The Automounter: Solaris 2.0 and Beyond

Brent Callaghan

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

Problems

- Symbolic links and /tmp_mnt.
  - Breaks applications e.g. at
  - Confuses users.
- Hangs up.
  - Single-threaded implementation
  - Automounter hang <=> 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

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!

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
```

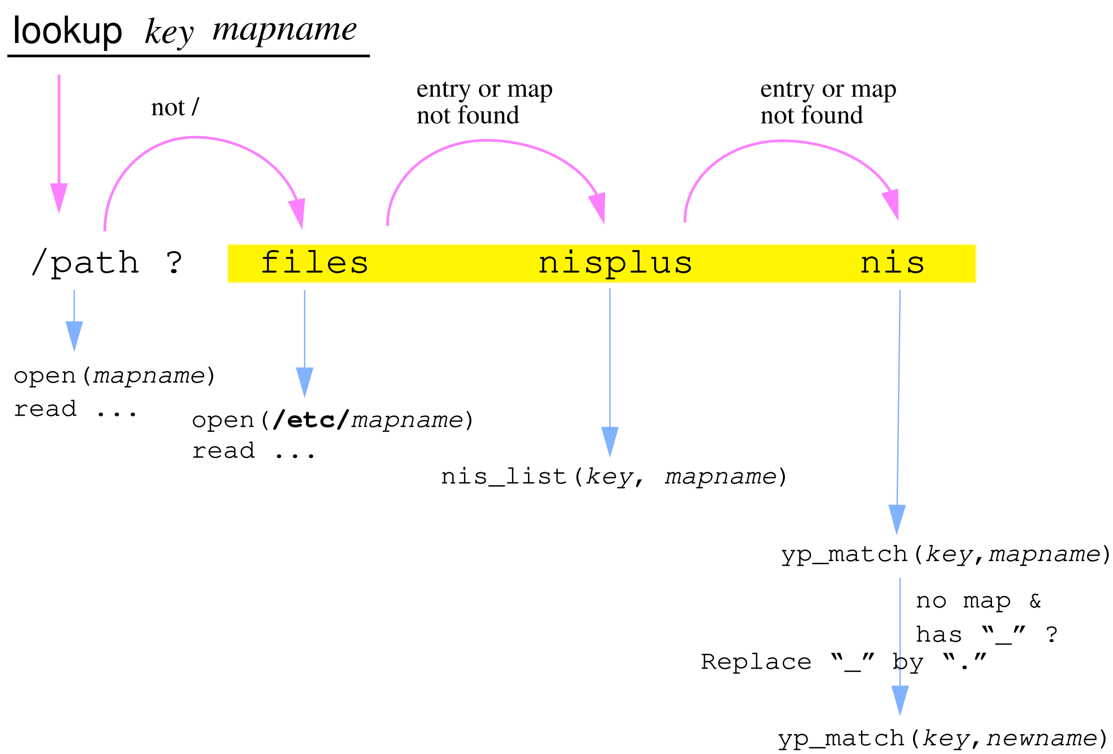
- Finds /etc/auto_home

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

Name Services

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

```
automount:  files nisplus nis
```



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`

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.

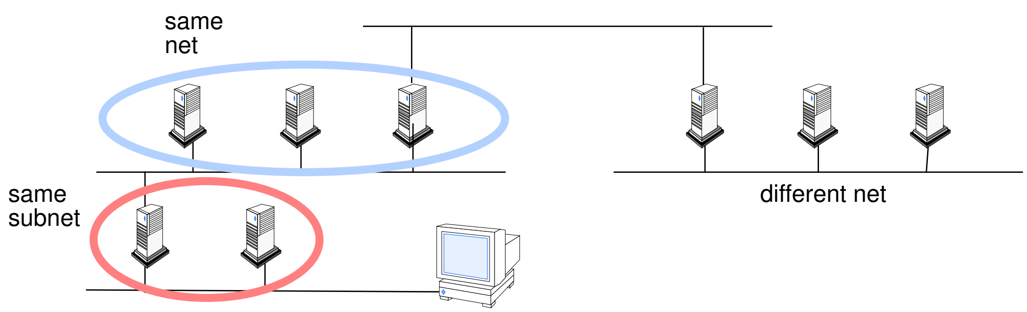
  `mystuff.brent.Eng.Sun.COM.`

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.

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.

New Automounter

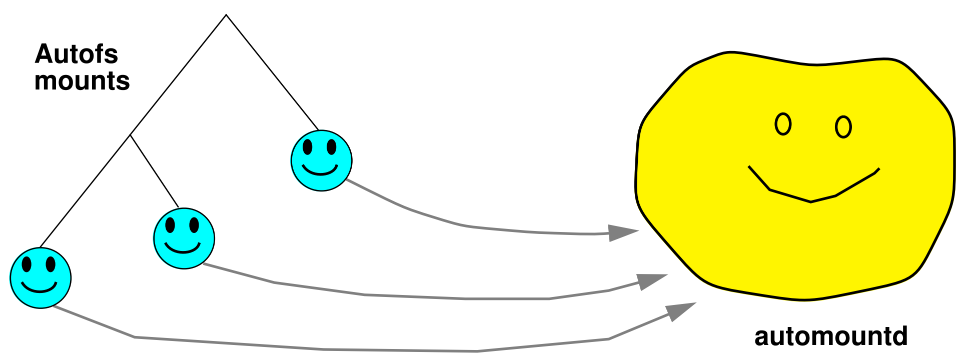
- Autofs.
- Automountd
- Automount
- Multi-threaded
- Filesystem independent

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.

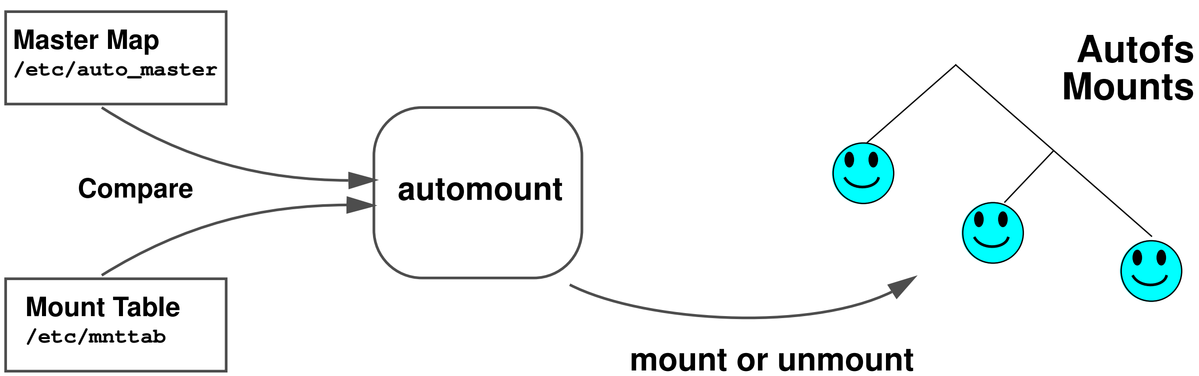
Automountd

- 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.



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.



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.

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
```

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`Advice

(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.