

# Automounter Improvements

**Ashok Advani**

**Sunsoft**

*advani@eng.sun.com*

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## Objective

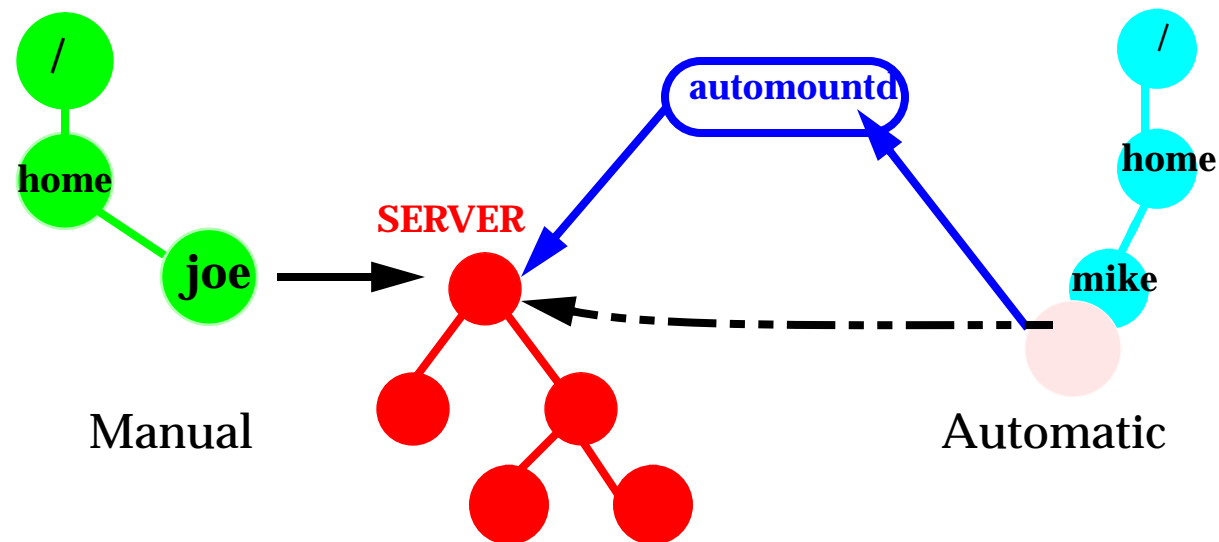
- **To evaluate and discuss improvements made to the Solaris automounter in the upcoming Solaris 2.6 release, and in the ongoing Fileset Migration/Replication project**

## SCOPE

- **Solaris Autofs Automounter**
- **Solaris 2.6 Automounter Features**
- **Atomic Unmounting and Mounting Hierarchies**
- **Automounter wish-list**
- **Summary**

## Solaris Autofs Automounter

- automatic, on-demand mounting and unmounting of filesystems



## Solaris 2.6 Automounter Features

- **Fully multithreaded automounter daemon**
  - 2.5.1 Daemon is not completely threaded
  - daemon hangs => system hangs
    - mount from dead server => daemon hang
    - recursive calls to daemon => daemon hang
  - Performance

## Solaris 2.6 Automounter Features

- **Browsability**

- Only mounted entries are visible in Solaris 2.5.1
- Needed for global name space construction (xfn)

% ls /home                      Solaris 2.6

advani ( + 7000 more!!!)

- Performance

/ws      80 entries      instantaneous

/home 7000 entries      15 seconds on cold cache

/net    30,000 entries => you don't want to know!!

- Applications that mount the world!

/net   -hosts   -nobrowse

## Solaris 2.6 Automounter Features

- **Hierarchical Mounting of Filesystems**

- Server exporting a hierarchy of filesystems can cause mount storms in Solaris 2.5.1

Example: NFS server x exports 27 filesystems /, /a, /b,...,/z  
client % cd /net/x

- ALL 27 NFS mounts (/net/x, /net/x/a, /net/x/b,...,/net/x/z) take place up front!
- Solaris 2.6 does better on-demand mounting  
Example: Only /net/x is NFS mounted.
  - Place AUTOFS trigger nodes on /net/x/b, ..., /net/x/z
- Performance

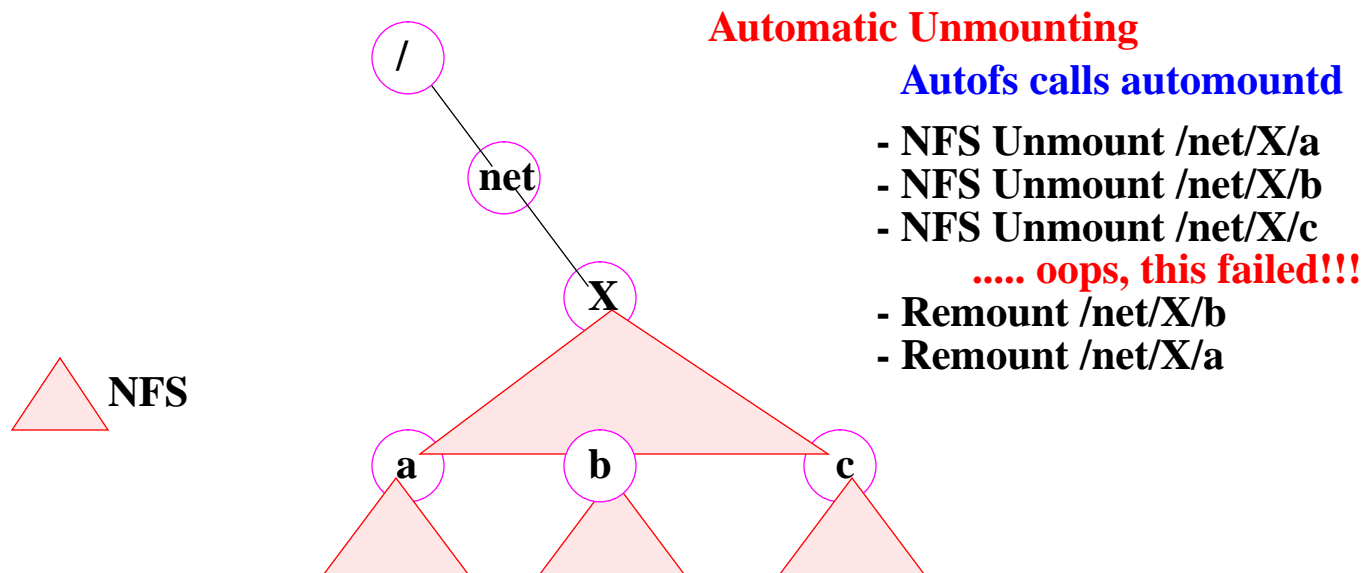
## Solaris 2.6 Automounter Features

- **Duplicate Request Cache**
  - Recurrence of non-idempotent operations, eg., mount
  - Solaris 2.5.1 automounter supports 16 entry duplicate request cache based on xid's
  - Solaris 2.6 supports a time-based cache
    - hash table based on xid
    - time-based removal of entries in the cache (LRU)
    - current timer set at 900 seconds
    - built into the RPC library



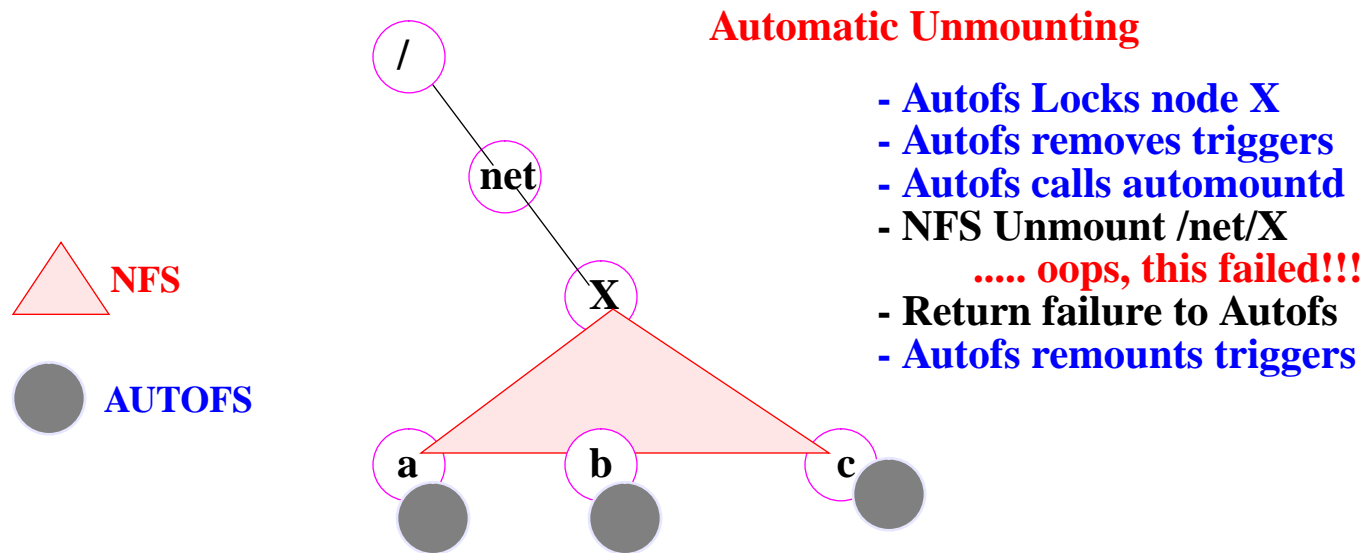
# Atomic Unmounting/Mounting Hierarchies

## •The Unmount/Remount Problem in Solaris 2.5.1



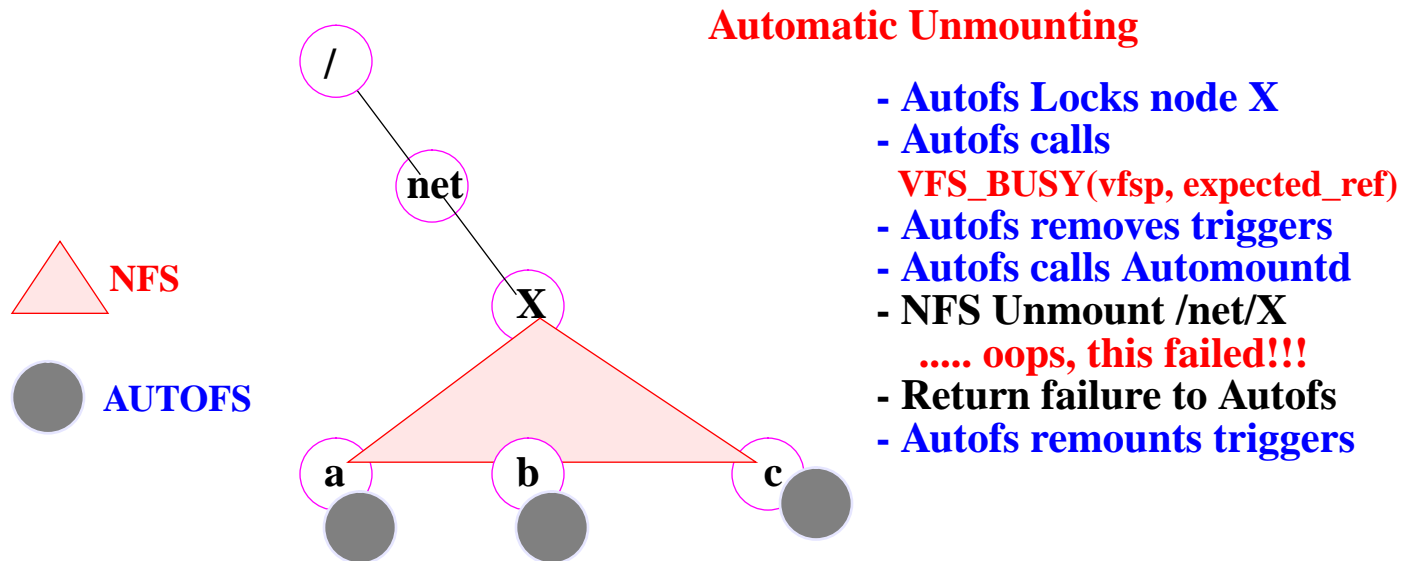
# Atomic Unmounting/Mounting Hierarchies

## •The Unmount/Remount Problem in Solaris 2.6



# Atomic Unmounting/Mounting Hierarchies

## •Atomic Unmounting Design (Fileset Project)



# Atomic Unmounting/Mounting Hierarchies

- **Hierarchical Mounting problem in Solaris 2.5.1**

- Autofs calls automountd
- Automountd reads list of hierarchical mounts from map

Example: Server X exports /, /a, /b, /c, /d

```
for (i = 0; i < number_mounts; i++) {  
    build_nfs_args();  
    nfs_mount();  
}
```

- What if automountd dies in the middle? Autofs is confused!

# Atomic Unmounting/Mounting Hierarchies

- **Hierarchical Mounting Problem in Solaris 2.6**

- Autofs calls automountd
- Automountd reads list of hierarchical mounts from map

**Example: Server X exports /, /a, /b/, /c, /d**

```
nfs_mount(/net/X);
```

```
for (i = 0; i < trigger_mounts; i++)
```

```
    build_autofs_args_action_list();
```

- Automountd returns action list to Autofs
- Autofs mounts trigger nodes
- What if automountd dies in the middle? Autofs is still confused!

## Atomic Unmounting/Mounting Hierarchies

- **Atomic Mounting Design (Fileset Project)**

- Autofs calls automountd with cookie vnode
- Automountd reads list of hierarchical mounts from map

**Example: Server X exports /, /a, /b/, /c, /d**

```
mounta_list = build_nfs_mounta(/net/X);
```

```
for (i = 0; i < trigger_mounts; i++)
```

```
    mounta_list->next = build_autofs_mounta();
```

```
    _autofssys(AUTOFS_MOUNT, cookie, mounta_list);
```

- What if automountd dies in the middle? Autofs simply checks the vnode to see if its mounted or has trigger nodes installed

## Automounter Wish-list (Fileset Project)

- **Rearchitect User-level mounting to use shared libraries**
- **Autofs Name Space Synchronization**
  - Server X exports /a, /b and its mounted
  - Sysadmin now decides to export /c
  - Must wait for unmount until /c is seen by the automounter
- **Mount option concatenation**

<code>mntpnt</code>	<code>-nosuid</code>	<code>server-x:/</code>
<code>/a</code>	<code>-rw</code>	<code>server-x:/a</code>

  - override the options vs. concatenate them
- **in-kernel /etc/mnttab**

## Summary

- Continuing to work to enhance the automounter
- Solaris 2.6 Automounter Features
- Atomic Unmounting and Mounting Hierarchies
- Automounter wish-list

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