Memory

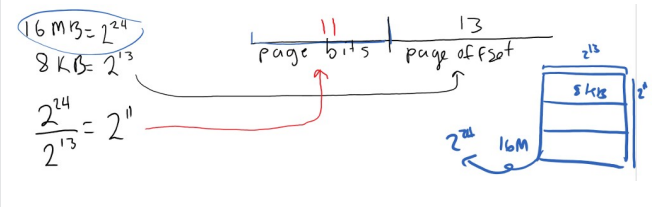
Sunday, November 13, 2016 10:00 PM

Part I

1. What is bigger, logical or physical memory?
2. Name three differences between logical and physical memory.
3. If a logical address is 0x567B0 and the relocation register has the program loaded with relocations register of 0x878000, what would the physical address be? What if the program loaded at 0x980000?

Part II

1. If you have a 16 MB logical address space and wish to have 8KB-pages for logical to physical mapping, how many bits should be allocated for indexing into the page table?



How many bits make up the page offset?

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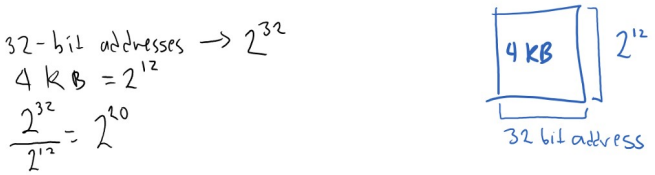
2. If you have a 32 bit logical address and an 4KB page, how many entries does the page table have?



So 2^20 entries

3. How ***large*** must a page table be for 1KB-pages and a logical address space of 4GB?

Pages are 1KB, which is 2^10

Since the logical address space is 4GB, must be using 32-bit addresses: 4GB = 2^32

So the page table has 2^22 entries (4M entries) to get the number of bytes, multiply times 4B, because in a 32-bit addressing scheme, every entry is 32 bits, regardless of the number of bytes used for addressing within the page. So, we get 4M * 4B = 16 MB.

Part III

1. What is the difference between swapping and paging?
2. Mention three contiguous-memory allocation algorithms discussed. Which one is the best and why?
3. If a 32bit system uses a two level page table with 4 KB pages and an outer page table of 1024 entries, how big is the page table?

Part IV

1. Consider a system with 4200 bytes of main memory using variable size partitions. At a certain time, the memory will be occupied by three blocks of code/data as follows:

Starting Address	Length
1000	1000
2900	500
3400	800

2. When loading a new block into memory, the following strategy is used:
   a. Try the best-fit algorithm to locate a hole of appropriate size
   b. If that fails, create a larger hole by shifting blocks in memory toward address zero; this always starts with the block currently at the lowest memory address and continues only until enough space is created to place the new block.

   Assume that three new blocks with respective sizes 500, 1200, and 200 are to be loaded (in the order listed). Show the memory contents after all three requests have been satisfied.

3. Solve Exercise 8.23 of your textbook.