File system, files, and *tab

- File system
  - files
  - directories
  - volumes, file systems
  - mounting points
  - local versus networked file systems

/etc/fstab

- Specifies what is to be mounted where and how
  - fs_spec: describes block special device for remote filesystem to be mounted
  - fs_file: describes the mount point
  - fs_vfstype: describes the type of file system
  - fs_mntops: describes the mount options associated with the filesystem

/etc/fstab

- cont.
  - fs_freq: used by the *dump* command
  - fs_passno: used by *fsck* to determine the order in which checks are done at boot time. Root file systems should be specified as 1, others should be 2. Value 0 means that file system does not need to be checked

/etc/fstab

```
[krings@eternium /etc]$ more fstab
LABEL=/                 /                       ext3    defaults        1 1
LABEL=/usr              /usr                    ext3    defaults        1 2
LABEL=/tmp              /tmp                    ext3    defaults        1 2
LABEL=/opt              /opt                    ext3    defaults        1 2
LABEL=/var              /var                    ext3    defaults        1 2
LABEL=/boot             /boot                   ext3    defaults        1 2
tmpfs                   /dev/shm                tmpfs   defaults        0 0
devpts                  /dev/pts                devpts  gid=5,mode=620  0 0
sysfs                   /sys                    sysfs   defaults        0 0
proc                    /proc                   proc    defaults        0 0
LABEL=SWAP-sda6         swap                    swap    defaults        0 0
```

from blocks to mounting points

- metadata
- inodes
- directories
- superblocks

mounting file systems

- mounting
  - e.g., mount -a
- unmounting
  - manually or during shutdown
  - umount

/etc/mtab

- see what is mounted

```
[krings@eternium /etc]$ more /etc/mtab
/dev/sda2 / ext3 rw 0 0
proc /proc proc rw 0 0
sysfs /sys sysfs rw 0 0
devpts /dev/pts devpts rw,gid=5,mode=620 0 0
/dev/sda8 /usr ext3 rw 0 0
/dev/sda7 /tmp ext3 rw 0 0
/dev/sda5 /opt ext3 rw 0 0
/dev/sda3 /var ext3 rw 0 0
/dev/sda1 /boot ext3 rw 0 0
tmpfs /dev/shm tmpfs rw 0 0
none /proc/sys/fs/binfmt_misc binfmt_misc rw 0 0
sunrpc /var/lib/nfs/rpc_pipefs rpc_pipefs rw 0 0
//granite.cs.uidaho.edu/jeffery /home/jeffery cifs rw,mand,nosuid,nodev 0 0
//granite.cs.uidaho.edu/krings /home/krings cifs rw,mand,nosuid,nodev 0 0
```

Network File System

- Access file system (FS) over a network
  - looks like a local file system to user
  - e.g. mount user FS rather than duplicating it (which would be a disaster)
- Developed by Sun Microsystems (mid 80s)
  - history for NFS: NFS, NFSv2, NFSv3, NFSv4
  - RFC 3530 (from 2003)
    - take a look to see what these RFCs are like!)

Network File System

- How does this actually work?
  - server needs to export the system
  - client needs to mount the system
- server: /etc/exports file
- client: /etc/fstab file

Network File System

- Security concerns
  - UID
  - GID
  - What problems could arise?

Network File System

- example from our raid system (what is a RAID again?)

- Example of exports file from the back-end disk array:

```
/raid/classes   129.101.153.0/26(rw,root_squash) 129.101.153.64/26(rw,root_squash)
129.101.153.128/26(rw,root_squash) 129.101.178.64/26(rw,root_squash)
/raid/scratch   129.101.153.0/26(rw,root_squash) 129.101.153.64/26(rw,root_squash)
129.101.153.128/26(rw,root_squash) 129.101.178.64/26(rw,root_squash)
/raid/special   129.101.153.0/26(rw,root_squash) 129.101.153.64/26(rw,root_squash)
129.101.153.128/26(rw,root_squash) 129.101.178.64/26(rw,root_squash)
/raid/web       129.101.153.0/26(rw,root_squash) 129.101.153.64/26(rw,root_squash)
129.101.153.128/26(rw,root_squash) 129.101.178.64/26(rw,root_squash)
```