Faculty of Engineering

Ain Shams University

CSE 211s: Introduction to Embedded Systems

Assignment (1)

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Sec.: 1

Program: CSE

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For the below ARM assembly code, trace the values that will be placed into the registers R4, R5, and R6. By tracing, you are expected to write the values of the mentioned registers after the execution of each instruction.

```
        MOV R4, #7
        MOV R5, #4
        MOV R6, #4
again   MOV R7, R4
        ADD R4, R5, R4
        MOV R5, R7
        SUBS R6, R6, #1
        BNE again
```

Solution:

1 – R4 = 7

2 – R4 = 7 | R5 = 4

3 – R4 = 7 | R5 = 4 | R6 = 4

4 – R4 = 7 | R5 = 4 | R6 = 4 | R7 = 7

5 – R4 = 11 | R5 = 4 | R6 = 4 | R7 = 7

6 – R4 = 11 | R5 = 7 | R6 = 4 | R7 = 7

7 – R4 = 11 | R5 = 7 | R6 = 3 | R7 = 7

8 – Zero flag = 0 >> Branching to again

9 – R4 = 11 | R5 = 7 | R6 = 3 | R7 = 11

10 – R4 = 18 | R5 = 7 | R6 = 3 | R7 = 11

11 – R4 = 18 | R5 = 11 | R6 = 3 | R7 = 11

12 – R4 = 18 | R5 = 11 | R6 = 2 | R7 = 11

13 – Zero flag = 0 >> Branching to again

14 – R4 = 18 | R5 = 11 | R6 = 2 | R7 = 18

15 – R4 = 29 | R5 = 11 | R6 = 2 | R7 = 18

16 – R4 = 29 | R5 = 18 | R6 = 2 | R7 = 18

17 – R4 = 29 | R5 = 18 | R6 = 1 | R7 = 18

18 – Zero flag = 0 >> Branching to again

19 – R4 = 29 | R5 = 18 | R6 = 1 | R7 = 29

20 – R4 = 47 | R5 = 18 | R6 = 1 | R7 = 29

21 – R4 = 47 | R5 = 29 | R6 = 1 | R7 = 29

22 – R4 = 47 | R5 = 29 | R6 = 0 | R7 = 29

23 – The zero flag = 1 >> the program terminates

Final values for each register: R4 = 47

R5 = 29

R6 = 0

R7 = 29