

22C:060: Computer Organization

Homework 1

Total points = 50

Assigned September 4, 2012, due September 13, 2012, 11:59: 59 PM

1. Read the handout (on ICON) about ARM assembly language programming and the ARMsIm simulator. The simulator is available on the departmental Windows machines. If you want, you can download a personal copy free on your laptop using the link given in the handout.
2. Appendix D of the textbook contains details about the ARM processor and its assembly language. Study the sample programs given in the handout. Be familiar with the various system calls (using SWI: Software Interrupt) for performing input and output operations, and the assembler directives.
3. **Be generous about using comments to improve readability. Ideally you should add a comment with each line of your program. Insufficient comments will lead to loss of grade. Include a comment at the beginning specifying the purpose of the program.**

You should turn in an executable program with adequate comments about the use of the registers and the strategy that you used to solve the problem. To submit the program, *zip* (or *tar*) them into a single file, and submit your solution through ICON dropbox.

Problem 1. (10 points)

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MOV r2, #10      @ Load the value 10 into register r2
MOV r3, #2       @ Load the value 2 into register r3
MUL r1, r2, r3   @ Compute r2*r3 and store in r1 (10*2 = 20)
MOV r0, #1       @ Load 1 into register r0 (stdout handle)
SWI 0x6b        @ Print integer in register r1 to stdout
SWI 0x11        @ Stop program execution

```

(SWI stands for software interrupt, not yet discussed in the class. But that hardly matters. SWI followed by a 1-byte code transfers control to a location that helps the machine to carry out a designated operation. Thus SWI 0x6b transfers control to a subroutine used for printing a character (from register r1). To know more about the use of SWI for various input output operations, see Chapter 8 of the ARMsIm user guide)

Study the above program whose goal is clearly explained. Now, write a program to compute 2^8 and display it on the screen.

Problem 2. (15 points)

Write a program to generate and print the integers 1, 2, 3, ..., N. The program should ask for an input "Enter a positive integer N:" When you input a positive integer, the program

will output the list on the screen in the ascending order.

Problem 3. (15 points)

Write a program to compute $S=1+2+3+\dots+N$. Assume that the user can input a positive integer N as in problem 2, and write a loop to compute S (i.e. do not use the formula $S=N(N+1)/2$ to write your program).