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CS401 Computer Architecture and Assembly Language Programming
Final Term Examination - August 2004
Time Allowed: 150 Minutes

Instructions

Please read the following instructions carefully before attempting any question:

1. The duration of this examination is 150 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.
7. All Coding questions should be answered using the Assembly language syntax.

WARNING: Please note that Virtual University takes serious note of unfair means. Anyone found involved in cheating will get an `F` grade in this course.

Total Marks: 60

Total Questions: 4

Question No. 1

Marks : 15

Answer the following regarding Protected Mode descriptors

Part a:

Write the following descriptors in the format

dd 0x0000FFFF, 0x00CF9A00

Assume following values for attributes

- A bit = 1
- P bit = 1
- G bit = 0
- AVL bit = 0
- r bit = 0

- i. 32 bit, non conforming, execute-only code segment at level 2, with base at 0x00400000 and a limit of 0x0FFFF.
- ii. 32 bit Read only data segment at level 0, with base at 0x00A00000 and limit of 0x10000.

Part b:

Write 32 bit physical addresses for the following accesses where Base = 0x00A00000 and Limit = 0x10000, EBX contains 0x00001000, and ESI contains 0x00002000

- i. [bx + si]
- ii. [ebx + esi - 0x000012FD]

Question No. 2

Marks : 15

Write a function "strcat" that takes the address of two memory locations (strings) via the stack. The first parameter is address of first null terminated string. The second parameter is the address of a second null terminated string. The function should append the "string passed as second parameter" including the null character at the end of "the string passed as first parameter". For example, if first string is "assem" and second string is "bly", then after the execution of this function, first string should contain "assembly".
 (Well commented and well indented program will be given extra mark)

Question No. 3

Marks : 15

Suggest a reason for each of the following.

- a. The interrupt mechanism is an "extended far call".
- b. Hardware interrupts are called "real time interrupts".
- c. Since there is only one pin going into processor then how more than one interrupts are handled.
- d. Interrupts are asynchronous.
- e. Debugger is developed using interrupts 1 and 3.

Question No. 4

Marks : 15

Explain the purpose and working of the following program. Also, write comments in front of each instruction describing the purpose of that particular instruction.

```
[org 0x0100]
        jmp  start

filename:  db  'file.txt'
handle:    dw   0
buffer:    times 64 db 0

start:    mov  ah, 0x3d
          mov  al, 2
          mov  dx, filename
          int  0x21

          mov  [handle], ax
          mov  ah, 0x3f
          mov  bx, [handle]
          mov  cx, 64
          mov  dx, buffer
          int  0x21

          mov  bx, buffer
          mov  si, 0
          mov  cx, 64
next:     add byte [bx+si], 1
          inc  si
          loop next

          mov  ah, 0x42
          mov  bx, [handle]
          mov  al, 0
          mov  cx, 0
          mov  dx, 0
          int  0x21
```

```
mov  ah, 0x40
mov  bx, [handle]
mov  cx, 64
mov  dx, buffer
int  0x21

mov  ax, 0x4c00
int  0x21
```