

Network File System (NFS)

- Version 3
- Share file systems among computers.
- On top of RPC (Remote Procedure Call) that allows processes to communicate over network.
- TCP or UDP
- Stateless server does not maintain any information about status of ongoing interactions with clients.

- Server passes cookie on successful mount.
- Security concerns

Root and Nobody

- NFS server intercepts requests made on behalf of UID 0.
- Changes them to another user (nobody).
- “Squashing Root”
- Root has abilities of normal user.
- `no_root_squash`

Server-Side NFS

- Exports directories.
- Client mount file systems (learn secret cookie) with separate process from accessing files.
- **mountd** for mount requests
- **nfsd** for file service.
- **/etc/exports** is human readable list of exported directories.

- **exportfs** to export directories.
- Any directory exported.
- For security, each device exported separately.
- Clients can mount subdirectories.

exports

- Client in Whitespace separated list.
- Comma-separated list for options.
- `/use/share/man *.toadranch.com(ro)`

Options	Description
ro	Read-only
rw	default
rw=list	list is hosts for writing. Mostly ro
root_squash	default
no_root_squash	Normal access by root
all_squash	All UIDs and GIDs to anonymous versions
anonuid=xxx	UID remote roots squashed to
anongid=xxx	GID remote roots squashed to
secure	Access at privileged port
insecure	Access from any port
noaccess	Presents access to this dir and subdirs

nfsd

- Usually, only on server
- number of threads as argument

Client-Side NFS

- Mount nfs filesystems much like local.
- **mount hostname:directory**
- To verify export, **showmount -e coyote**
- **mount -o rw,hard,intr,bf coyote:/home/boggs /coyote/home/**
- To mount at boot, **/etc/fstab**

- `filesystem mountpoint fstype flags dump fsck`
- Or by a automatic mounting service.

Options	Description
ro	Read-only
rw	Read-write
bg	Keep trying to mount in background
hard	Block until server up
soft	Access causes error
intr	User can interrupt blocks
nointr	User cannot interrupt blocks
retrans=n	Times to repeat request to soft
timeo=n	Timeout for request
rsize=n	Read buffer
wsize=n	Write buffer
nfsvers=n	Protocol version
tcp	Transport by tcp

Automounting

- Don't have to maintain **/etc/fstab**
- **automount** is background process that mounts and umounts filesystems based on use.
- **/etc/init.d/autofs**
- **/etc/auto.master**
- Lists directories that should have autofs filesystems mounted on them, and associates a map with each.

- Map translates key (directory name) into command line that **mount** can use.
- `+auto.home` to mount NIS home directories.
- Map files automount several filesystems under a common directory.
- Example tells **automount** to mount specified directories from host **chimchim**, with options.

Directory	Map	Options
<code>/chimchim</code>	<code>/etc/auto.chim</code>	<code>-secure,hard,bg,intr</code>

Name of subdirectory	Options and source path
user	chimchim:/chimchim/users
devel	-soft,nsfproto=3 chimchim:/chimchim/devel
info	-ro chimchim:/chimchim/info