

Operating Systems, Final Exam, Jan. 12, 2009

1. (10%) Please write down the full name of each terms:
 (1) LRU, (2) FIFO, (3) ACL, (4) FAT, (5) NFS, (6) SAN, (7) RAID, (8) SCSI,
 (9) RBAC (in access control) (10) VM (in memory)
2. (20%) Explain the following terms briefly:
 (1) thrashing (2) working set, (3) I/O interlock, (4) mount (a file system)
 (4) ACL, (5) inode (note: block diagram is not needed) (6) bit vector, (7) master
 boot record, (8) disk mirroring, (9) polling, (10) spooling
3. (10%) Consider intel Pentium CPU, (1) Draw a block diagram showing that how a
 logical address is transformed to a physical memory address when the
 segmentation unit and the paging unit are enabled. (2) What is a "selector"?
4. (10%) Draw a diagram showing the steps in handling a page fault. Note that the
 operations of each step should be explained.
5. (10%) There are many extra bits used in a the page/segment table, such as (1)
 valid/invalid bit; (2) modified/not modified bit, (3) read/write/execution bits
 What are these bits used for?
6. (10%) Draw diagrams showing how a file is opened and how a file read operation
 is performed. Not that explanation is necessary.
7. (10%) (1) Draw a diagram to show the FAT concept. (2) What is the access (control)
 matrix? What is 'capability'?
8. (10%) For the following reference string, with four page frames:
 1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2
 What is the number of page faults for (1) an optimal page-replacement (2) LRU
 page replacement.
9. (10%) Consider a disk queue with requests for I/O to blocks on cylinders: 98, 183,
 37, 122, 14, 124, 65, 67 in the order. Suppose that the disk head is currently at 13.
 What are the total (disk) head movement if the following scheduling algorithms
 are taken: (1) SSTF, (2) C-LOOK
10. (10%) Considering the following do loop, the array is arranged in row order.
 Suppose that a page contains 256 data elements exactly. Each row of the array is
 stored in a page. How many page faults would occur?

`int[256,256] data;`

`for (j = 0; j < 256; j++)`

`for (i = 0; i < 256; i++)`

`data[i,j] = 0;`

`3 3 1`

`21 256`

`256`

`6`

`15 3 0`

`128`

`51 2`

`65 5 3 6`