

# Network File System

Concept: machines can share files.

File Server: must grant permission for access

Client: must import file system

Unix: permission and import is by subtree  
a directory and its descendants

Unix attaches directories into a tree using `mount`

A `mount` of a subtree from a server will be used to attach  
the server's subtree into our file system tree

Linux: Networking components

`rpc.portmap`: NFS is based on remote procedure calls

`rpc.mountd`: The server runs this program, it handles  
`mount` requests from clients

`rpc.nfsd`: The server runs this program, it handles  
requests for files from client machines

# Exports

file: /etc/exports

Purpose: say what is exported and to whom

Each line: A directory and a list of machines permitted to mount the subtree under that directory

```
/harddisk lab17.net.cecs.csulb.edu(rw, sync)
/usr/info lab19.net.cecs.csulb.edu(ro) lab20(rw)
/usr/bin *.net.cecs.csulb.edu(ro)
/oops 134.139.136.64/255.255.255.192(rw)
```

lab17 is allowed read/write access to /harddisk

lab19 is allowed read only access to /usr/info and lab20 is allowed read/write

/usr/bin is exported with a wild card

User sam on will have “sam” priviledges on /harddisk

sync: write immediate to keep files in sync

root\_squash: root on the client machine doesn't get root priviledges

no\_subtree\_check: ensure file requests are in the exported subtree

exportfs: A command similar to mount; it causes the exports file to be reread. Pay attention command to the options!

## Remote Programs

At boot the remote programs are started by the `rc.nfsd` script.

The script may be enabled by `chmod a+x rc.nfsd`

May be run by hand, but requires the parameter `start`.

The script will start the remote programs only if the `exports` file exists and contains some exports.

The `rc.nfsd` script can also be run by hand with either a `start` and `stop`.

You may also start `rpc.mountd` and `rpc.nfsd` by hand.  
Start only one copy.

May also start from `inetd`.

## Mounting Remote Files

Normal mount command syntax is used

The fstab can be used

```
/etc/fstab
```

```
lynx.net.cecs.csulb.edu:/u1 /lynx nfs bg,soft 0 0
```

server machine-name:/directory

Where to attach it locally

nfs: the type of file system

other options include `ext2` or `msdos`

bg: if the mount times out, background it and keep trying

soft: report an error if an NFS operation times out

intr: allow a control C to abort an operation if it has timed out

nocheck: file locking is local to this machine and does not attempt to lock against other NFS clients.

Caution: booting or a program will hang if you give options which require an NFS operation to succeed and the NFS server is down. (i.e. we recommend bg, soft, intr).

Review:

The machine owning the disk must *export*.

The machine wanting to use the files must *mount*.

# Network File System

## automatic mounts

Situation: you have a lot of NFS mounts, many are infrequently used.

Regular NFS mount: Error if server goes offline.

Solution: keep unused NFS mounts in the unmounted state.

automatically mount when needed.

A `cd`, `ls` or other program that needs something in an NFS area triggers a NFS mount.

If a NFS mount hasn't been used in a while, (timeout period), unmount it.

Sun: automount

Linux: automount

BSD: amd

## Linux automount

- 1) Attach an automount daemon to a directory.
- 2) Specify which subdirectories to automount

Invoking automount (sample):

```
/usr/sbin/automount /home/mount file /etc/autostuff
```

Automounts are done for subdirectories of /home/mount  
The file /etc/autostuff tells us what to do.

Sample autostuff:

```
u1 -soft,intr d1.cecs.csulb.edu:/u1
u2 -soft,intr d1.cecs.csulb.edu:/u2
mail -soft,intr charlotte.cecs.csulb.edu:/var/mail
```

- 1) if the user wants /home/mount/u1,  
automount /u1 from d1.
- 2) if the user wants /home/mount/u2,
- 3) if the user wants /home/mount/mail,  
automount /var/mail from charlotte.

## **automount (alternative config)**

Automount has a master map that can be used to specify other files.

The name of this file is specified by the MASTER\_MAP\_NAME variable in `/etc/defaults/autofs`

Default master map entry (must be last)

`/net -hosts`

Meaning:

If `/net/d1/u2` is requested assume:

`d1` is the hostname

`u2` is the directory name on that host

mount that directory under `/net/d1/u2`

Typical master map override entry:

`/net/aardvark /etc/auto.aardvark`

Meaning:

If the directory `/net/aardvark` is requested, see the file `/etc/auto.aardvark` for directions.

File format same as given on previous slide.