CS401 Computer Architecture and Assembly Language Programming

Mid Term Examination - November 2004

Time Allowed: 90 Minutes

Instructions

Please read the following instructions carefully before attempting any question:

1. The duration of this examination is 90 minutes.
2. This examination is open Handouts.
3. Answer all questions.
   a. There is no choice.
   b. You will have to answer correctly all questions in this examination to get the maximum possible marks.
4. Do not ask any questions about the contents of this examination from anyone.
   a. If you think that there is something wrong with any of the questions, attempt it to the best of your understanding.
   b. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem.
5. You have been provided with all assembly tools so you can use assembly tools also.
6. Your paper contains 4 questions.

All Coding questions should be answered using the Assembly language syntax.

Total Marks: 60 **Total Questions: 5**

Question No. 1 **Marks : 10**

Write a program named **"Countvowels"** that counts all occurrences of the vowels in a source string and then prints the result in the format (vowel, count). For example if the string is 'afadefsoieaid' it should print (a,3) (e,2) (i,2) (o,1) (u,0) on the screen. The program should take address of the source string as a parameter via stack. Also provide proper comments against each instruction.

Note: String is assumed to contain only small case legal letters and length of the string is fixed to 15 characters. Vowel characters include a, e, i, o, u.

Question No. 2 **Marks : 10**

Answer the following questions.

a. What does the symbol [ ] indicate?
b. Explain what the REP prefix does?
c. What is FAR jump?
d. What does the INT 21h accomplish if AH contains 4CH?
e. What is the difference between SUB and CMP instructions?

Question No. 3 Marks : 10

Calculate **the first and the last physical** memory addresses accessible using each of the following segment values?

a. FFFF
b. F009
c. 1234
d. 0000

Question No. 4 Marks : 10

Find all the errors in the following code and write those errors against each erroneous instruction.
Example: push IP ; IP can't be pushed on the stack.

```
[0x0100]
jmp start

  numarray dw 7, 11, 5, 0, 3, 1, 9, 4, 2, 10
  index1   0
  index2   dw 0

 start:
      mov ax 0
      mov bx, 0
 loop:
     cmp ax, 20
     je  num1
     mov bh, ax
     mov [ index1 ], [ index2]
     mov cx, [ numarray + bx ]
     add ax, 2
  swap:
      add bx, 2
      cmp bx, 20
      je  end
      cmp cx, [ numarray + bx ]
      jc  swap
     jmp swap
swap:
  mov dx, [ numarray + bx ]
  mov [ index2 ], bx
  mov bx, [ index1 ]
  mov [ bp + bx ], dx
  mov bx, [ index2 ]
  mov [ numarray + bx ], cx
  mov cx, dx
```

```
  jmp start

end:
    mov ax, 0x4c00
```

Question No. 5 Marks : 10

What will be the **value of AX** after the execution of each of the following instruction? Each instruction is independent of others.
If AX= 0x44FF and BX= 0x011F

a. xor ah, bh
b. ror bx, 2
c. not ah
d. and ax, bx
e. rcl ax, 2 if carry flag = 0