

University of Central Florida School of Computer Science		
<i>CDA 3103</i>	<i>COMPUTER ORGANIZATION</i>	<i>SPRING 2005</i>

HW#2

DUE DATE: MARCH 2

LAST NAME:

FIRST NAME:

NID:

YOU MUST READ THE FOLLOWING INSTRUCTIONS:

- 1- You should submit both a hardcopy in class on March 2 at 4:30pm and a softcopy through webct.ucf.edu on March 2 at 11:55pm. The name of the zip file should be YourLastName_YourFirstName_HW2.zip (for example, Hussain_Khaled_HW2.zip).
- 2- This course covers a lot of material and late assignments will seriously impact your ability to learn the next section of the course. Late assignments will be penalized 20% per day, up to 2 days.
- 3- Upon receiving grades for the homework, you have two weeks to question/contest your grade. After that, you will not be able to contest your grade which you received. This is to ensure that the grader remembers the grading criteria and is able to fairly consider any re-grading request.
- 4- The homework must be submitted in a high-quality and professional manner. They should be well written and understandable. The steps/methods of solving the problems should be clearly stated.
- 5- Feel free to talk to other students in the class, the TA, or myself. However, you are not allowed to look at or copy another student's solution. Exchanging them is cheating and will be reported to the University. Both the source and the recipient will get a grade F for the course.

Convert the following into both assembly and machine codes. Then use a hexadecimal editor to write the machine code into a file that has .com extension. Then run this file on a PC that has a Microsoft operating system.

- 1) (25 pts) print "*" character on the screen
- 2) (25 pts) print your last name on the screen
- 3) (25 pts) print "0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9" on the screen
- 4) (25 pts) print the day of week on the screen

For each one, submit a) Q#.asm, b) Q#.txt (machine code) and c) Q#.com

Solution for Q1

; Q1.asm file

```
mov ah,02
mov dl,02Ah
int 021h

mov ah,04Ch
mov al,0
int 021h
```

Q1.txt

```
mov ah,02h → 1011wrrr 02 → 10110rrr 02 → 10110100 02 → B4 02
mov dl,02Ah → 1011wrrr 2A → 10110rrr 2A → 10110010 2A → B2 2A
int 21h → 11001101 21 → CD 21
mov ah,04Ch → 1011wrrr 4C → 10110rrr 4C → 10110100 4C → B4 4C
mov al,0h → 1011wrrr 00 → 10110rrr 00 → 10110000 00 → B0 00
int 21h → 11001101 21 → CD 21
```

Q1.com (binary file) the size of this file should be 268 (10Ch) bytes. Start the machine code from address 100h.

```

000000 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
000010 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
000020 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
000030 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
000040 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
000050 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
000060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
000070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
000080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
000090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0000a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0000b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0000c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0000d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0000e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0000f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
000100 B4 02 B2 2A CD 21 B4 4C B0 00 CD 21 ....*!.I...!

```

c:\>Q1

(It should print a character '*' on the screen)

MACHINE CODE TABLES

rrr:

000 : AL or AX

001 : CL or CX

010 : DL or DX

011 : BL or BX

100 : AH or SP

101 : CH or BP

110 : DH or SI

111 : BH or DI

Name	Regs	Description
POPF		10011101
PUSHF		10011100

Name	Regs	Description
PUSH	RegWord	01010rrr
	Seg	00sss110

Name	Regs	Description
POP	RegWord	01011rrr
	Seg	00sss111

Name	Regs	Description
ADD	Reg,Reg	0000001woorrrmmm
	Acc,Imm	0000010w
	Reg,Imm	1000000woo000mmm

Name	Regs	Description
SUB	Reg,Reg	0010101woorrrmmm
	Acc,Imm	0010110w
	Reg,Imm	1000000woo101mmm

MOV	Reg,Imm	1011wrrr
	Reg,Reg	1000101woorrrmmm
	Reg16,Seg	10001100oosssmmm
	Seg,Reg16	10001110oosssmmm

INT	Imm8	11001101
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JMP	Short	11101011
	Near	11101001

Jcc	Short	0111cccc
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CCCC	Name	Means
0000	O	overflow
0001	NO	Not overflow
0010	C/B/NAE	Carry, below, not above nor equal
0011	NC/AE/NB	Not carry, above or equal, not below
0100	E/Z	Equal, zero
0101	NE/NZ	Not equal, not zero

LOOP	Short	11100010
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DOS INT 21h - DOS Function Codes

- 2- AH = 01h - READ CHARACTER FROM STANDARD INPUT, WITH ECHO; Return: AL = character read
- 3- AH = 02h -WRITE CHARACTER TO STANDARD OUTPUT; Entry: DL = character to write; Return: AL = last character output
- 4- AH = 09h - WRITE STRING TO STANDARD OUTPUT; Entry: DS:DX -> '\$'-terminated string; Return: AL = 24h
- 5- AH = 2Ah - GET SYSTEM DATE; Return: CX = year (1980-2099) DH = month DL = day AL = day of week (00h=Sunday)
- 6- AH = 4Ch - "EXIT" - TERMINATE WITH RETURN CODE; Entry: AL = return code; Return: never returns