Homework 3

Due Date: June 4, 2008 **Points**: 100

Short-Answer Problems

These can be answered in a sentence or two, and are intended to reinforce important points.

1. (*10 points*) Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames. How many bits are there in the logical address? In the physical address?
2. (*10 points*) How does the Working Set replacement strategy relate job scheduling to memory management?
3. (*5 points*) What is "device independence"?

Long-Answer Problems

These questions require some thought and longer answers than the short-answer questions. They are intended to have you use the concepts discussed in class, to be sure you understand them and can work with them.

1. (*25 points*) A virtual memory has a page size of 1024 words, eight virtual pages, and four physical page frames. The page table is as follows:

virtual page	*page frame*
0	3
1	1
2	not in main memory
3	not in main memory
4	2
5	not in main memor
6	0
7	not in main memor

   a. Make a list of all virtual addresses that will cause page faults.
   b. What are the physical addresses for 0, 3728, 1023, 1024, 1025, 4096, and 7800?
2. (*25 points*) You are the president of Cheapo Computronics, Inc., and your star hardware designer has suggested a brilliant idea: Implement segmentation, but let the least significant m bits of a virtual address be used to select the segment, and let the other bits determine the offset. What is the problem with this idea?
3. (*25 points*) This question asks you to compare different disk scheduling policies.
   a. Under very light loads, all the disk scheduling policies we have discussed degenerate into which policy? Why?
   b. Consider a system on which a seek takes $0.5 + 0.4T$ msec, where T is the number of cylinders moved. Then assume the arm is initially at cylinder 100, the disk has 200 cylinders, and the arm is moving inward. Will requests scheduled by a FCFS disk scheduling policy ever have a lower mean waiting time than those scheduled by a SCAN policy? Than those scheduled by a SSTF policy? Justify your answers.

Extra Credit Problems

1. (*10 points*) Prove that Belady's anomaly cannot occur in a stack algorithm.