

Announcements

- Reading Chapter 19
- Last day to request midterm #2 re-grades is Th

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

Booting in GeekOS

- **PC Architecture**

- Reads first sector on drive and then executes it
- Hardware thinks it is a 16 bit 8088 processor at boot
 - Provides backwards compatibility

- **Boot Sector**

- contains code to read
 - kernel.bin into memory
 - setup.bin into memory
 - uses bios to access drives
- Includes a boot record to find kernel

- **Setup code**

- Detects amount of memory
- Moves processor to protected mode
- Jumps to 32 bit code (and 32 bit mode)
- Sets up initial kernel stack

GeekOS Booting Notes

- Kernel and setup files

- Are normal files in what ever filesystem we have
- Bootinfo record in boot sector tells how to find them
- Must be in contiguous blocks on disk
 - A restriction in the boot sector code

- Once booted

- Boot sector is ignored by main filesystem
- Rest of disk is available to be used as desired

- Have special utility to write boot sector

- Gosfs has a call `GOFs_BootInfo`

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
- Need to plan for disasters too
 - What if the building burns down?
- 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 date of the file compared to the last backup
 - permits several levels of backup
 - may want multiple levels of incremental (day, week changes)

Backups

- 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.
 - easy answer is to shutdown the machine for backup
 - more typical setup:
 - Compute backup set
 - Backup files
 - Compute new backup set
 - Add any files that were missed

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

Who do you trust?

- It's easy to get paranoid
- Do I trust a login prompt?
- Do I trust the OS that I got from the vendor?
- Do I trust the system staff?
 - should I encrypt all my files?
- Networking
 - do you trust the network provider?
 - do you trust the phone company?
- How do you bootstrap security?
 - always need one “out of band” transfer to get going