Announcements

- Reading Chapter 13

- Project #4 is due Friday at 6:00 PM

- Midterm #2 is next Thursday (11/17)

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 Environment 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

Platter
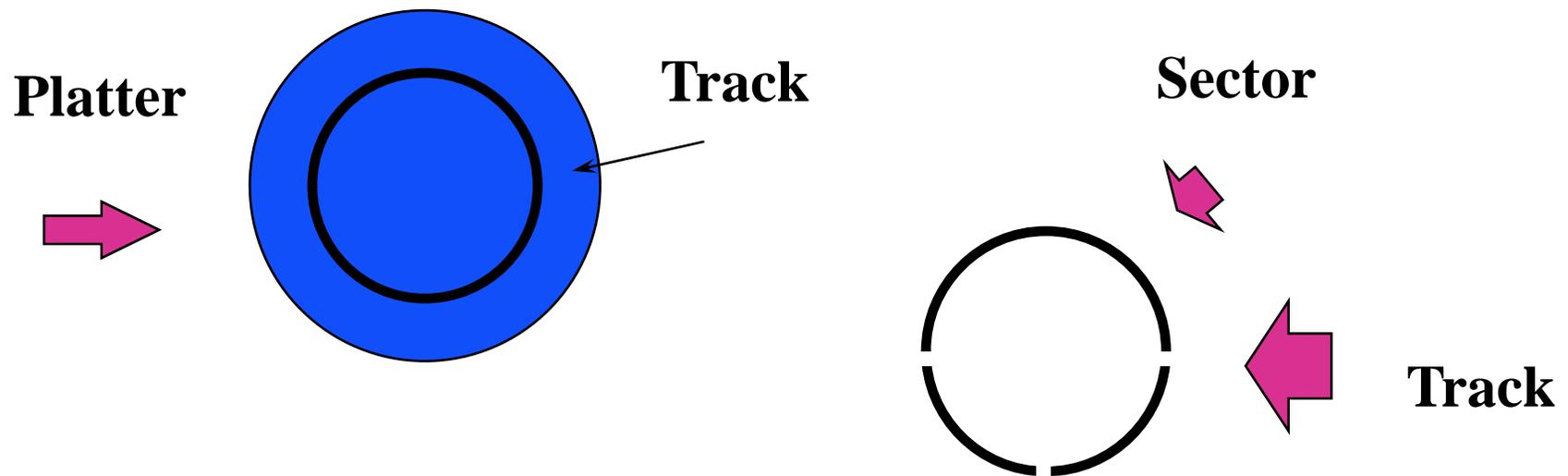
Track

Sector

Track

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

4

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

Solid State Disks (SSD)

- **Random Access nearly as fast as sequential**
- **Limited number of writes to a sector possible**
  - Controller needs to move things around
- **Implemented to provide same HW interface as disks**
  - IDE and SCSI attached
- **Long Term reliability of media still unknown**
  - Will they be readable if idle for 5-10 years?