

# Announcements

- Reading Chapters 13 & 19.1-19.2
- Clarification to project #4 posted on class web page
  - unload is not a blocking operation

# Bad Blocks

- Some blocks on a disk may not work
  - could be bad from the start (when disk is installed)
  - could go bad during use
- Two options to manage bad blocks
  - disk drive maps the blocks to “replacement” blocks
    - special blocks that are held in reserve for this purpose
  - OS keeps track of where the bad blocks are located and avoids them
- Replacement blocks
  - can be located in tracks at one location, or around the disk
  - provide correct behavior, but change disk performance
- Even if the disk re-maps bad blocks
  - OS could lose data stored on disk
  - needs to be able to recover filesystem from partial update

# Booting the OS

- How does the OS get loaded and started?
- Process is called booting
  - want to use the OS to load itself
  - but what loads the OS?
- ROM monitor
  - knows how to read from a fixed location on disk and jump into it
- Bootstrap program
  - knows how to load a program from the filesystem and jump into it
- Alternative:
  - put more info into ROM about booting
    - MAC OS has most of the info in ROM
    - hard to change OS without changing ROMs

# Booting the OS (cont.)

- put info into ROM about booting
  - MAC OS has most of the info in ROM
  - hard to change OS without changing ROMs
- Network Booting
  - ROM knows how to request a boot packet from the network
    - once the packet is received, execute it
  - useful for systems without local disks
  - used by OS developers to ease edit/compile/boot cycles

# Swap Space

- Where is swap space located?
  - Is it a “normal” file in the filesystem?
  - Is it in a special location on disk?
- “normal” file
  - 📄 simple, just looks like a file
  - 📄 easy to change size
    - use normal tools
  - slow since it requires all of the filesystem overhead
- separate disk partition
  - 📄 faster
  - harder to change size (need a new partition)

# Backups

- Disks can fail, so need to provide a way to copy them
- Two types of backups
  - full backup (all of the data on disks)
  - incremental (data that has changed since last backup)
    - can mark changed files with a field
    - can use the data of the file compared to the last backup
      - permits several levels of backup
    - may want multiple levels of incremental (day, week changes)
- Does the system need to be shutdown for backups?
  - what if a file is moved during a backup?
    - it could get copied 0, 1, or 2 times.
  - easiest answer is to shutdown the machine from dumps

# Security

- security vs. protection

- protection provides a mechanism to control access to resources
- security also includes external features such as users

- security requires precluding unauthorized

- access to data
- modification of data
- destruction of data

- several major types of security

- physical: must protect access to resource it self
  - if you have physical access to a machine, you can break security.
- users: if a user gives away access (or info) computer security is useless
- software: OS and system software must provide protection