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ENEE 350 Problem Set 11

(Due: Class 29, Mon., Jul. 21, 2008)

Read Chapter 6, Section 6.1, of Tanenbaum's 5th Ed. textbook and work the following problems:

1. Prob. 6-2.
2. Prob. 6-4.
3. Prob. 6-5.
4. Prob. 6-9.
5. Prob. 6-13.
6. Prob. 6-15.
7. Prob. 6-16.
8. Prob. 6-17.
9. Consider a paging system that uses a one-level page table with a virtual memory size of 2^{24} bytes, a physical memory size of 2^{21} bytes, and a page size of 2^{10} bytes. The machine has byte addressing and the entire page table resides in the main memory at all times.

   a. How many entries are there in the page table?

   b. If a page table entry contains a "valid" bit, a "clean/dirty" bit, and the physical page frame number, how many bits are needed for each page table entry? (Note: the "valid" bit acts as a "presence" bit that indicates whether the mapping information in this page map table entry is valid. If "v" = 1, the entry is valid and the page is present in physical memory; if "v"= 0, the entry is not valid and any reference to the corresponding page will generate a page fault.)

   c. With the assumptions in part b. above, how many pages does the page table require? (In this part assume that a page table entry requires an integral number of bytes; e.g., if your answer in part b. is 9 bits, then in part c. assume that a page table entry requires two bytes; hence, round up to the nearest integral number of bytes for each page table entry.)

   d. At a given time in the operation of the machine, a portion of the page table is as given below. What is the physical address corresponding to the virtual address 4980_{10}? (Hint: $2^{10} = 1024$)

Virtual Page Number	Valid Bit	Physical Page Number
0	0	7
1	1	9
2	0	6
3	1	3
4	1	5
5	0	5
6	0	4
7	1	1
...	...	...