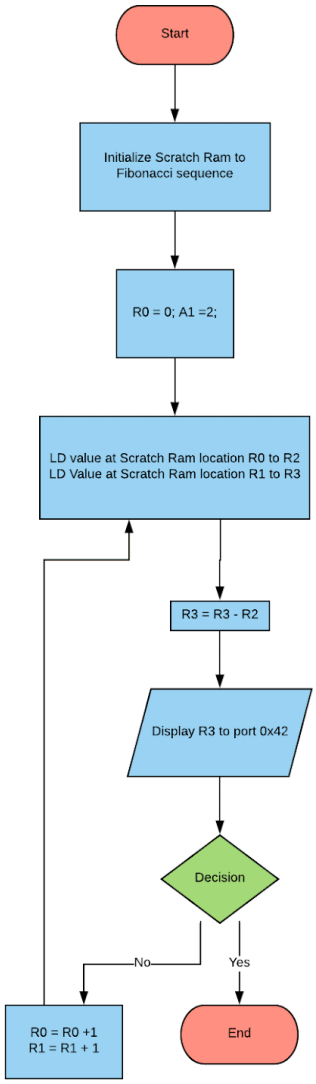
Software Assignment 5 – Arrays

Stan Carpenco & Luis Gomez

Behavior Description

The following program stores the first 14 values of the Fibonacci sequence inside the first 14 Scratch Ram memory location. It then computes the difference between values that are 3 memory locations apart. These values are then displayed to the user in port 0x42.

Flow Chart



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Verification

To verify the validly of the program every single possibility was tested and tabulated in table 1 below. The values start with the first combinations of {0,2} and end with the last combination of { 55, 233}.

Test #	Lower Number	Upper Number	Output Port 0x42
1	0	2	0x02
2	1	3	0x2
3	1	5	0x04
4	2	8	0x06
5	3	13	0x0A
6	5	21	0x10
7	8	34	0x1A
8	13	55	0x2A
9	21	89	0x44
10	34	144	0x6E
11	55	233	0xB2

Table 1: Test Cases for Software Assignment 5

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Assembly Source Code

```
; ------------------------------------------------------
; Software Assignment 5 - Arrays
; Engineers: Stan Carpenco &  Luis Gomez
; Date; 7 February 2019
; Description:
; the following program stores the first 14 values
; of the Fibonacci sequence into the ScratchRam, then,
; it computes the difference between all the numbers that
; are 3 places away. These numbers are then
; outputted to port 0x42.
; REGISTERS
; R0=  Location of lower number being compared
; R1 = Location of upper number being compared
; R2 = Stores value at Scratch Ram location in adress R0
; R3 = Stores value at Scratch Ram location at adress R1

.EQU OUT_PORT = 0x42

.DSEG
.ORG 0x00
.DB 0 , 1 , 1 , 2 , 3 , 5, 8 , 13 , 21 , 34 , 55 , 89 , 144 , 233

.CSEG
.ORG 0x1D

                    MOV R0, 0           ; Moves zero into R0
                    MOV R1, 2           ; Moves two  into R1
LOOP:     LD  R2, (R0)                  ; Loads value into R2 stored in ScratchRam location R0
                    LD  R3, (R1)        ; Loads value into R3 stored in ScrarchRam location R1
                    SUB R3, R2          ; R3= R2 - R2
ufc                 OUT R3, OUT_PORT    ; Outputs result to User in port 0X42
                    ADD R0, 1           ; Incriments bottom  count by 1
                    ADD R1, 1           ; Incriments upper count by 1
                    CMP R1, 14          ; Compare R1 with upper limmit 14
                    BRNE LOOP           ; Branch to loop if != 0
```