Announcements

- Reading Chapter 13
- Midterm #2 was returned
  - Mean 73 (standard deviation 15)
  - Last day for re-grade requests is Tuesday 4/27/10 (11:59 PM)

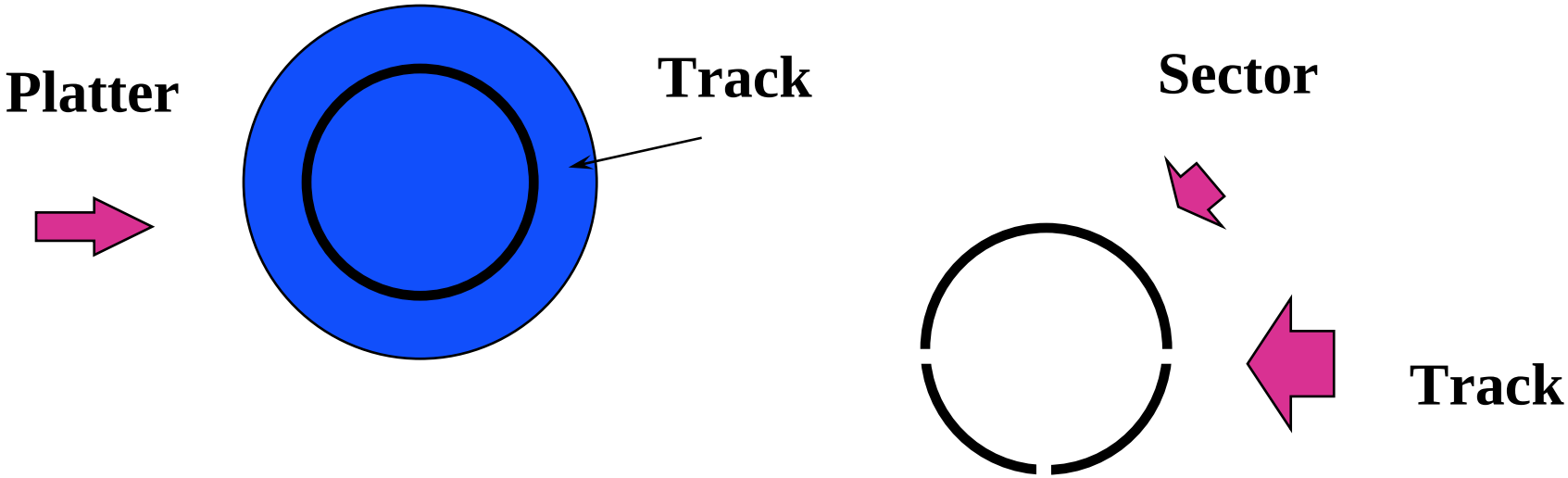
UNIX Shell and Current Directory

- Current Directory
  - Maintained on a per process basis by kernel
  - System Calls: get/set the current directory
  - Open system Call
    - File name checked and if it lacks a leading /, pre-pend cwd onto path
- Shell (file path)
  - Entirely implemented in user space
  - PATH Encironment variable
    - Lists directories to search
  - Hash table of commands and their location (file, or internal)

Log Structured File Systems

- Key Idea
  - Use transactions like model for filesystem updates
- Write data to a log (also called a journal)
  - Records meta data changes
  - Records data blocks written
  - File operation is committed once it is to the log
  - Partial updates to log are lost on failure
- Next Step
  - Eliminate the filesystem and just keep the log
  - Requires a process called a cleaner
    - Copies old data from log to head of log to allow compaction

Magnetic Disks



Total capasity: up to 1TB
Collection of platters (1-20)
Rotate at 3600-15000 RPM
Size - usually 2.5-3.5 inch
1,000-50,000 tracks per platter
Track consists of ~100-700 sectors
  zones: vary number of tracks/sector based on distance from center

Access Times

- Seek: Move disk arm over appropriate track
  - Seek times vary depending on locality
  - Times are order of milliseconds
- Rotational delay: Wait until desired information is under disk arm
  - A disk that rotates at 10,000 RPM will take 6.0 ms to complete a full rotation
  - Improving only a few percent per year
- Transfer time: time taken to transfer a block of bits
  - Minimum transfer is one sector
  - Depends on recording density of track, rotation speed, block size
  - Achieved transfer rate for many blocks can also be influenced by other system bottlenecks (software, hardware)
  - Rates range from 2 to 40 MB per second

Disk Scheduling

- First come, first served
  - ordering may lead to lots of disk head movement
  - i.e. 1, 190, 3, 170, 4, 160 etc.
  - total number of tracks traversed : 863
- Shortest seek time first: select request with the minimum seek time from current head position
  - move head to closest track
  - i.e. 1,3,4,160,170,190
  - total number of tracks traversed: 189
  - potential problem with distant tracks not getting service for an indefinite period

Disk Scheduling

- Scan scheduling - read-write head starts at one end of the disk, moves to the other, servicing requests as it reaches each track
  - Consider example: 1, 190, 3, 170, 4, 160
  - If head starts at track 64 and moves towards 0, the ordering would be 4,3,1,160,170,190
  - Total distance 265
- C-Scan (circular scan)
  - disk head sweeps in only one direction
  - when the disk head reaches one end, it returns to the other
  - Consider example: 1, 190, 3, 170, 4, 160
  - If head starts at track 64 and moves towards 0, the ordering would be 4,3,1,190,170,160
  - Total distance 282

Midterm #2

- The last 15 minutes we spent going over the solutions to midterm #2