

CS 3733 Review Problems on Paging

- 1) This problem concerns paging (no virtual memory).

Assume a machine has a 30-bit logical address space and is byte-addressable. The physical address space is 31 bits and the page size is 1K bytes. Give the best answer to each of the following that you can. If you need to make additional assumptions to give an answer, state the assumptions you are making. If the answer is a power of 2, leave it in exponential form.

- a) How many frames of physical memory are possible? _____
- b) How many bits of the logical address space are needed for the page number? _____
- c) How many bits of the logical address space are used for the page offset? _____
- d) How many bits of the physical address are used for the frame number? _____
- e) How many bits of the physical address are used for the frame offset? _____
- f) How many bits would be needed for a page table entry? _____
- g) How many bytes would be needed for a page table for one process? _____

- 2) This problem concerns memory address translation in a paging memory system.

Suppose the TLB has an access time of 2 ns. and the main memory access time is 30 ns. Suppose the page size is 256 bytes, the logical address space is 32 bits, and the physical memory address space is 24 bits.

The entire TLB and the beginning of the page table are given below. For each of the logical addresses given in binary below, find the corresponding page number, estimate the time to access the memory location, and give the corresponding physical memory address.

TLB	
page	frame
5	3
7	9
2	4
4	6

page table
2
5
4
1
6
3
8
9
7
...

- a) 01110100010
- b) 01001000101
- c) 10110110100

Logical Address	Page Number	Access Time	Physical Address
a) 01110100010			
b) 01001000101			
c) 10110110100			