

(cont)

- Keep mount options to a minimum. Use global options.

```
software      -rw,hard,intr,bg,timeo=15    server:/export/software
```

```
/home         auto_home                      -nosuid
```

- Avoid local customizations.
 - Don't edit `/etc/init.d/nfs.client` (or `/etc/rc.local`)
 - Don't use automount command line flags
 - Avoid local maps.
- Keep automounts under a common directory.
 - Automount paths should be readily identifiable e.g. `/shared/...`
- Do exported mounts under `/export`.
 - Allows server to participate in shared namespace without customization.
- Avoid embedding `/net` paths in symlinks or scripts.

Advice

- Avoid direct maps. Use indirect wherever possible.

Instead of:

```
/usr/proj/this      server:/export/proj/&  
/usr/proj/that      server:/export/proj/&  
/usr/proj/theother  server:/export/proj/&  
:
```

Use

```
/usr/proj          auto_proj  
  
this               server:/export/proj/&  
that               server:/export/proj/&  
theother           server:/export/proj/&
```

- Don't use shared mounts feature.

```
bob                server:/export/home:&  
carol              server:/export/home:&  
ted                server:/export/home:&
```

Get weird paths e.g. /tmp_mnt/home/bob/bob or /tmp_mnt/home/bob/ted

Filesystem Independent

- Mounts NFS and other filesystem types
- In particular, floppies and CDROM's.
- Uses standard mounting/unmounting interfaces e.g.
/usr/lib/fs/pcfs/mount
/usr/lib/fs/pcfs/umount
- Incorporates filesystem type into automount map syntax

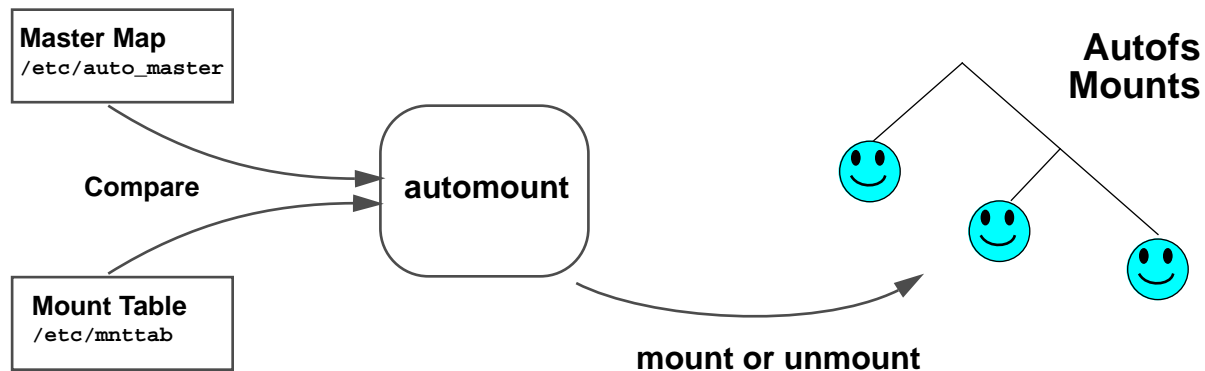
```
cdrom      -fstype=hsfs,ro  :/dev/sr0
```

Multi-threading

- Increases availability of automounting services.
- Uses multi-threaded RPC and name-services.
- Supports multiple requests concurrently, one thread per request.
- Difficult to deadlock.

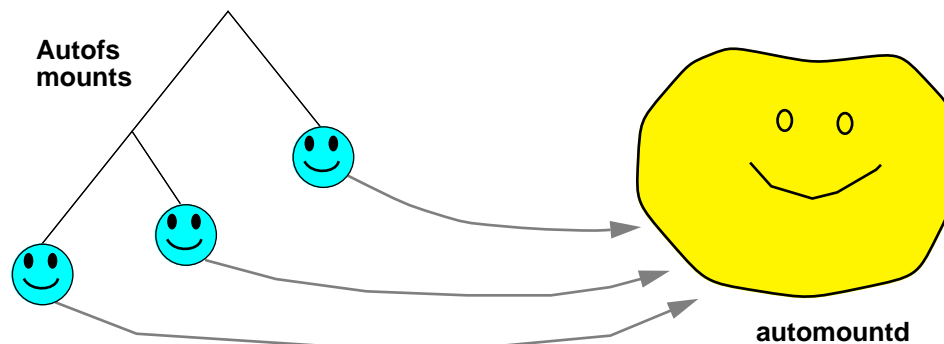
Automount Command

- No longer spawns a daemon.
- Compares master map (and direct map) against autofs mounts in /etc/mnttab.
- Adds or deletes autofs mounts as necessary.
- Daemon is stateless. No need to ever restart it.



Automountd

- Daemon started at boot time.
- Stateless. Has no knowledge of current mountpoints.
- Mount requests from kernel to daemon contain all information: mountpoint, map, default options etc.
- Separate automount program adds/deletes automount mountpoints. No need to restart daemon.
- Daemon required only for mounts/unmounts. Access to mounted filesystems does not require the daemon.



Autofs

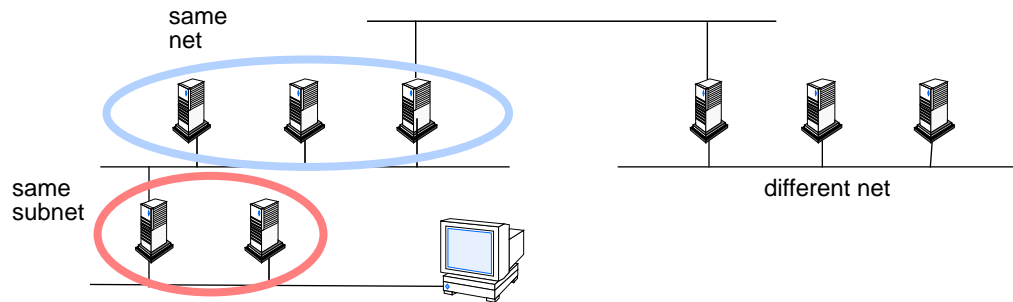
- A new kernel VFS supports automatic mounting
- Mounted by automount command.
- User-level daemon automountd
- Mounts are done in-place. ~~/tmp_mnt~~
- Better performance.

New Automounter

- Autofs.
- Automountd
- Automount
- Multi-threaded
- Filesystem independent

Replica Location

- Solaris 2.0 automounter is subnet-aware. Will always mount the “nearest” server.
- Chooses the “nearest” interface if a server is multi-homed (multiple network interfaces).



- Can use server weighting to state preference. Weighting value applies a time penalty when client is evaluating round-trip time for “ping”.
`man primary,backup1(1),backup2(2) : /usr/man`
- Cannot use preference weighting to force a mount from a “far” server in preference to a “near” server.
- SunOS 4.x clients cannot mount at all from weighted servers since they parse the weighting value as part of the server name.

Home Directory Path

- */home/user* is better than */home/server/user*.
Less typing, more location independence.
- Before automounter: */home/server/user* easier to manage than */home/user*. One entry per user in */etc/fstab* was too hard to administer.
- Automounter makes it easy to manage */home/user*.
Need one entry per user in organization-wide *auto_home* map.
- We recommend */home/user* to Solaris 2.0 customers.
Customers can continue to use their existing scheme if they prefer.

NIS+ Maps

- Keep “well known” automount maps in **org_dir** of current NIS+ domain. If NIS+ domain is Eng.Sun.COM then

`auto_home` → `auto_home.org_dir.Eng.Sun.COM.`

- Maps outside of **org_dir** must be specified with fully qualified name.

`mystuff.brent.Eng.Sun.COM.`

Why Underscores ?

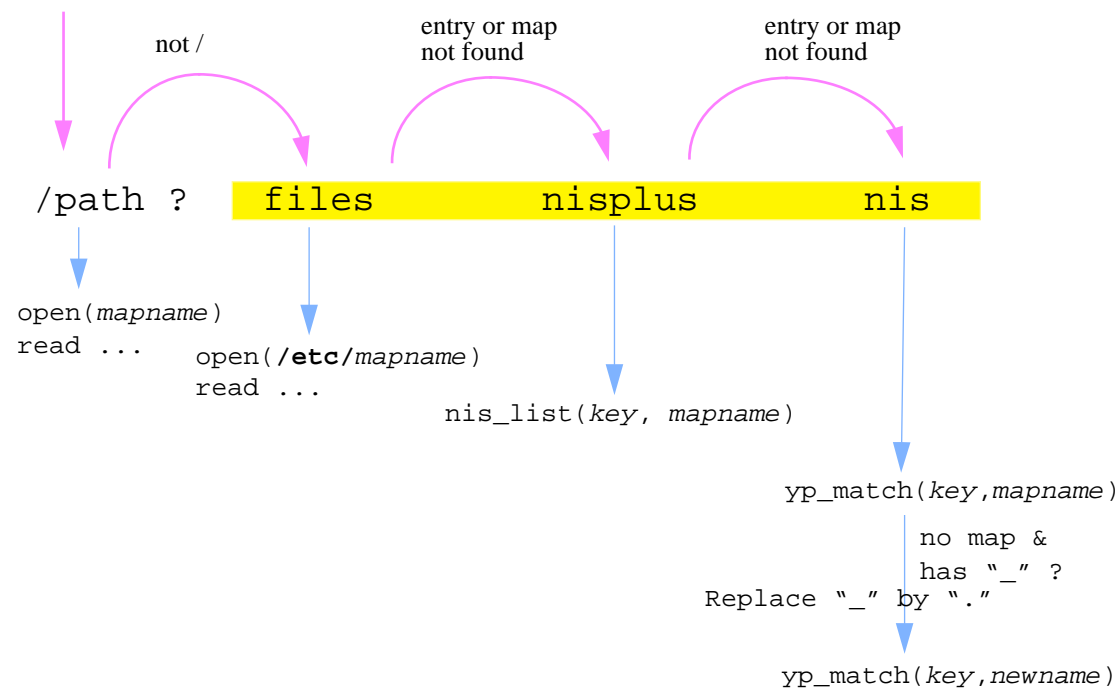
- NIS+ uses dots to separate “labels” in a path e.g.
`tab.dir`
means “table tab in directory dir”
- Conflict with automount map name convention e.g.
`auto.master auto.home`
- Better just to recommend underscore instead of dot e.g.
`auto_master auto_home`

Name Services

- Solaris 2.0 automounter uses name service switch policy to find all maps.
- Entry in `/etc/nsswitch.conf`

```
automount: files nisplus nis
```

lookup key mapname



Automount Startup

- Starts from `/etc/init.d/nfs.client`
- Looks for master map: `auto_master`
- Finds `/etc/auto_master`

```
# Master map for automounter
#
+auto_master
/net      -hosts      -nosuid
/home     auto_home
```

- Finds `/etc/auto_home`

```
# Home directory map for automounter
#
+auto_home
```

Automounter in Solaris 2.0

- Consults 3 name services: NIS+, NIS, /etc files according to name service switch.
- Comes pre-configured with /etc/auto_master and /etc/auto_home.
- Both /net and /home are automounted by default.
- Now recommend /home/user for home directories.
- Improved replica server location code handles subnets, multi-homed servers.
- Compatible with existing networks and automounter maps.

- Does not address problems on previous slide!

Problems

- Symbolic links and /tmp_mnt.
 - Breaks applications e.g. at
 - Confuses users.
- Hangs up.
 - Single-threaded implementation
 - Automounter hang \Leftrightarrow system hang for most users.
- Reboot to get new maps
 - Need to restart automounter to get new maps/mountpoints
 - No graceful restart - usually have to reboot.
- Works only for NFS
 - What about floppies or CDROM ?
- Performance
 - Symbolic links can be slow

The Automounter: Solaris 2.0 and Beyond

Brent Callaghan

- Problems
- Automounter in Solaris 2.0
- New Automounter
- Advice