



CSE 331L: Microprocessor Interfacing & Embedded System Lab

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EEE 332/ CSE 331

Lab 6

Topic: String

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	<p>Short Jump if Zero (equal). Set by CMP, SUB, ADD, TEST, AND, OR, XOR instructions.</p> <p>Algorithm:</p> <p>if ZF = 1 then jump (ZF=Zero Flag. So, ZF=1 means it is 0)</p> <p>Example:</p> <pre>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</pre>
JNZ	Label	<p>Short Jump if NOT Zero (equal). Set by CMP, SUB, ADD, TEST, AND, OR, XOR instructions.</p> <p>Algorithm:</p> <p>if ZF = 0 then jump (ZF=Zero Flag. So, ZF=0 means it is 1[NOT ZERO])</p> <p>Example:</p> <pre>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</pre>

JMP	Label	<p>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.</p> <p>Algorithm:</p> <p>always jump</p> <p>Example:</p> <pre>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</pre>						
INT	Label	<p>Interrupt, used to take input or to show output.</p> <p>Algorithm:</p> <p>Halt the program to fulfill the interrupt depending on “ah” register value.</p> <p>Example:</p> <pre>org 100h mov ah,1 int 21h ret</pre> <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></table>	Single Input	ah=1 int 21h (al=input)	Single Output	ah=2 int 21h (print dl as ascii)	Single Message/String Print:	ah=9 dx->offset “string name” int 21h
Single Input	ah=1 int 21h (al=input)							
Single Output	ah=2 int 21h (print dl as ascii)							
Single Message/String Print:	ah=9 dx->offset “string name” int 21h							

Practice 1 (Length of String)

Copy the code in emulator and run:

```
org 100h

lea si,str1

search:
    mov bl,[si]
    inc si
    inc count
    cmp bl,"$"
    jnz search

ret

str1 db "Hello$"
count db -1
```

Practice 2 (Find key in string)

Copy the code in emulator and run:

```
org 100h

lea si,str1

search:
    mov bl,[si]
    inc si
    cmp bl,key
    jz save
back:
    cmp bl,"$"
    jnz search
ret

save:
    inc count
    jmp back

ret

str1 db "Hello$"
count db 0
key db "l$"
```

Practice 3 (Reverse String)

Copy the code in emulator and run:

```
org 100h

lea si,str1
lea di,str2
add di,4 ;(string length-1)

search:
    mov bl,[si]
    mov [di],bl
    inc si
    dec di
    cmp bl,"$"
    jnz search

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

lea di,str2
mov cx,5 ;(string length)
print:

    mov ah,2
    mov dl,[di]
    int 21h
    inc di
    loop print

ret

str1 db "hello$"
str2 db 5 dup (0)

msg1 db "Reverse string is:$"
```

Practice 4 (String Match)

Copy the code in emulator and run:

```
org 100h

lea si,str1
lea di,str2

search:
    mov bl,[si]
    mov bh,[di]
    cmp bl,bh
    jnz result
    inc si
    inc di
    cmp [si],"$"
    jnz search

    mov dx,offset msg1
    mov ah,9
    int 21h
    ret

result:
    mov dx,offset msg2
    mov ah,9
    int 21h

ret

str1 db "Hello$"
str2 db "World$"

msg1 db "Same String$"
msg2 db "Not Same String$"
```