CSE 331L: Microprocessor Interfacing & Embedded System Lab

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EEE 332/ CSE 331

Lab 3

Topic: Loops, Jump, Interrupt (I/O)

Topics to be covered in class today:

- Conditional Jumps/Unconditional Jumps
- Procedures
- Instructions:
  - CMP = Compare
  - AND/OR = Logic AND/OR operation
  - JZ = Jump if Zero
  - JNZ = Jump if not Zero
  - JMP =(Unconditional) Jump
  - INT = Interrupt

Instruction	Operands	Description

CMP	REG, memory
	memory, REG
	REG, REG
	memory, immediate
	REG, immediate
		Compare.
		
		Algorithm:
		
		operand1 - operand2
		
		Result is not stored anywhere, flags are set (OF, SF, ZF, AF, PF, CF) according to result.
		
		Example:
		
		MOV AL, 5
		MOV BL, 5
		CMP AL, BL; (AL = 5, ZF = 1 so equal!)
		
		RET

JZ	Label	Short Jump if Zero (equal). Set by CMP, SUB, ADD, TEST, AND, OR, XOR instructions.
		
		Algorithm:
		
		if ZF = 1 then jump (ZF=Zero Flag. So, ZF=1 means it is 0)
		
		Example:
		
		include 'emu8086.inc'
		
		ORG 100h
		
		MOV AL, 5
		CMP AL, 5
		JZ label1
		PRINT 'AL is not equal to 5.'
		JMP exit
		label1:
		PRINT 'AL is equal to 5.'
		exit:
		RET

JNZ	Label	Short Jump if NOT Zero (equal). Set by CMP, SUB, ADD, TEST, AND, OR, XOR instructions.
		
		Algorithm:
		
		if ZF = 0 then jump (ZF=Zero Flag. So, ZF=0 means it is 1[NOT ZERO])
		
		Example:
		
		include 'emu8086.inc'
		
		ORG 100h
		MOV AL, 5
		CMP AL, 5
		JNZ label1
		PRINT 'AL is equal to 5.'
		JMP exit
		label1:
		PRINT 'AL is not equal to 5.'
		exit:
		RET

<table>
<tr>
<td>JMP</td>
<td>Label</td>
<td>Unconditional Jump. Transfers control to another part of the program. 4-byte address may be entered in this form: 1234h:5678h, first value is a segment second value is an offset.

Algorithm:

always jump

Example:

include 'emu8086.inc'
ORG 100h
MOV AL, 5
JMP label1 ; jump over 2 lines!
PRINT 'Not Jumped!'
MOV AL, 0
label1:
PRINT 'Got Here!'
RET</td>
</tr>
<tr>
<td>INT</td>
<td>Label</td>
<td>Interrupt, used to take input or to show output.

Algorithm:
Halt the program to fulfill the interrupt depending on “ah” register value.

Example:
org 100h
mov ah,1
int 21h
ret

<table>
<tr><td>Single Input</td><td>ah=1
int 21h (al=input)</td></tr>
<tr><td>Single Output</td><td>ah=2
int 21h (print dl as ascii)</td></tr>
<tr><td>Single Message/String Print:</td><td>ah=9
dx->offset “string name”
int 21h</td></tr>
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Task 1

Concept of JUMP:

Copy, compile and run the following code:

```
org 100h

jmp adder


printer:
mov ah,2
mov dl,al
add dl,'0'
int 21h
jmp finish


adder:
mov al,2
mov bl,2
add al,bl
jmp printer

finish:

ret
```

Task 2

Concept of ARRAY:

Copy, compile and run the following code:

```
org 100h

lea si,arr
mov cx,5

search_loop:

mov al,[si]
cmp al,key
JZ found
inc si
LOOP search_loop


ret

found:
mov ah,9
mov dx,offset msg1
int 21h


ret

arr db 1,2,3,4,5
key db 9
msg1 db "Key is found$"
```

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Task 3

Write a program that will search for a specific value in an array and print “found” if it is there and print “not found” if the value is not there.
Example:
Array: 1,2,5,6,7,8,9
Value: 3
“Not Found”
Value: 2
“Found”

Submission Procedure:

1. Name the file after your ID. E.G: 161123123
2. “Turn In” the file in Google Classroom under Lab Assessment section