CS 423/523 Assignment 4

Published: Apr. 7, 2016
Due: Apr. 15, 2016 (11:59pm)

Total: 30 points

Please upload your solutions to classes*v2. To do so, please enter classes*v2, then click the “Assignment” button on your left-hand toolbar, and finally click “Assignment4” to upload your assignment.

If you know you are going to submit your assignment late, please let us know in advance (send an email to cs423ta@cs.yale.edu).

Any and all resources may be used as long as you cite them, with the exception of collaborating with other people. Please do not copypasta your definitions from Wiki. We do not really care if you do this, but you are not really learning anything.

If you have ANY questions, please do not hesitate to let us know (email, office hours, etc.)
**Part 1: OS definitions** (1-3 line answers, 5 x 2 points each = 10 points)

1. Address binding
2. Virtual memory
3. What’s the motivation of proposing inverted page table? In other words, compared with a page table, what’s the difference.
4. Difference between paging and segmentation (please list three different points)
5. Lazy swapping

**Part 2: Multiple choice** (6 x 2 points each = 12 points)

1. Double buffering:
   a. Adds overhead
   b. Is used for context switching
   c. Both of the above
   d. None of the above

2. A forward mapped page table:
   a. Pages a page table
   b. Is faster than having normal page table
   c. Both of the above
   d. None of the above

3. Copy on write:
   a. Modified pages are copied back to disk
   b. Any two (or more) processes can share a page, as long as they do not write to it
   c. Both of the above
   d. None of the above

4. Global frame allocation:
   a. Means processes cannot control their page fault rate
   b. Want better throughput
   c. Both of the above
   d. None of the above

5. I/O interlocking
   a. Helps with prepaging
   b. Prevents eviction of some pages
   c. Both of the above
   d. None of the above

6. Least Recently Used (LRU) algorithm
   a. Needs past knowledge rather than future
   b. Needs special hardware
   c. Both of the above
   d. None of the above
Part 3: A longer question (2 x 4 points each = 8 points)

Suppose we have the following reference string: 041424342404, and three memory frames (empty at the initial state). Please draw the replacement pictures (like page32 in chapter 9) for First-in-First-Out (FIFO) and Least-Recently-Used (LRU) algorithms, respectively. Note that the two algorithms are just basic versions learned from our class. In addition, please compute the number of page faults for each algorithm.

Please answer the following questions:
1. Draw replacement picture for FIFO algorithm and compute the number of page faults.
2. Draw replacement picture for LRU algorithm and compute the number of page faults.