

CS162, Spring 2004
Section 11 Quiz 1
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Directions: Complete the following questions as best you can. You're encouraged to discuss these questions with the people around you. This quiz IS NOT GRADED. Its only intended to help you understand the material.

1. Consider the following events during a memory access:

- i) Detecting a protection fault
- ii) TLB miss
- iii) Replacing a dirty page
- iv) Replacing a clean page

Order these events by cost (time taken).

$I \sim 2, 4, 3$

2. Suppose a disk has 5000 cylinders (numbered 0 - 4999). Suppose also that the drive is currently servicing 143, and previously serviced 125.

Given that the pending requests in FIFO order are:

86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130

a) Rank the following algorithms from most to least fair:

- FCFS
- SSTF
- SCAN
- C-SCAN

Ranking (most to least fair):

FCFS
C-SCAN
SCAN
SSTF

b) For each of the above algorithms, what is the seek order?

c) What is the total distance moved by the disk head (in cylinders)?

FCFS:

86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130
cylinders: 7081

C-Scan:

913, 948, 1022, 1470, 1509, 1750, 1774, 4999, 0, 86
cylinders: 9985

SCAN:

913, 948, 1022, 1470, 1509, 1750, 1774, 4999, 130, 86
cylinders: 9769

LOOK:

913, 948, 1022, 1470, 1509, 1750, 1774, 130, 86
cylinders: 3319

SSTF:

130, 86, 913, 948, 1022, 1470, 1509, 1750, 1774
cylinders: 1745

3. Given a "flat" file system (i.e. one with only a single directory), a reasonable design decision is to place the directory on the middle cylinder of the disk.

a) Why?

To minimize the seek time when accessing entries in the single directory.

b) Why doesn't the UNIX FFS put all of its directories (directory inodes) on the middle cylinder(s)? (Hint: think of some common disk access patterns.)

For some disk access patterns, e.g. compiling all the .c files in one directory, we could get better performance by putting the directory inode AND the inodes of those files close to each other, instead of putting all the directory inodes together.