

EE467/567 “Advanced Microprocessors”

Homework #3

(Due: in-class, Monday February 27, 2012)

1. For a Pentium 4 descriptor that contains a base address of $003A0000_{16}$ and a limit of 01028_{16} and $G=1$, what starting and end locations are addressed by this descriptor (you may have to check the Intel manuals for this)?
2. Given the following information:

Global Descriptor Table starts at memory location: $00001000H$

Memory Location	Memory Contents*
00003028	03 82 86 40 50 00 E0 FF
00003020	07 81 DE 80 00 00 FF FF
00003018	01 84 FF FF 00 00 DE 80
00003010	00 01 00 FF 00 00 FF FF
00003008	02 03 FF FF 00 00 DE 80
00003000	0A 0B 00 10 00 01 00 FF
00001028	02 03 FF FF 00 00 DE 80
00001020	01 84 DF FF 00 00 DE 80
00001018	03 82 86 40 50 00 E0 FF
00001010	00 01 00 FF 00 00 FF FF
00001008	07 81 DE 80 00 00 FF FF
00001000	0A 0B 00 10 00 01 00 FF
000001B8	0A 0B 00 10 00 01 00 FF
000001B0	80 00 01 00 FF 00 00 FF FF
000001A8	01 84 FF FF 00 00 DE 80
000001A0	00 01 00 FF 00 00 FF FF
00000198	00 00 DE 80 00 00 FF FF
00000190	01 01 00 10 00 01 00 FF

*Right most byte is the least significant byte of each block of 8 bytes.

During a particular program the next instruction must be retrieved. At that moment $(CS) = 0022H$ and $(IP) = 1988H$. Given the above memory contents, determine the physical address of the next instruction in memory for the following situations:

- a) An 80286 running in real mode.
- b) A Pentium computer is running in protected mode with paging disabled.
- c) In case of scenario (b), determine the size of the code segment.

3. A Pentium computer is running in protected mode. During a particular program the next instruction must be retrieved. At that moment (CS) = 0009H and (IP) = 82A0H. Given the following memory segments and register contents, determine the physical address of the next instruction in memory. Furthermore, determine if the page needs to be loaded in RAM from the SWAP file or not.

Global Descriptor Table starts at memory location: 00001000H
 Page Directory starts at memory location: 00006000H

Memory Location	Content
00009024	00 11 90 03
00009020	00 11 80 03
0000901C	00 11 70 03
00009018	00 11 60 03
00009014	00 11 50 03
00009010	00 11 40 03
0000900C	00 11 30 03
00009008	00 11 20 03
00009004	00 11 10 03
00009000	00 11 00 03
00007004	00 02 10 03
00007000	00 02 00 03
0000600C	00 00 A0 03
00006008	00 00 90 03
00006004	00 00 80 03
00006000	00 00 70 03
00001010	00 00 FF FF
0000100C	00 00 DE 80
00001008	00 00 FF FF
00001004	01 01 00 10
00001000	00 01 00 FF

*Right most byte is the least significant byte of each block of 4 bytes.

4. A Pentium is running in protected mode. During a particular program the next instruction must be retrieved. The result of segmentation is:

Linear Address is: 014038CFH

Page Directory starts at memory location: 00008000H

Memory Location	Content
00009010	11 00 00 03

0000900C	22 13 43 67
00009008	22 00 A0 03
00009004	00 11 60 03
00009000	00 12 80 03
00008018	00 00 30 27
00008014	00 00 50 27
00008010	00 00 90 25
0000800C	00 00 DE 80
00008008	00 00 FF FF
00008004	01 01 50 10
00008000	00 00 70 25
00007010	10 00 00 03
0000700C	A2 1A 43 67
00007008	00 0B A0 03
00007004	00 10 60 03
00007000	00 12 80 03
00005010	10 02 00 03
0000500C	02 12 43 67
00005008	00 0A A0 03
00005004	00 1B 60 03
00005000	00 0C 80 03

*Right most byte is the least significant byte of each block of 4 bytes.

Given the above memory contents, determine the physical address of the next instruction in memory.