16.317: Microprocessor Systems Design I

Spring 2015

Homework 1
Due **Friday, 2/6/15**

Notes:

- While typed solutions are preferred, handwritten solutions are acceptable.
- Any electronic submission must be in a single file. Archive files will not be accepted.
- Electronic submissions should be e-mailed to Dr. Geiger at Michael_Geiger@uml.edu.
- This assignment is worth 100 points.

1. (50 points) Given each of the binary or hexadecimal number below, determine what the decimal value is if the number is (i) an unsigned integer, and (ii) a signed integer. Note that, in some cases, your answers for both will be the same.

a. 01110110_2
b. 10011001_2
c. BCh (or 0xBC—recall that, in x86 assembly notation, the "h" at the end of a number signifies that the previous value is in hexadecimal)
d. 61DFh
e. ACEDh

<u>**See the next page for Question 2.**</u>

2. (50 points) Assume the contents of memory are shown below. All values are in hexadecimal. The table shows four bytes per line; the given address is the starting address of each line.

   Each block in the table contains a single byte, with the low and high bytes per line indicated as shown. Each byte has its own address, so the byte at address 10430h is 01h, address 10431h is 30h, address 10432h is 20h, and address 10433h is 15h.

   You should assume all multi-byte values are stored in little-endian format.

Address	Lo			Hi
10430h	01	30	20	15
10434h	10	47	FE	AA
10438h	18	1F	15	2B
1043Ch	BE	60	10	99
10440h	78	D6	32	33
10444h	34	35	12	16
10448h	93	03	7C	EF

Furthermore, assume the following initial register values:

- EBX = 00010430h
- ECX = FFFFFFF8h
- ESI = 00010440h
- EDI = 00000003h

a. (10 points) The table above shows the address range 10430h-1044Bh. List the starting addresses for every aligned word in this range.

b. (10 points) What is the result of the instruction MOV AL, [1043Fh]? What is the decimal value of the data transferred in this instruction?

c. (10 points) What is the result of the instruction MOV DX, [EBX+**0013**h]? Is this memory access aligned? *(Originally, constant offset was written as 0043h.)*

d. (10 points) What is the result of the instruction MOV EDX, [ESI+ECX]? (Hint: treat ECX as a signed, two's complement integer and check its decimal value.) Is this memory access aligned?

e. (10 points) What is the result of the instruction MOV [EBX+4*EDI], AX, if EAX = 5599AA11h? Is this memory access aligned?