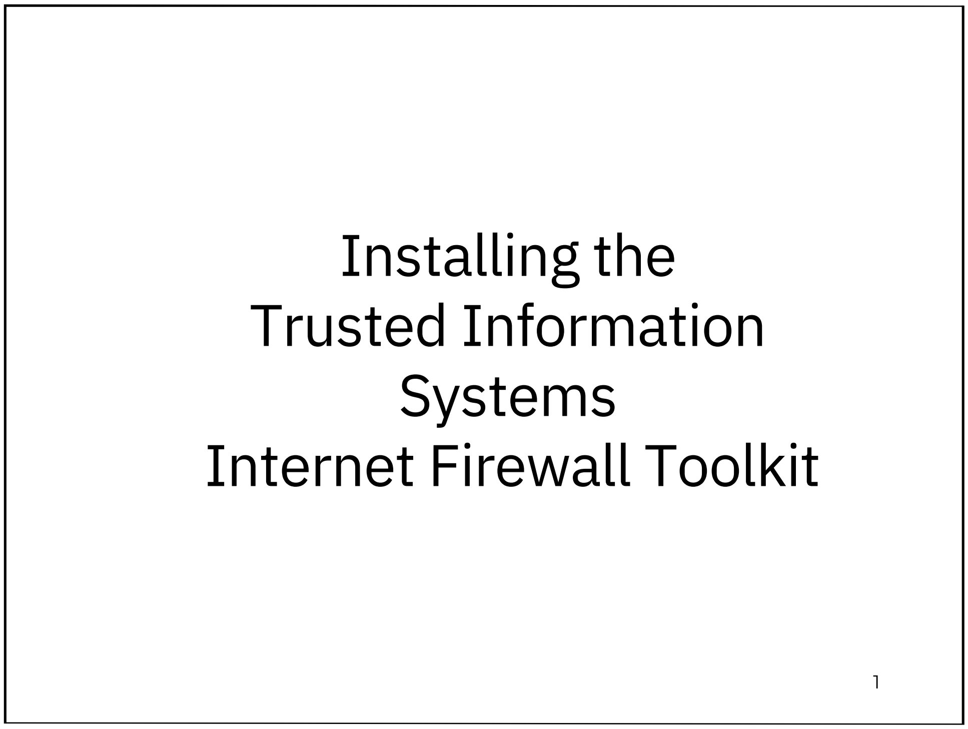
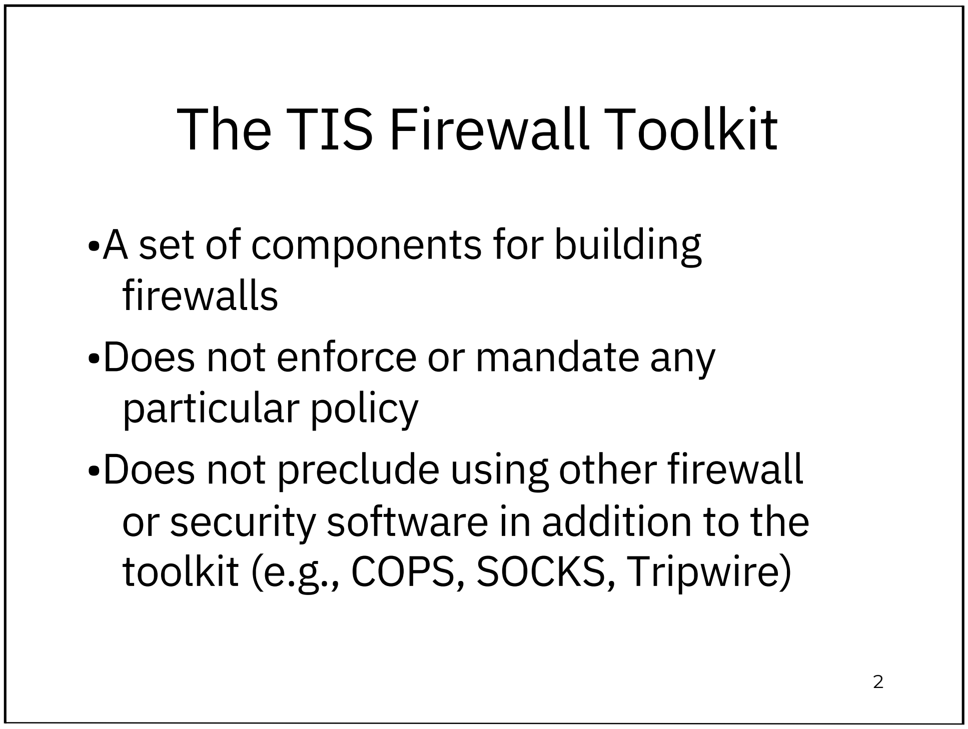


Installing the Trusted Information Systems Internet Firewall Toolkit

1



The TIS Firewall Toolkit

- A set of components for building firewalls
- Does not enforce or mandate any particular policy
- Does not preclude using other firewall or security software in addition to the toolkit (e.g., COPS, SOCKS, Tripwire)

2

The TIS Firewall Toolkit *(cont)*

- Provides a minimum functionality for services that can be implemented with high security
  - FTP
  - Telnet / rlogin
  - X
  - SMTP e-mail
  - WWW

The TIS Firewall Toolkit *(cont)*

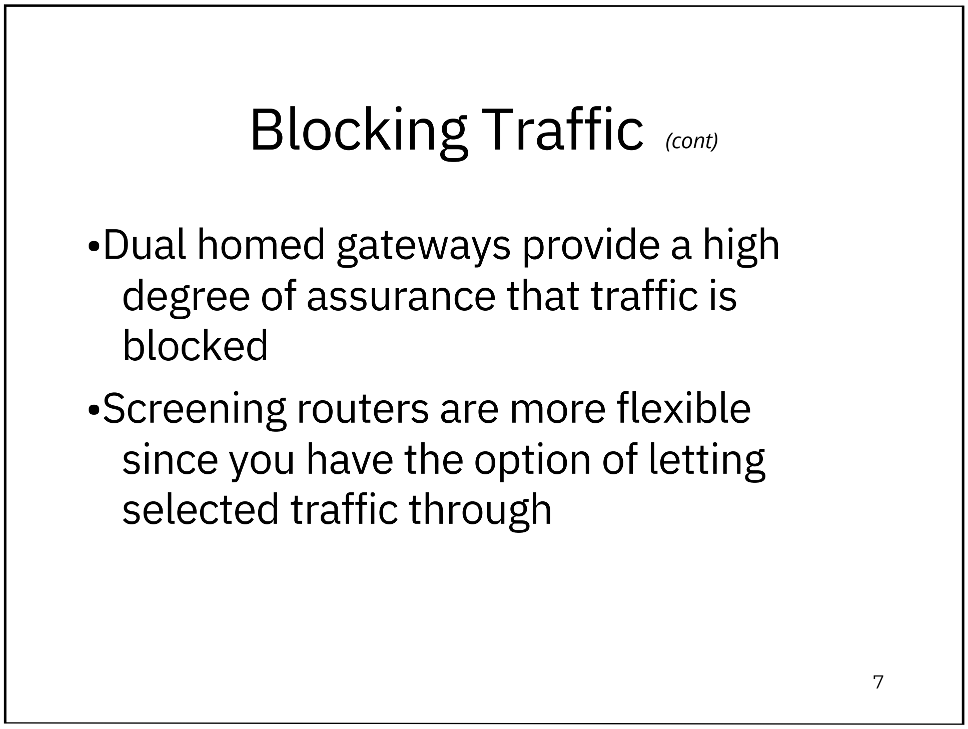
- Assumes that *something else* has managed blocking traffic or providing packet-level access control between networks

Blocking Traffic Between Networks

- Site policies may determine how traffic is blocked
- What *is* important is that traffic *is blocked* appropriately
- What *is not* important is *how* it's blocked

Blocking Traffic *(cont)*

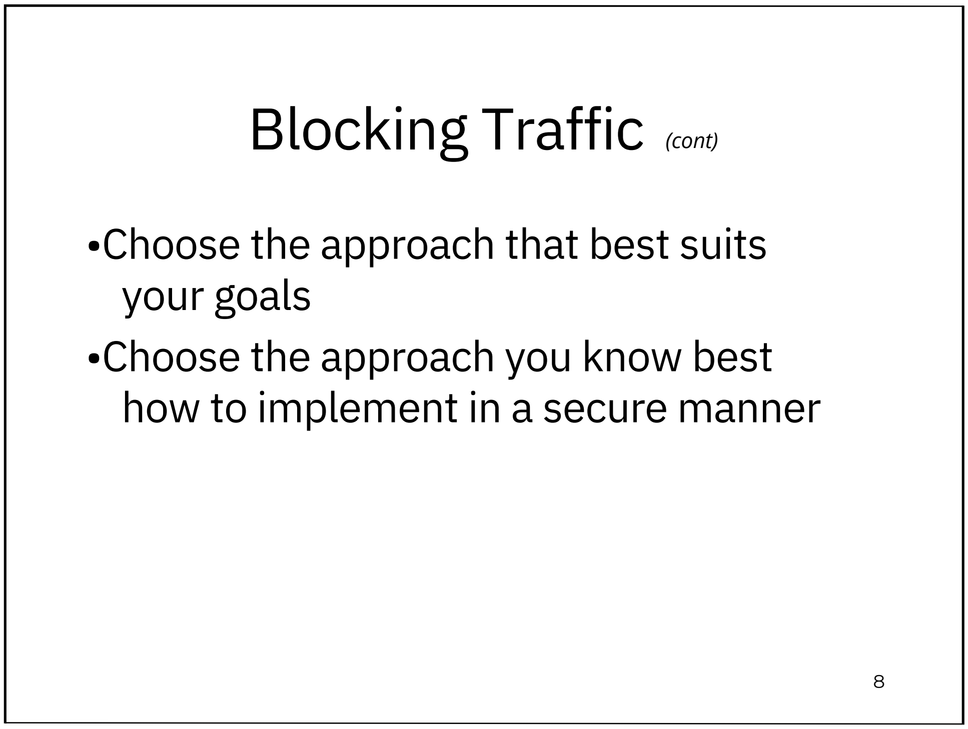
- May be a mixture of:
  - Screening via a router
  - Complete traffic blocking via disabling routing and forwarding
  - Other means
- Two preferred approaches:
  - Dual homed gateway
  - Screening router



Blocking Traffic *(cont)*

- Dual homed gateways provide a high degree of assurance that traffic is blocked
- Screening routers are more flexible since you have the option of letting selected traffic through

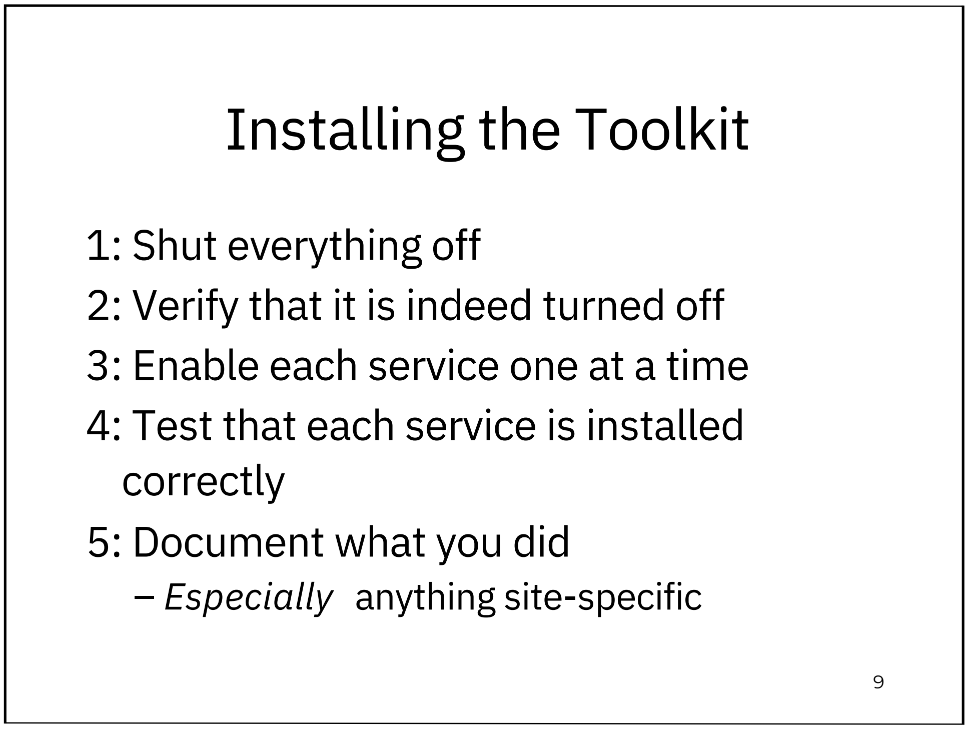
7



Blocking Traffic *(cont)*

- Choose the approach that best suits your goals
- Choose the approach you know best how to implement in a secure manner

8



Installing the Toolkit

1: Shut everything off

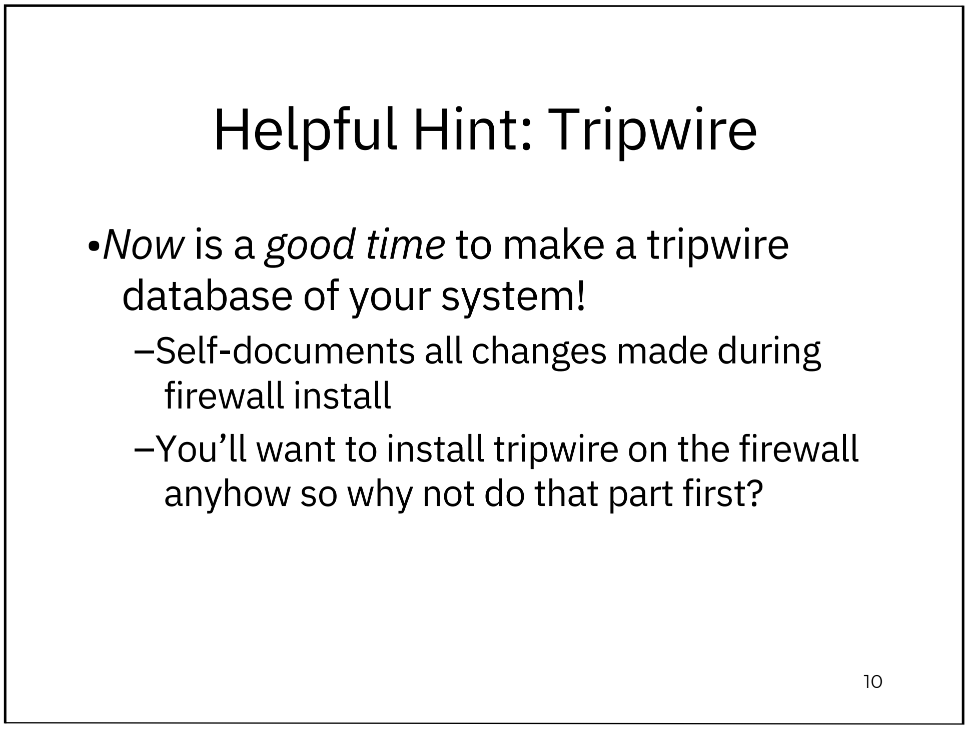
2: Verify that it is indeed turned off

3: Enable each service one at a time

4: Test that each service is installed correctly

5: Document what you did

- *Especially* anything site-specific

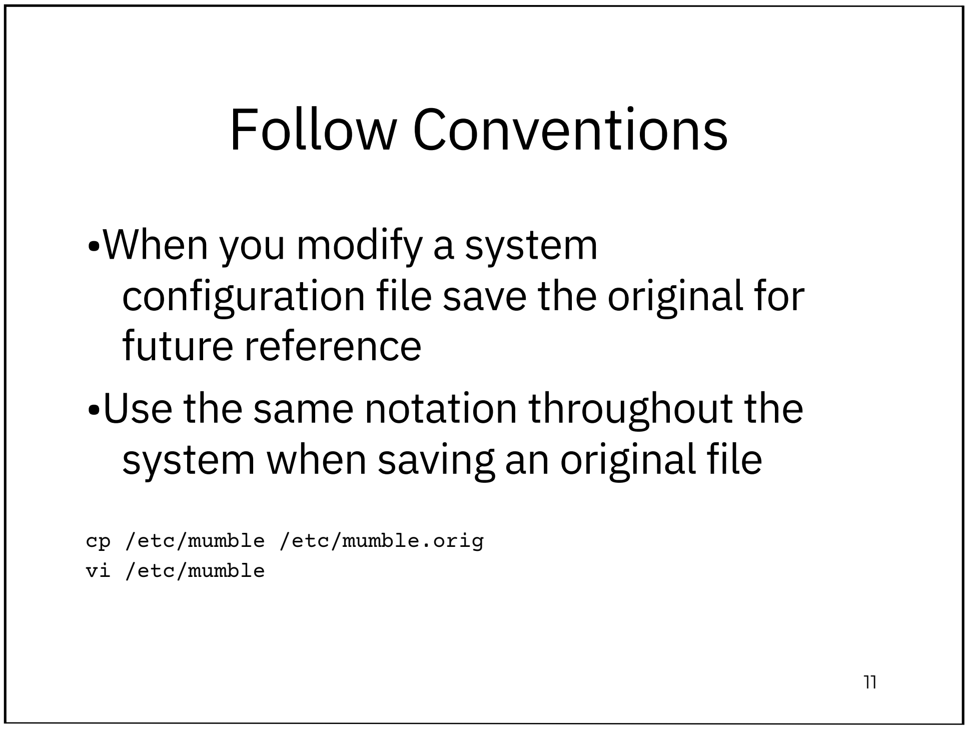


Helpful Hint: Tripwire

•*Now* is a *good time* to make a tripwire database of your system!

–Self-documents all changes made during firewall install

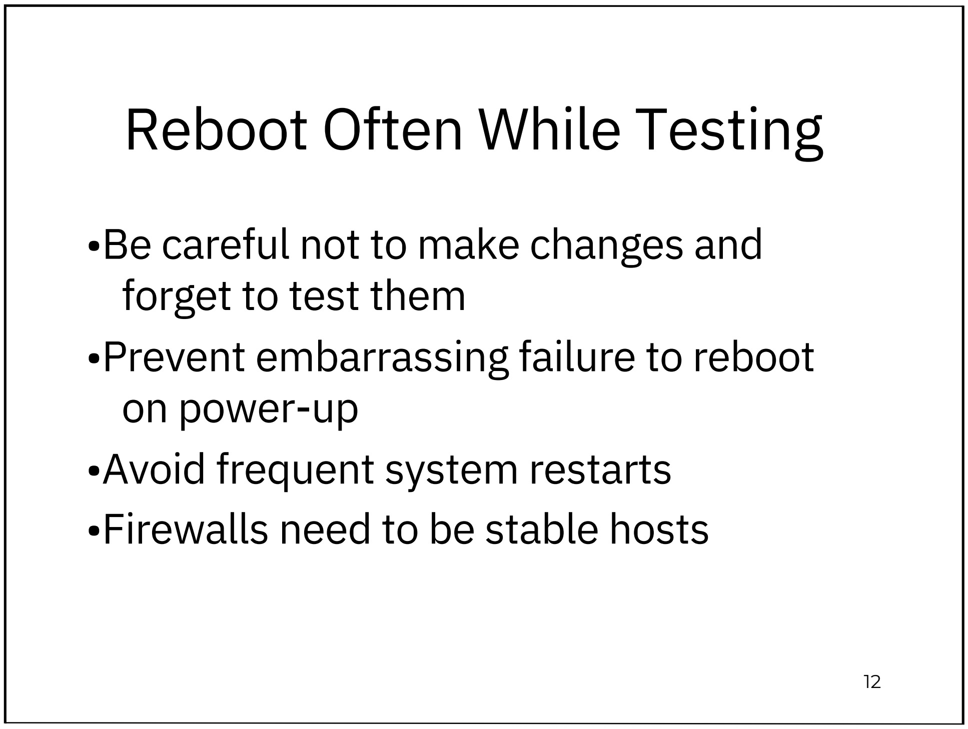
–You’ll want to install tripwire on the firewall anyhow so why not do that part first?



Follow Conventions

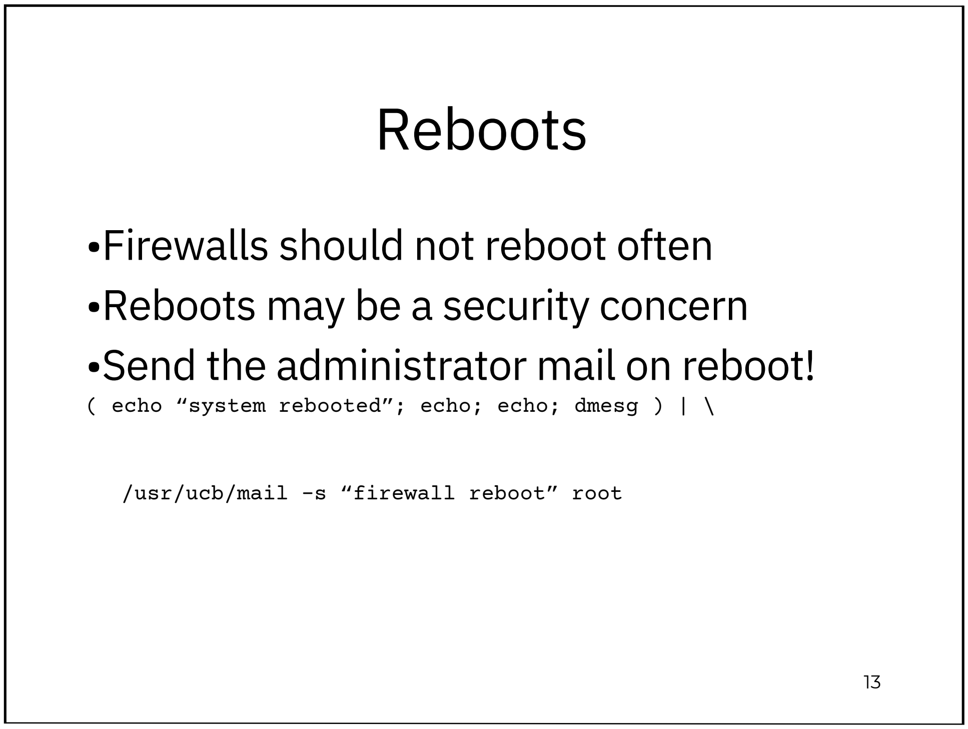
- When you modify a system configuration file save the original for future reference
- Use the same notation throughout the system when saving an original file

```
cp /etc/mumble /etc/mumble.orig
vi /etc/mumble
```



Reboot Often While Testing

- Be careful not to make changes and forget to test them
- Prevent embarrassing failure to reboot on power-up
- Avoid frequent system restarts
- Firewalls need to be stable hosts

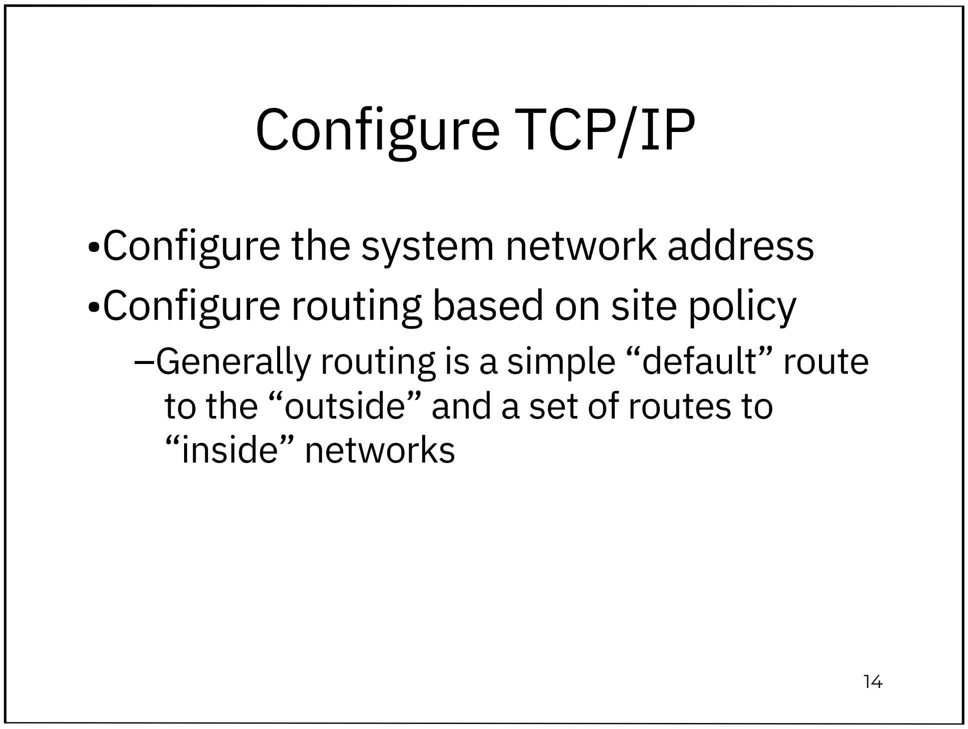


Reboots

- Firewalls should not reboot often
- Reboots may be a security concern
- Send the administrator mail on reboot!

```
( echo “system rebooted”; echo; echo; dmesg ) | \


   /usr/ucb/mail -s “firewall reboot” root
```



Configure TCP/IP

- Configure the system network address
- Configure routing based on site policy
  - Generally routing is a simple “default” route to the “outside” and a set of routes to “inside” networks

Adaptive Routing

- Adaptive routing
  - Trust only routes from routers belonging to your organization or your internet service provider
  - Prevent internal bozos from causing problems
  - *Gated* is good for tightly controlling routing

Gated

- Various levels of stability and complexity
- *Very* nice feature to restrict where to take routes from

```
rip yes {
        broadcast;
        interface 128.175.38.1 noripin;
};
```

Static Routing

- Static Routing
  - –Consider using static routing
  - –Static routed machines less likely to be affected by user error or misconfigured routers on internal or external networks
  - –Firewall routing should not change often

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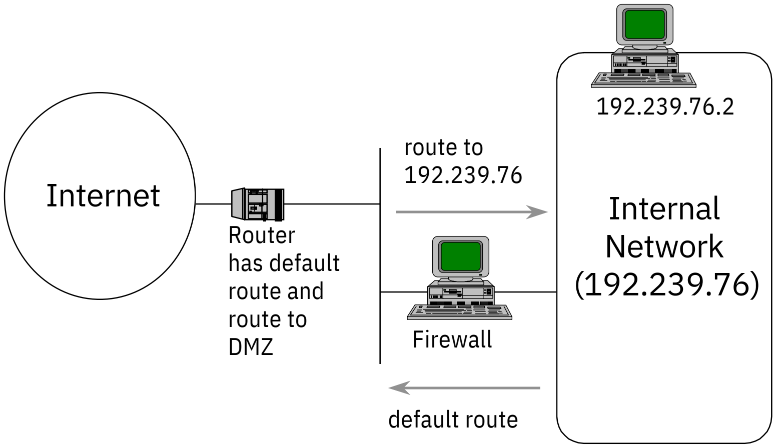
Typical Firewall Routing



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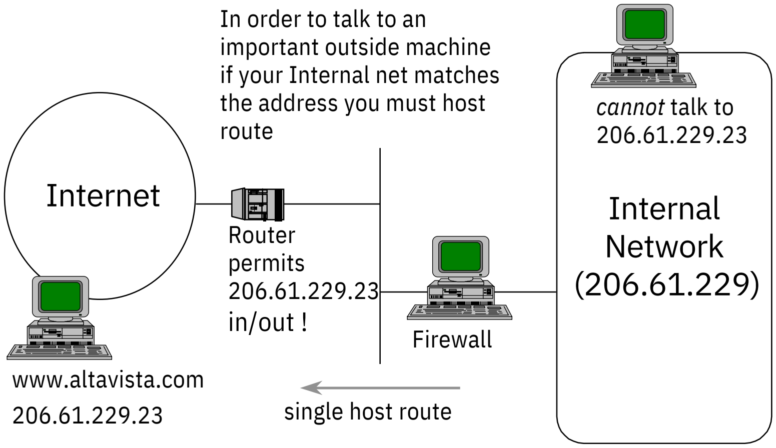
Nasty Routing

- If inside network address is non-assigned must use all static routes w/Internet
- If specific hosts on outside are worth talking to may need host routes
  - Can make router screening *extremely* ugly!

Nasty Routing *(cont)*



In order to talk to an important outside machine if your Internal net matches the address you must host route

cannot talk to 206.61.229.23

Internet

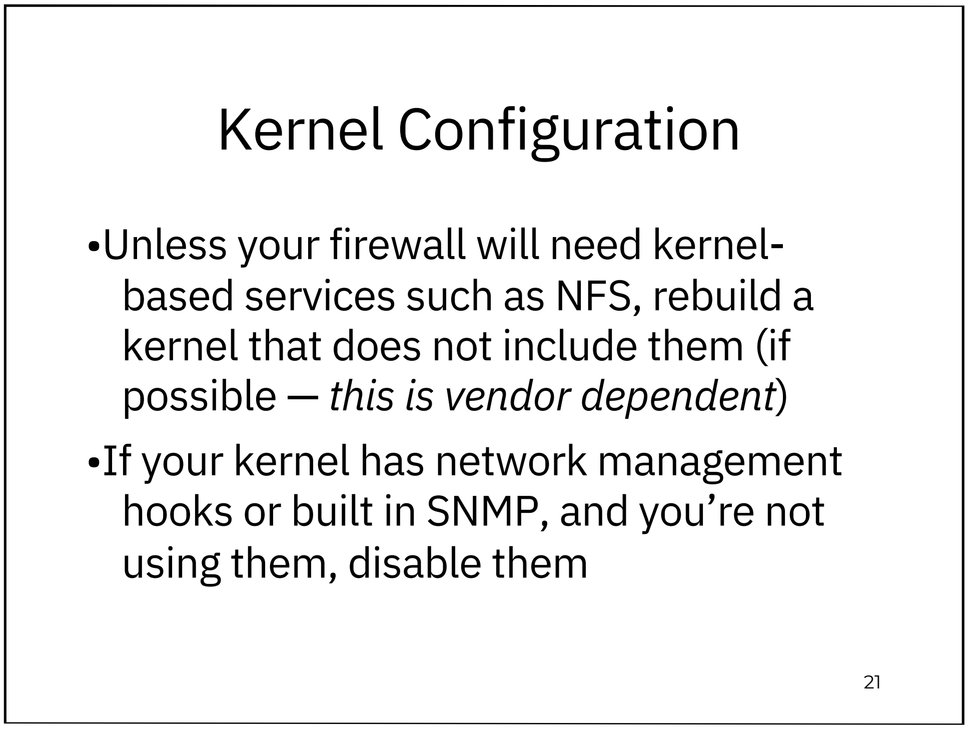
Router permits 206.61.229.23 in/out !

Firewall

Internal Network (206.61.229)

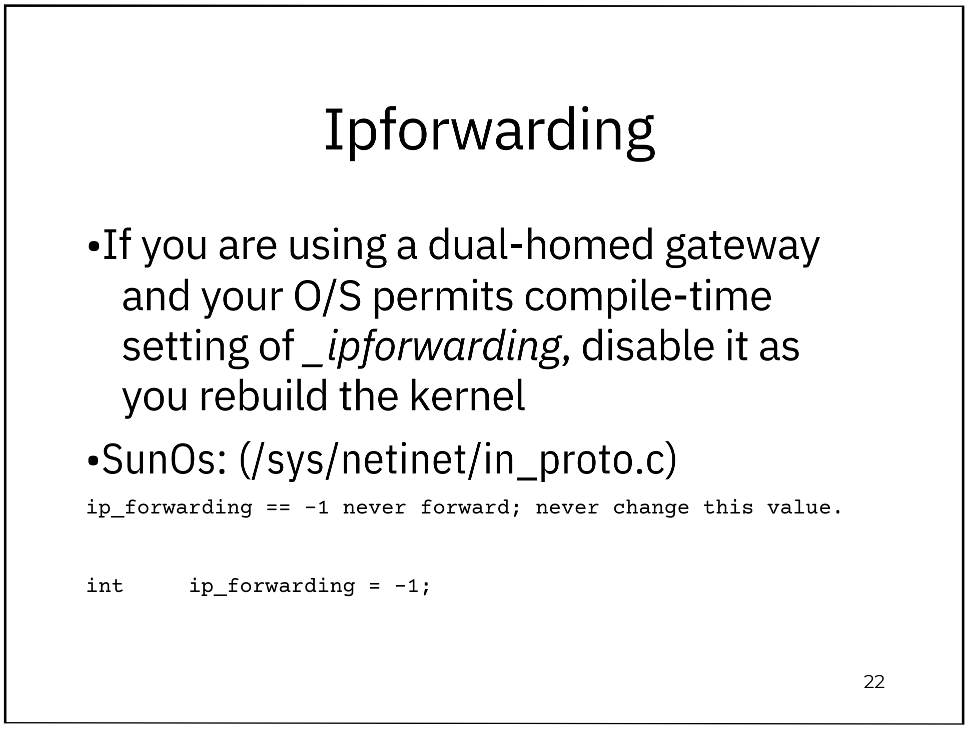
www.altavista.com 206.61.229.23

single host route



Kernel Configuration

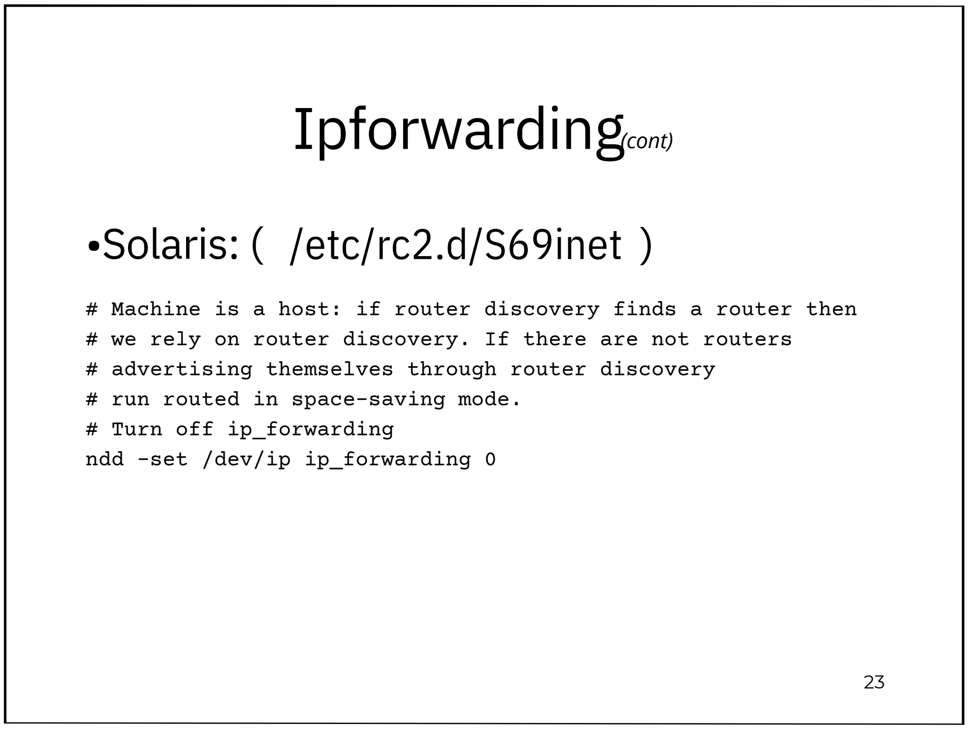
- Unless your firewall will need kernel-based services such as NFS, rebuild a kernel that does not include them (if possible — *this is vendor dependent*)
- If your kernel has network management hooks or built in SNMP, and you’re not using them, disable them



Ipforwarding

- If you are using a dual-homed gateway and your O/S permits compile-time setting of _*ipforwarding*, disable it as you rebuild the kernel
- SunOs: (/sys/netinet/in_proto.c)

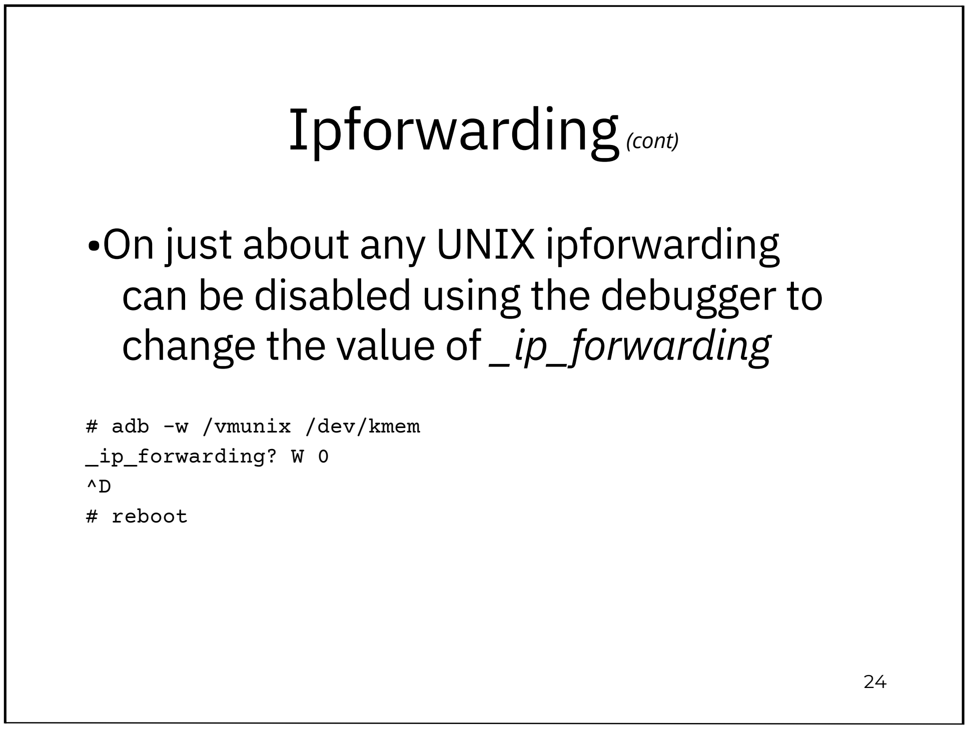
```
ip_forwarding == -1 never forward; never change this value.


int     ip_forwarding = -1;
```



Ipforwarding*(cont)*

- Solaris: (/etc/rc2.d/S69inet)

```
# Machine is a host: if router discovery finds a router then
# we rely on router discovery. If there are not routers
# advertising themselves through router discovery
# run routed in space-saving mode.
# Turn off ip_forwarding
ndd -set /dev/ip ip_forwarding 0
```



Ipforwarding *(cont)*

- On just about any UNIX ipforwarding can be disabled using the debugger to change the value of *_ip_forwarding*

```
# adb -w /vmunix /dev/kmem
_ip_forwarding? W 0
^D
# reboot
```

Server Processes

- Network service processes are generally started either at boot time or from service listeners such as *inetd*

Step 1: turn off boot time servers in *`/etc/rc.*`*

Step 2: turn off excess servers from */etc/inetd.conf*

Server Processes *(cont)*

Step 3: check the process table using the *ps* command

Step 4: check network sockets using the *netstat* command

Step 5: if there are still un-accounted-for processes running, return to Step 1

Boot Time Servers

- Servers started in */etc/rc**
  - –NFS client mounts (comment them out)
  - –Accounting (optional)
  - –Inetd (*leave this one running*)
  - –Lpd (comment it out)
- Consider starting with a bare slate

Boot Time Servers *(cont)*

- Servers started in */etc/rc.local*
  - –Biod (comment them out) –Nfsd (comment them out) –Mountd (comment it out)
  - –Syslogd (*leave this one running*)
  - –Portmapper (comment it out) –Sendmail (comment it out for now, we'll fix

    it later)

Boot Time Servers (cont)

- If a server process is running find out what it does
  - Check the manual
  - Determine if it is necessary to the operation of the system
- If shutting it off doesn't hurt, it wasn't necessary

A Bare Process Table

- Examining the process table should show just about nothing running on the bastion host (for now)

```
# ps -ax
 PID TT STAT TIME COMMAND
2:46 swapper
   0 ? D
0:29 /sbin/init -
   1 ? S
0:12 pagedaemon
   2 ? D
   63 ? S      18:19 syslogd
   77 ? I      89:07 update
   80 ? IW      3:55 cron
   82 ? S       2:24 inetd
  2014  co  IW  0:00 -sh
87 b IW         0:00 - std.19200 ttyb (getty)
 2228 co R      0:00 ps -ax
#
```

Netstat Output

```
% netstat -a
Active Internet connections (including servers)
Proto Recv-Q Send-Q Local Address       Foreign Address    (state
tcp        0      0 *.chargen           *.*                )
tcp        0      0 *.daytime           *.*                LISTEN
tcp        0      0 *.discard           *.*                LISTEN
tcp        0      0 *.echo              *.*                LISTEN
tcp        0      0 *.time              *.*                LISTEN
tcp        0      0 *.smtp              *.*                LISTEN
tcp        0      0 *.finger            *.*                LISTEN
tcp        0      0 *.telnet            *.*                LISTEN
tcp        0      0 *.ftp               *.*                LISTEN
udp        0      0 *.syslog            *.*                LISTEN
udp        0      0 *.chargen           *.*
udp        0      0 *.daytime           *.*
udp        0      0 *.discard           *.*
udp        0      0 *.echo              *.*
udp        0      0 *.time              *.*

Active UNIX domain sockets
Address   Type Recv-Q Send-Q Vnode Conn      Refs Nextref Addr
f70930c  dgram      0   0             0       0    0
f70808c dgram       0   0     f0cbc4 0        0    0    /dev/log
```

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Restricting Root Login

- •Root login should be restricted to console
- •Administrators accessing system over network should log in with their login then “su” to root
- •Consider using STEL or SSH for encrypted over the network firewall admin login

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Restricting Root Login *(cont)*

- */etc/ttytab* lists what terminals root can log in on with a “secure” flag

```
#
# @(#)ttytab 1.7 92/06/23 SMI
# name getty                        type sun        status  comments
console "/usr/etc/getty cons8"      unknown         on  local  secure
ttya    "/usr/etc/getty  std.9600"  unknown         off local secure
ttyb    "/usr/etc/getty  std.9600"  unknown         off local secure
tty00   "/usr/etc/getty std.9600"                   off local secure
```

- Delete all “secure” entries except “console”

Unpacking the Toolkit Sources

- Toolkit files are available for FTP from

  ftp.tis.com, in *pub/firewalls/toolkit*
- Toolkit sources come in two files

–*fwtk.tar.Z* - Toolkit source code

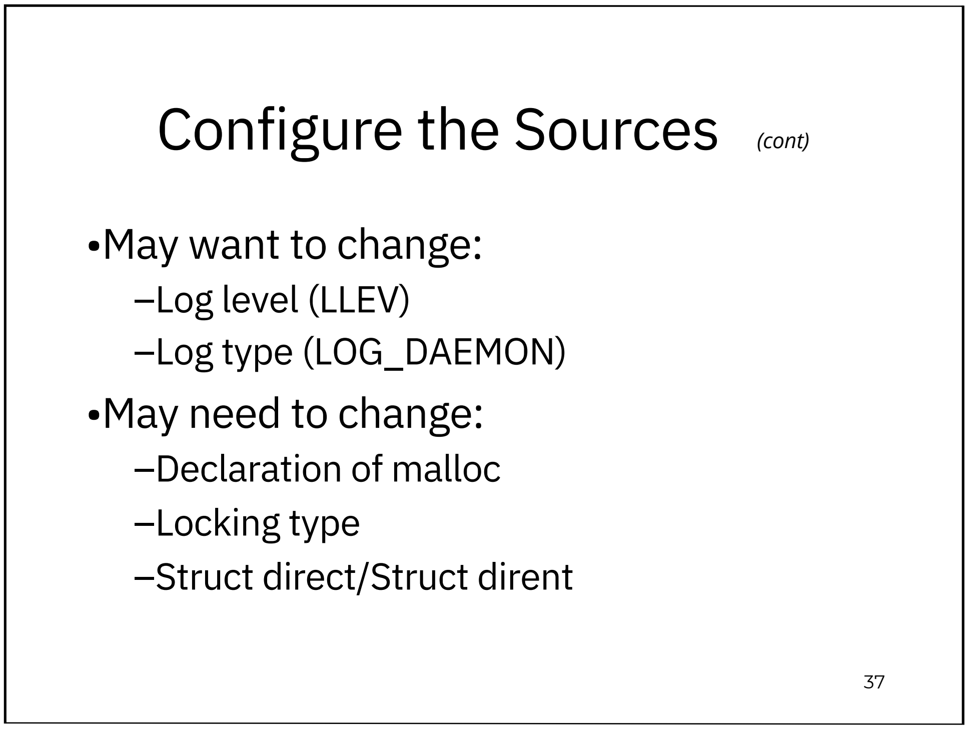
–*fwtk-doc-only.tar.Z* - Documentation (PostScript format)

Configure the Sources

- Master configuration file is *firewall.h*
  - Isolates system dependencies
  - Sets some default values
- *firewall.h* is already tailored for most BSD systems
- Some System V versions of UNIX require changes to Makefiles
  - See “fixmake”

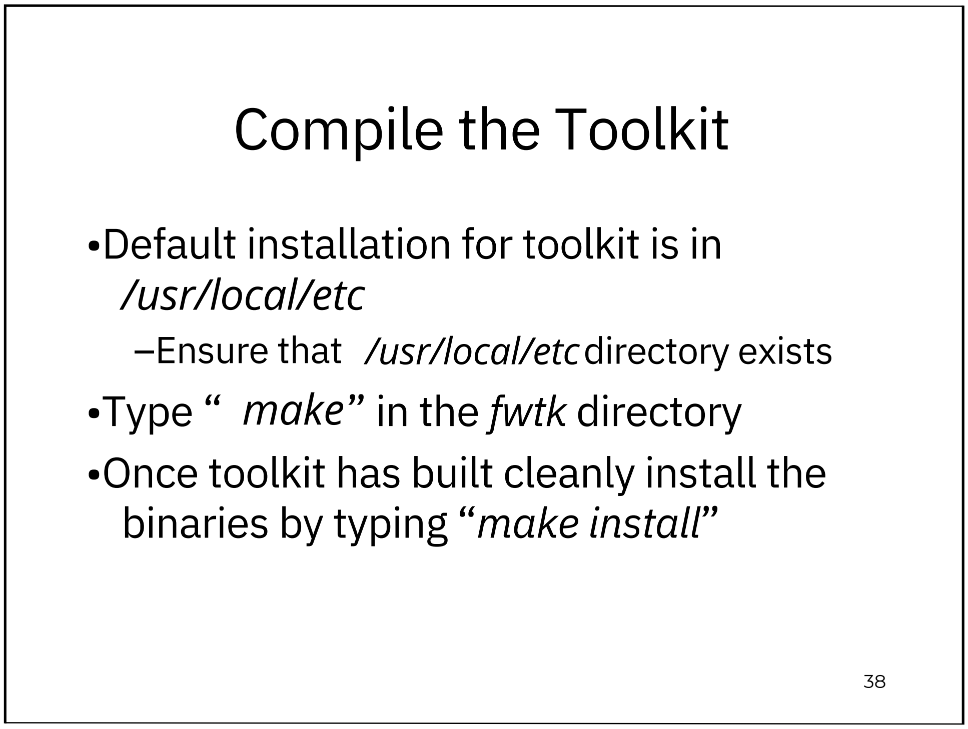
Configure the Sources *(cont)*

- Authentication options are configured in *auth.h*
  - Must be edited in conjunction with authentication library Makefile *auth/Makefile* to reflect supported forms of authentication
  - Default authentication mode is plaintext passwords — plaintext passwords are not adequate for network use



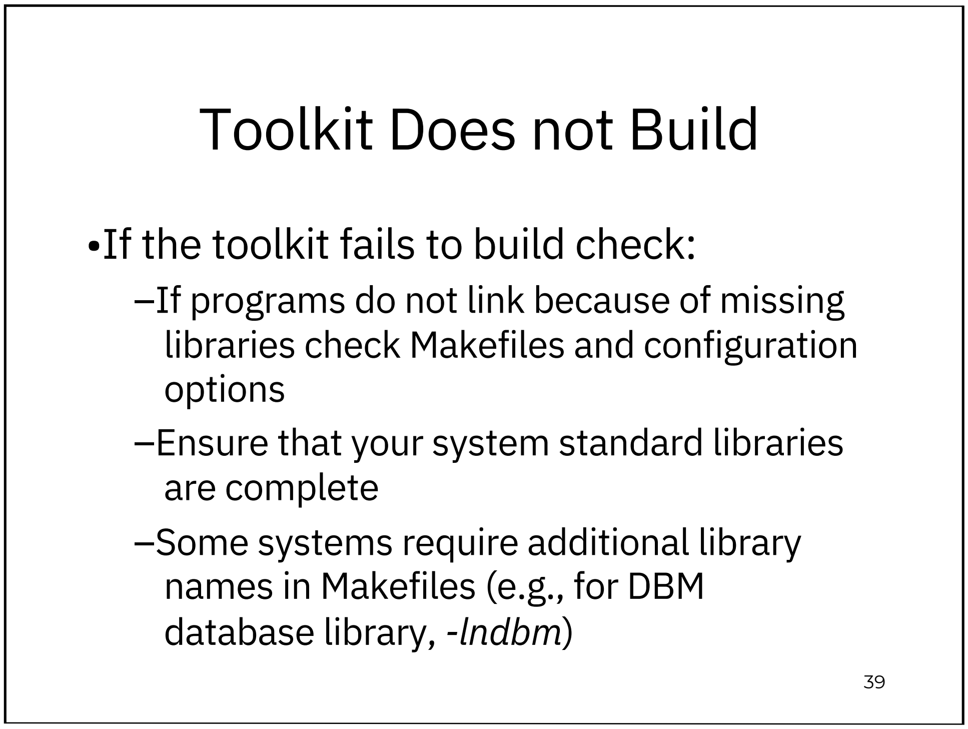
Configure the Sources *(cont)*

- May want to change:
  - Log level (LLEV)
  - Log type (LOG_DAEMON)
- May need to change:
  - Declaration of malloc
  - Locking type
  - Struct direct/Struct dirent



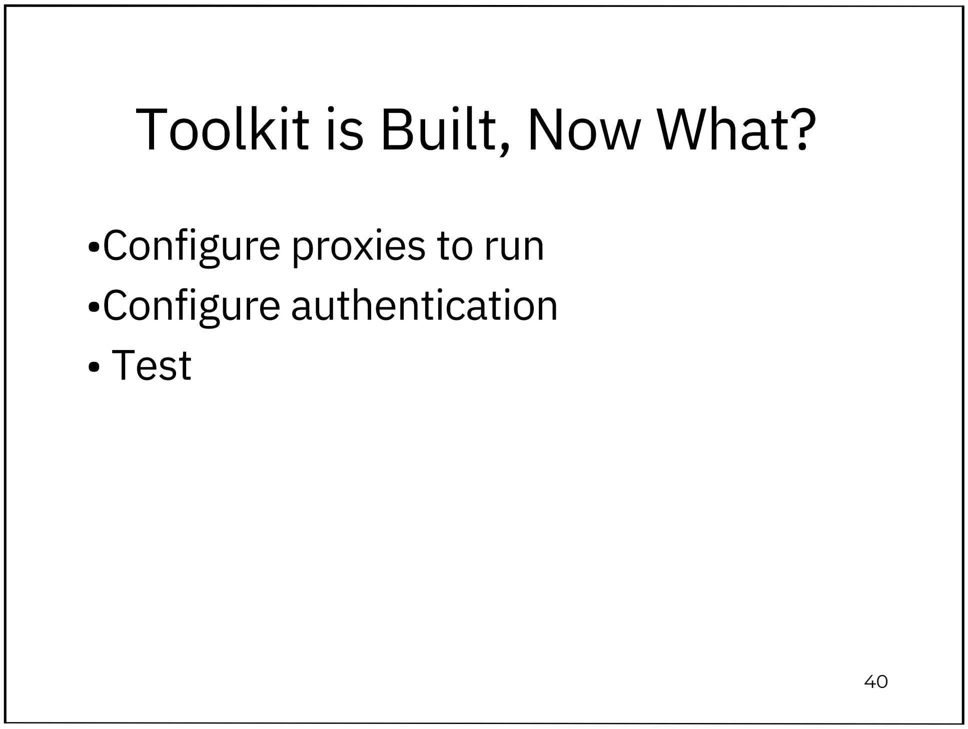
Compile the Toolkit

- Default installation for toolkit is in */usr/local/etc*
  - Ensure that */usr/local/etc* directory exists
- Type “ *make*” in the *fwtk* directory
- Once toolkit has built cleanly install the binaries by typing “*make install*”



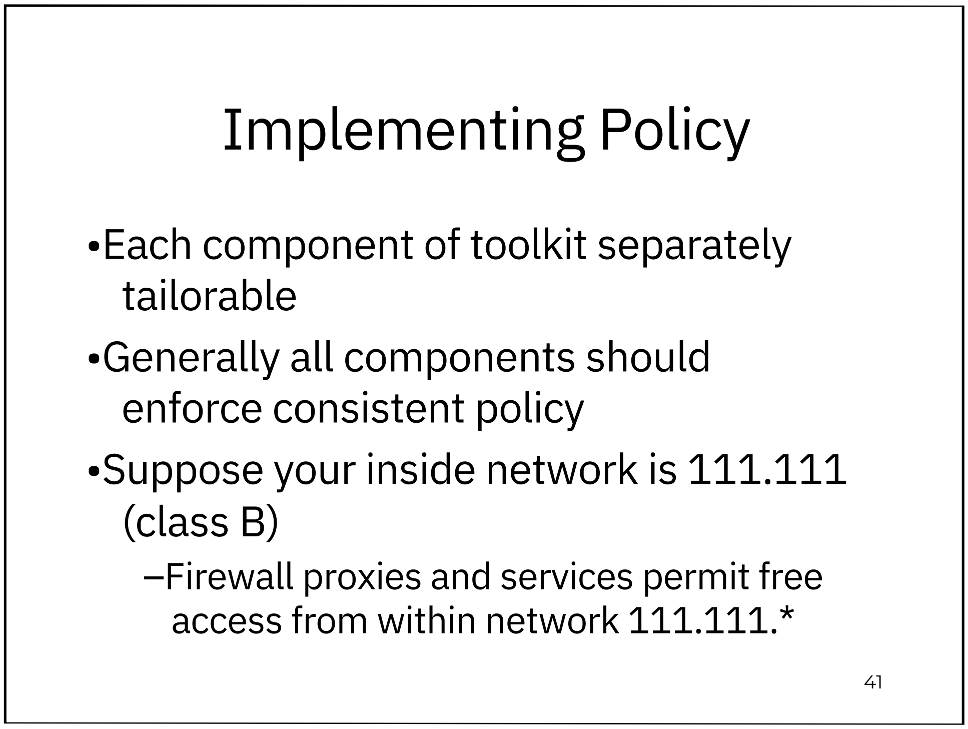
Toolkit Does not Build

- If the toolkit fails to build check:
  - –If programs do not link because of missing libraries check Makefiles and configuration options
  - –Ensure that your system standard libraries are complete
  - –Some systems require additional library names in Makefiles (e.g., for DBM database library, *-lndbm*)



Toolkit is Built, Now What?

- Configure proxies to run
- Configure authentication
- Test



Implementing Policy

- Each component of toolkit separately tailorable
- Generally all components should enforce consistent policy
- Suppose your inside network is 111.111 (class B)
  - Firewall proxies and services permit free access from within network 111.111.*

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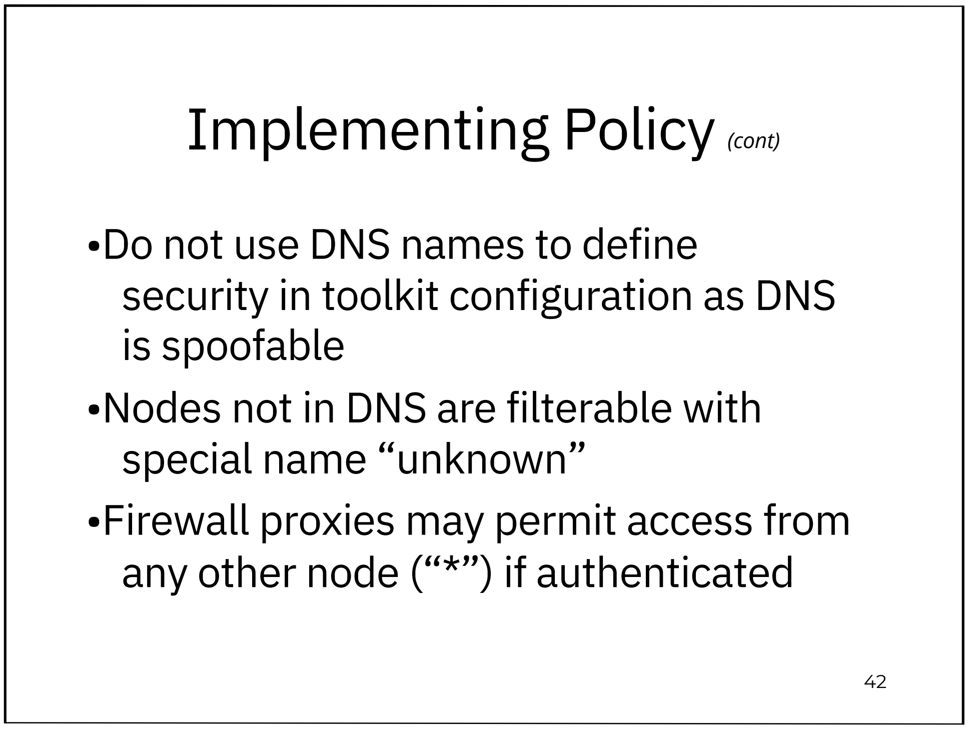

Implementing Policy *(cont)*

- Do not use DNS names to define security in toolkit configuration as DNS is spoofable
- Nodes not in DNS are filterable with special name “unknown”
- Firewall proxies may permit access from any other node (“*”) if authenticated

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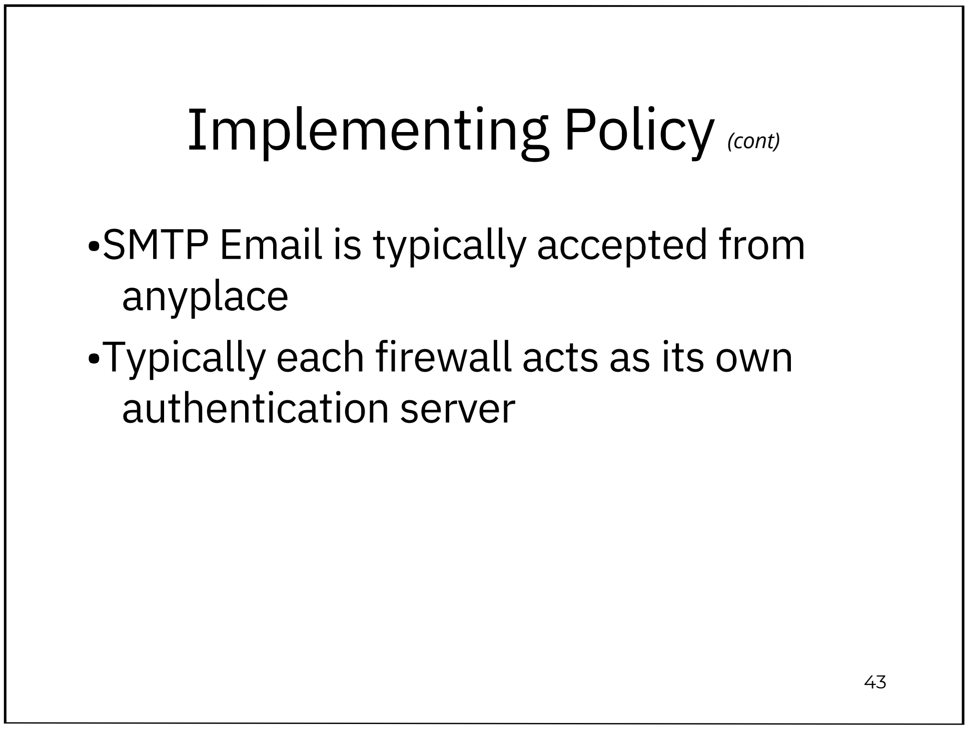
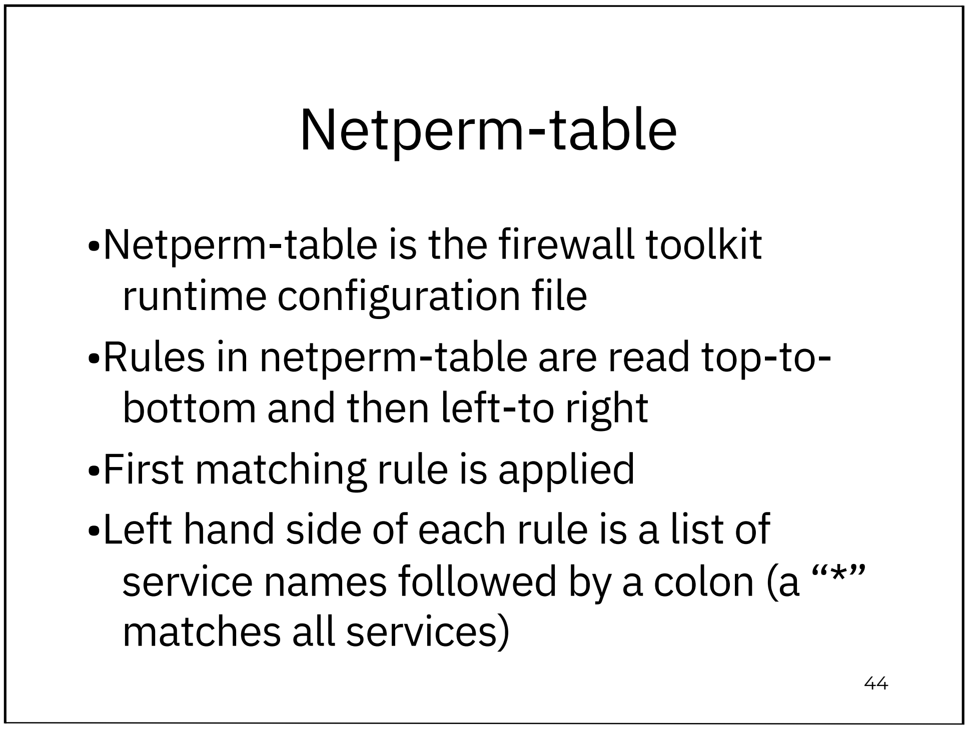


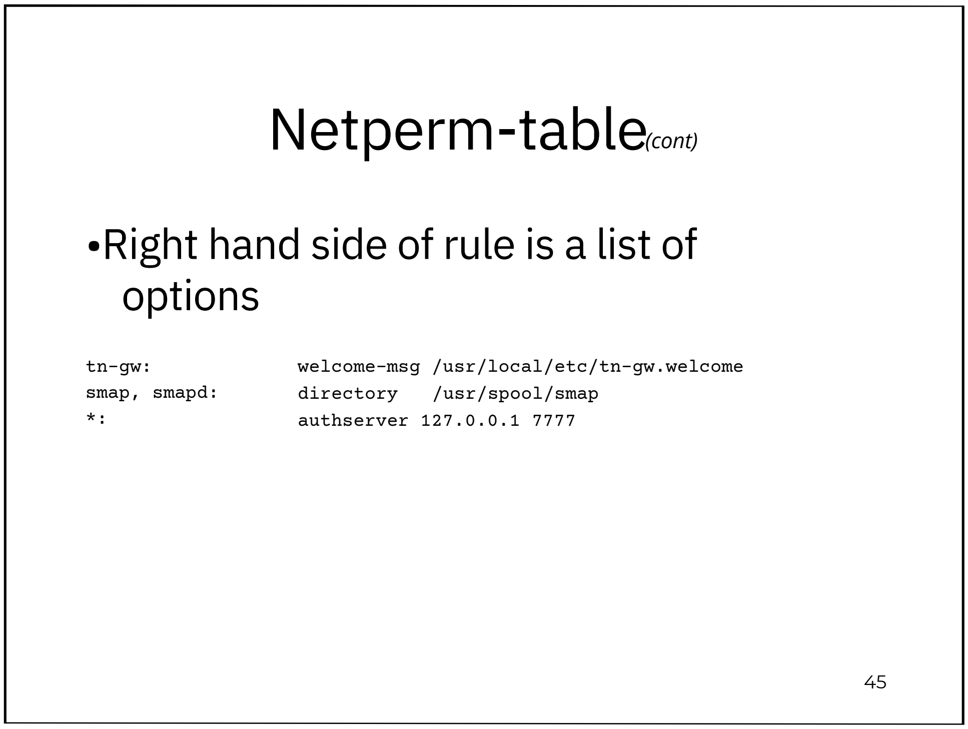
Implementing Policy *(cont)*

- SMTP Email is typically accepted from anyplace
- Typically each firewall acts as its own authentication server



Netperm-table

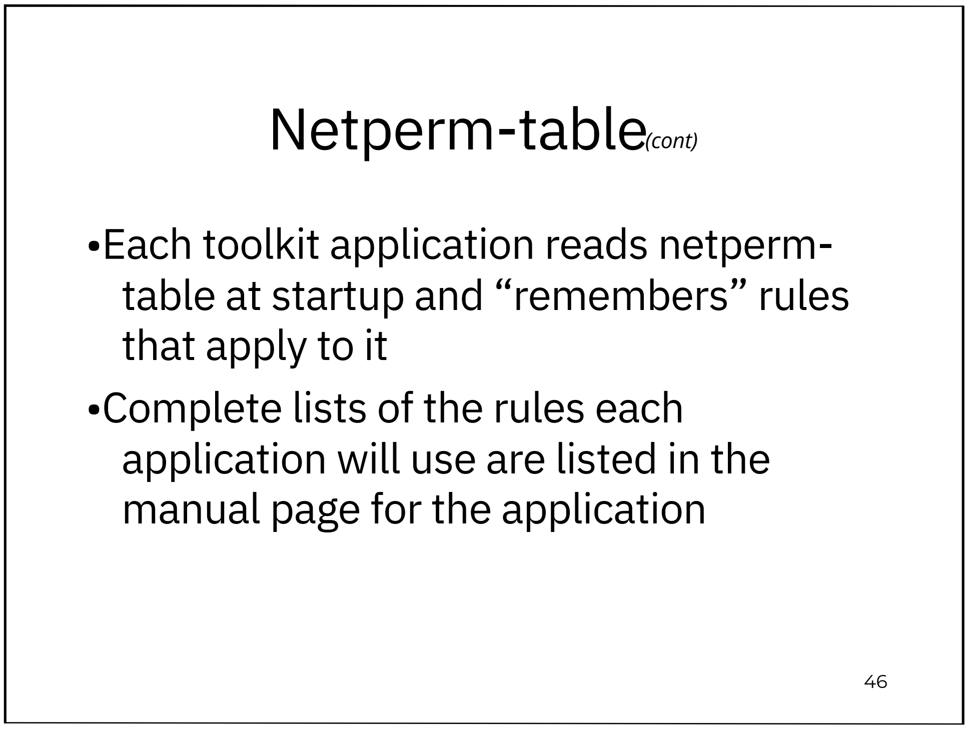
- Netperm-table is the firewall toolkit runtime configuration file
- Rules in netperm-table are read top-to-bottom and then left-to right
- First matching rule is applied
- Left hand side of each rule is a list of service names followed by a colon (a “*” matches all services)



Netperm-table*(cont)*

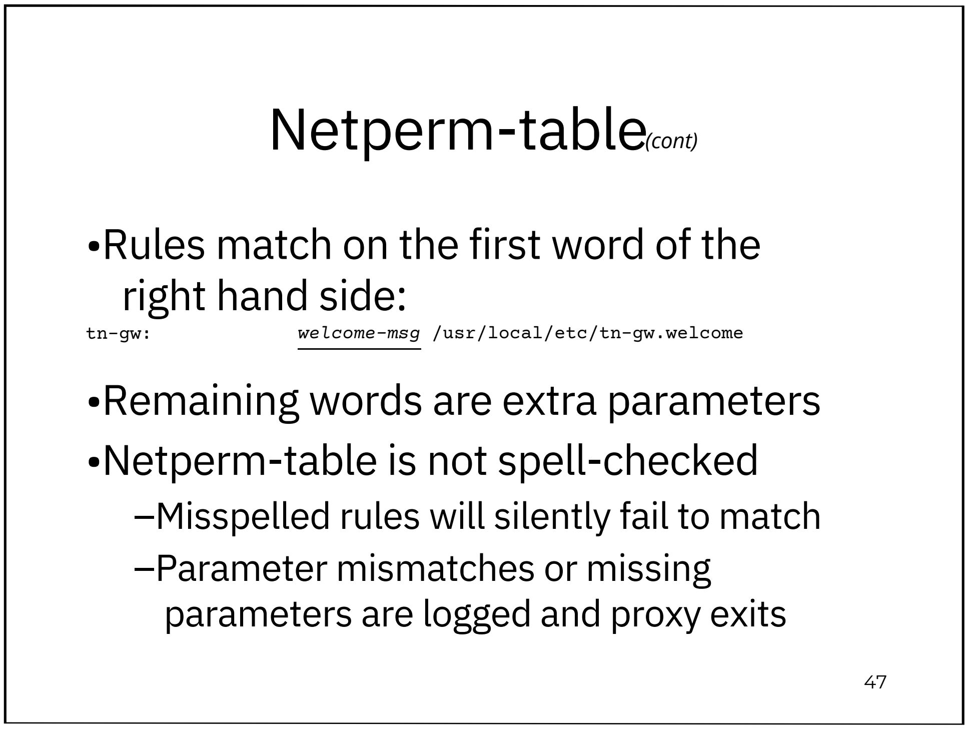
- Right hand side of rule is a list of options

```
tn-gw:            welcome-msg /usr/local/etc/tn-gw.welcome
smap, smapd:      directory   /usr/spool/smap
*:                authserver 127.0.0.1 7777
```



Netperm-table*(cont)*

- Each toolkit application reads netperm-table at startup and “remembers” rules that apply to it
- Complete lists of the rules each application will use are listed in the manual page for the application



Netperm-table*(cont)*

- •Rules match on the first word of the right hand side:

```
tn-gw:              welcome-msg /usr/local/etc/tn-gw.welcome
```

- •Remaining words are extra parameters
- •Netperm-table is not spell-checked
  - –Misspelled rules will silently fail to match
  - –Parameter mismatches or missing parameters are logged and proxy exits

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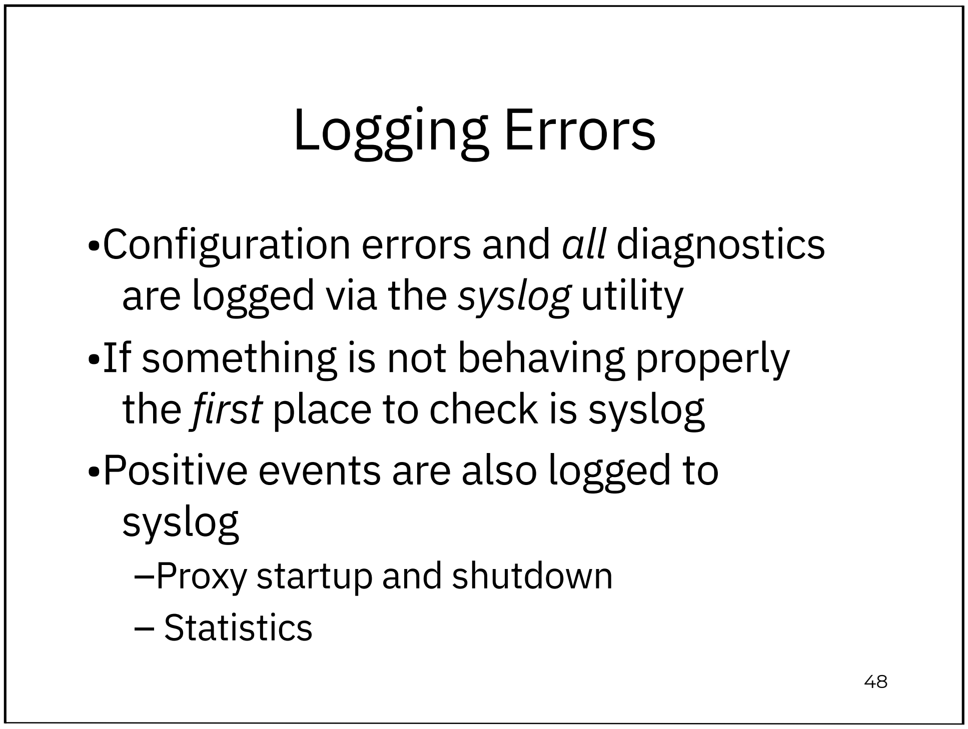

Logging Errors

- •Configuration errors and *all* diagnostics are logged via the *syslog* utility
- •If something is not behaving properly the *first* place to check is syslog
- •Positive events are also logged to syslog
  - –Proxy startup and shutdown
  - – Statistics

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Logging Errors *(cont)*

- Administrators may wish to install shell scripts to summarize event logs or to flag warnings
  - –Toolkit includes log reducers in “tools/admin/reporting”
- While installing the toolkit have all log messages directed to the console

```
# tail -f /usr/adm/messages &
```

Proxies

- Toolkit proxies (V1.3) assumed to be invoked from *inetd*
  - For high volume sites *inetd* may overload and shut down service
    - –More than 40 times/second causes “server failing, looping” message in syslog
    - –Inetd stops listening on port
    - –Newer version of toolkit will fix

Proxies *(cont)*

- Each proxy:
  - –Starts and reads netperm-table
  - –Checks client IP address and permissions
  - –Logs the connection
  - –Performs transactions on user’s behalf
  - –Logs the transactions
  - –Logs transaction summary
  - – Exits

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/etc/inetd.conf (for a toolkit firewall)

```
# Time service is used for clock syncronization by folks to lazy to use NTP
time               stream tcp nowait root   interna
time            dgram   udp wait    root    l
                                            interna
# Echo, discard, daytime, and chargen are used primarily for testing.
                                            l
echo  echo         stream tcp nowait root   interna
discard         dgram   udp wait     root   l
discard            stream tcp nowait root   interna
daytime         dgram   udp wait     root   l
daytime            stream tcp nowait root   interna
chargen         dgram   udp wait     root   l
chargen  #         stream tcp nowait root   interna
Wrappers        dgram   udp wait    root    l
ftp                                         interna
telnet                                      l
                stream  tcp  nowait  root  stream tcp nowait root
                                            /usr/local/etc/netacl        in.ftpd
login                                       interna
                stream  tcp  nowait  root  stream tcp nowait nobody
                                            /usr/local/etc/netacl        in.telnetd
finger                                      l
                /usr/local/etc/netacl       /usr/local/etc/netacl        in.rlogind
smtp nntp                                   interna
                                                                         in.fingerd
                                            l
                                                                         smap   plug-
                stream  tcp  nowait  root   /usr/local/etc/smap
                                            interna
                                                                         gw nntp
                stream tcp nowait root      /usr/local/etc/plug-gw
                                            l
# Authentication Server
auth            stream tcp nowait root      /usr/local/etc/authsrv       authsrv
```

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/etc/inetd.conf (alternate form)

```
# Time service is used for clock syncronization by folks to lazy to use NTP
time               stream tcp nowait root   interna
time            dgram   udp wait    root    l
                                            interna
# Echo, discard, daytime, and chargen are used primarily for testing.
                                            l
echo  echo         stream tcp nowait root   interna
discard         dgram   udp wait     root   l
discard            stream tcp nowait root   interna
daytime         dgram   udp wait     root   l
daytime            stream tcp nowait root   interna
chargen         dgram   udp wait     root   l
chargen  #         stream tcp nowait root   interna
Wrappers        dgram   udp wait    root    l
ftp                                         interna
telnet                                      l
                stream  tcp  nowait  root  stream tcp nowait root
                                            /usr/local/etc/ftp-gw          ftp-gw
login                                       interna
                stream  tcp  nowait  root  stream tcp nowait nobody
                                            /usr/local/etc/tn-gw           tn-gw
finger                                      l
                /usr/local/etc/netacl       /usr/local/etc/rlogin-gw       rlogin-gw
smtp nntp                                   interna
                                            l                              in.fingerd
                stream  tcp  nowait  root   /usr/local/etc/smap            smap
                                            interna
                stream tcp nowait root      /usr/local/etc/plug-gw         plug-gw nntp
                                            l
# Authentication Server
auth            stream tcp nowait root      /usr/local/etc/authsrv         authsrv
```

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Netacl: a TCP wrapper

- Front end “TCP wrapper” to control

  access to TCP-based services
  - General-purpose
  - Does not support UDP-based services
- You can use *tcp_wrappers* instead
- Process started by *inetd* replaces real server process

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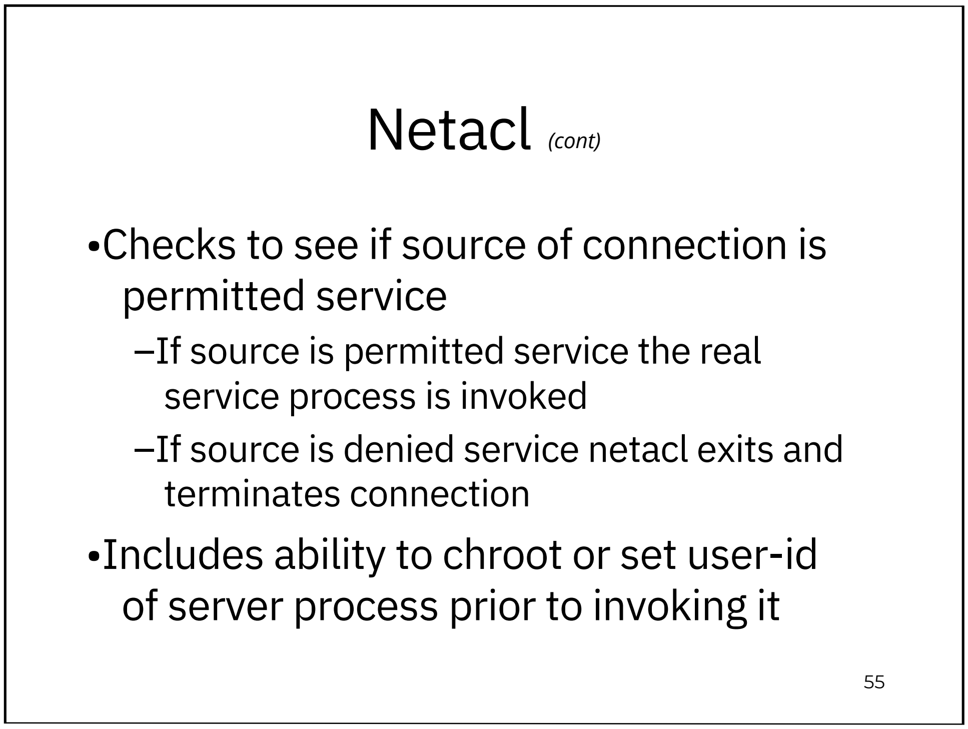
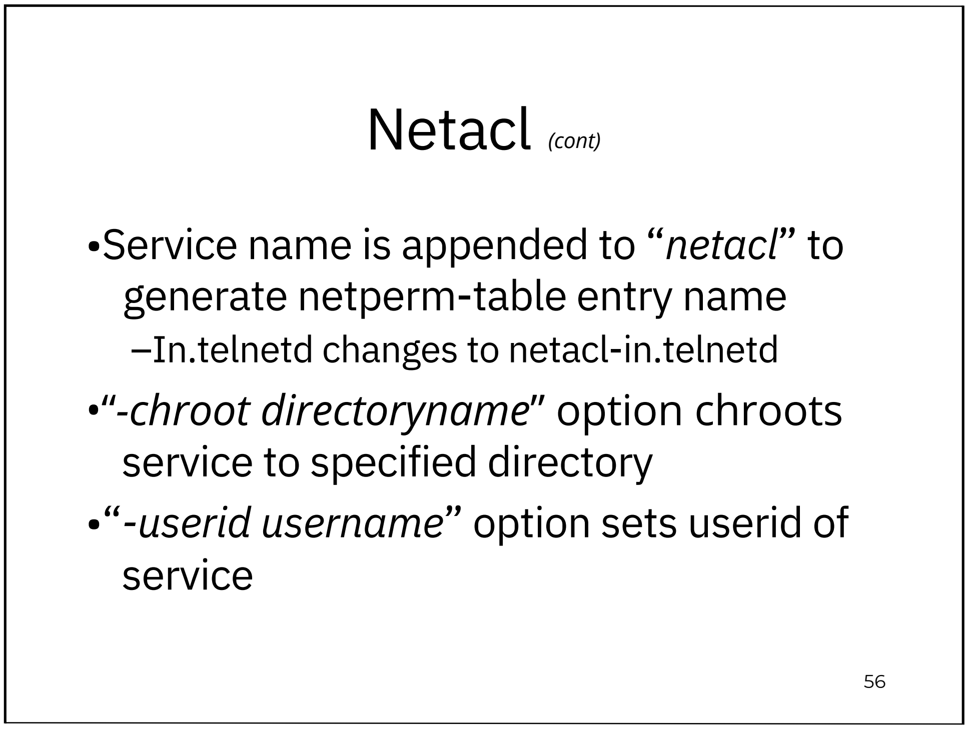


Netacl *(cont)*

- Checks to see if source of connection is permitted service
  - If source is permitted service the real service process is invoked
  - If source is denied service netacl exits and terminates connection
- Includes ability to chroot or set user-id of server process prior to invoking it



Netacl *(cont)*

- Service name is appended to “*netacl*” to generate netperm-table entry name
  - In.telnetd changes to netacl-in.telnetd
- “*-chroot directoryname*” option chroots service to specified directory
- “*-userid username*” option sets userid of service

Netacl *(cont)*

- “*-exec [options]*” must be last entry and specified server to invoke and its arguments
- Sample netacl rules

```
netacl-in.ftpd: permit-hosts 111.111.* -exec /usr/etc/in.ftpd
netacl-in.ftpd: permit-hosts unknown -exec /bin/cat /usr/local/etc/noftp.txt
netacl-in.ftpd: permit-hosts * -chroot /home/ftp -exec /bin/ftpd -f -l
netacl-in.fingerd: permit-hosts 111.111.* -exec /usr/etc/in.fingerd
netacl-in.fingerd: permit-hosts * -exec /bin/cat /usr/local/etc/finger.txt
```

TN-Gw: Telnet Proxy

- The first “permit-hosts” says the inside network is OK to use the proxy and that users may change passwords from there as it is a trusted network
- The second “permit-hosts” says any other host is OK to use the proxy if they authenticate first

TN-Gw *(cont)*

- Other rules define the command prompt and a welcome message

```
tn-gw:            prompt 'telnet proxy> '
tn-gw:            authserver 127.0.0.1 7777
tn-gw:            welcome-msg /usr/local/etc/tn-gw.welcome
tn-gw:            permit-hosts 111.111.* -passok -xok
tn-gw:            permit-hosts * -auth
```

Rlogin-Gw: Rlogin Proxy

- The first “permit-hosts” says the inside network is OK to use the proxy and that users may change passwords from there as it is a trusted network
- The second “permit-hosts” says any other host is OK to use the proxy if they authenticate first

Rlogin-Gw *(cont)*

- Other rules define the command prompt and a welcome message

```
rlogin-gw:          prompt 'telnet> '
rlogin-gw:          authserver 127.0.0.1 7777
rlogin-gw:          welcome-msg /usr/local/etc/tn-gw.welcome
rlogin-gw:          permit-hosts 111.111.* -passok -xok
rlogin-gw:          permit-hosts * -auth
```

FTP-Gw: FTP Proxy

- The first “permit-hosts” says the inside network is OK to use the proxy and that users may change passwords from there as it is a trusted network
- The second “permit-hosts” says any other host is OK to use the proxy if they authenticate first

FTP-Gw *(cont)*

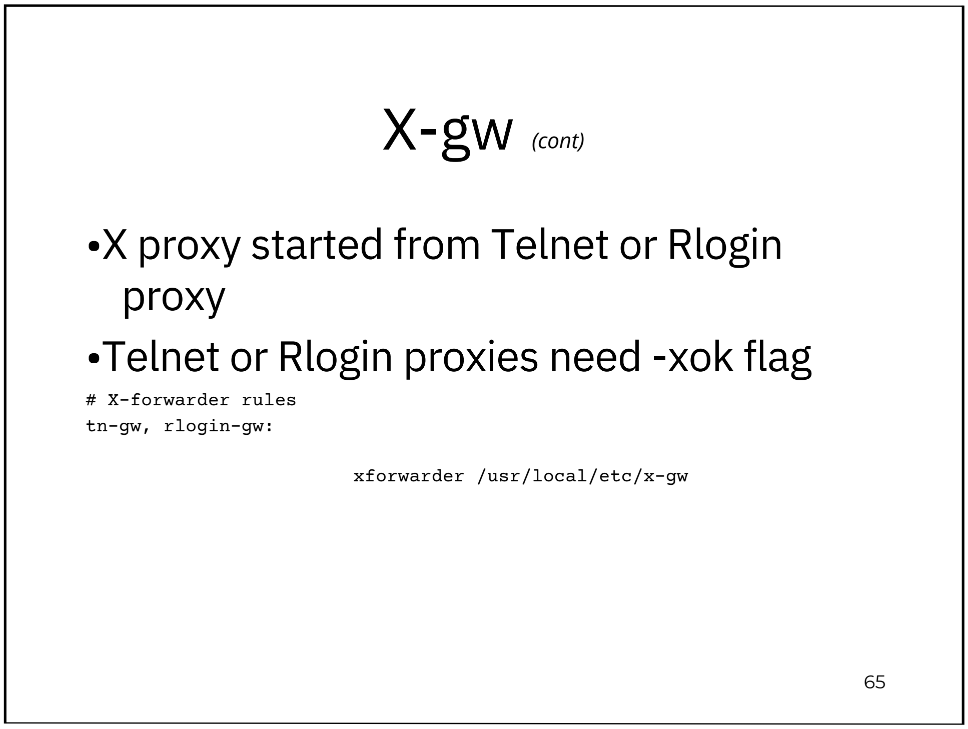
- The *“-log { stor retr }”* option on the last rule causes file transfer filenames with “outside” to be logged

```
ftp-gw:            authserver 127.0.0.1 7777
ftp-gw:            welcome-msg /usr/local/etc/ftp-gw.welcome
ftp-gw:            permit-hosts 111.111.*
ftp-gw:            permit-hosts * -authall -log { stor retr }
```

- Ftp-gw mostly obsoleted by Web

X-gw: X11 Proxy

- Requires a user to manually “OK” connections to X server through firewall
  - Creates virtual X server on firewall
  - User sets DISPLAY=firewall:somenumber
  - Starts X application
  - Answers “OK” or not “OK” to proxy popup
  - Can shut down proxy anytime

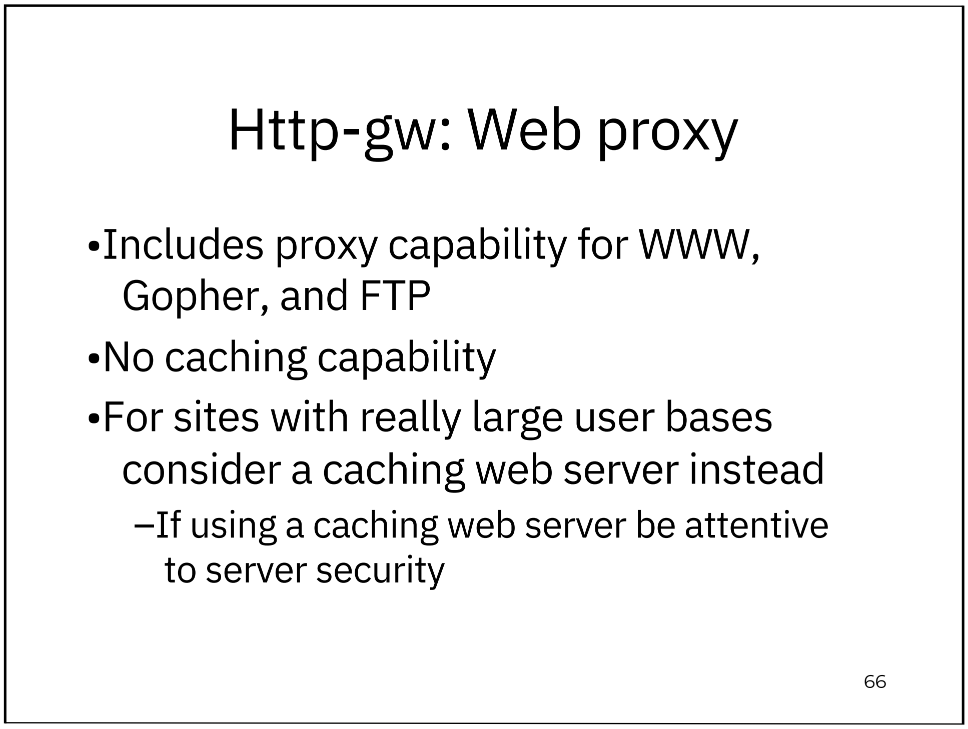


X-gw *(cont)*

- X proxy started from Telnet or Rlogin proxy
- Telnet or Rlogin proxies need -xok flag

```
# X-forwarder rules
tn-gw, rlogin-gw:

                        xforwarder /usr/local/etc/x-gw
```



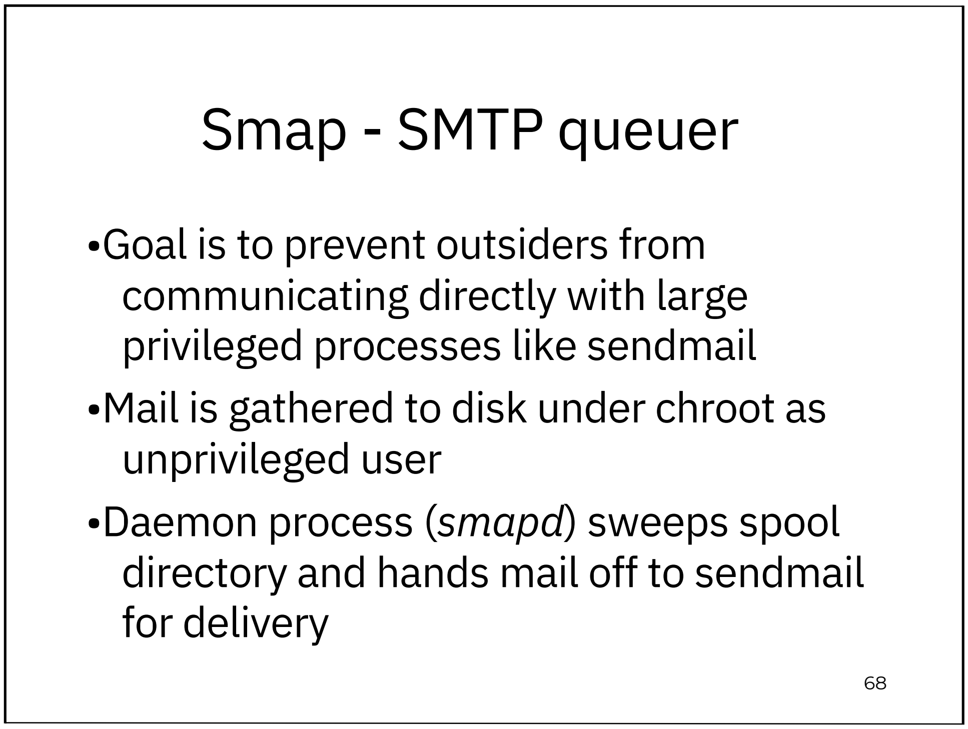
Http-gw: Web proxy

- Includes proxy capability for WWW, Gopher, and FTP
- No caching capability
- For sites with really large user bases consider a caching web server instead
  - If using a caching web server be attentive to server security

Http-gw *(cont)*

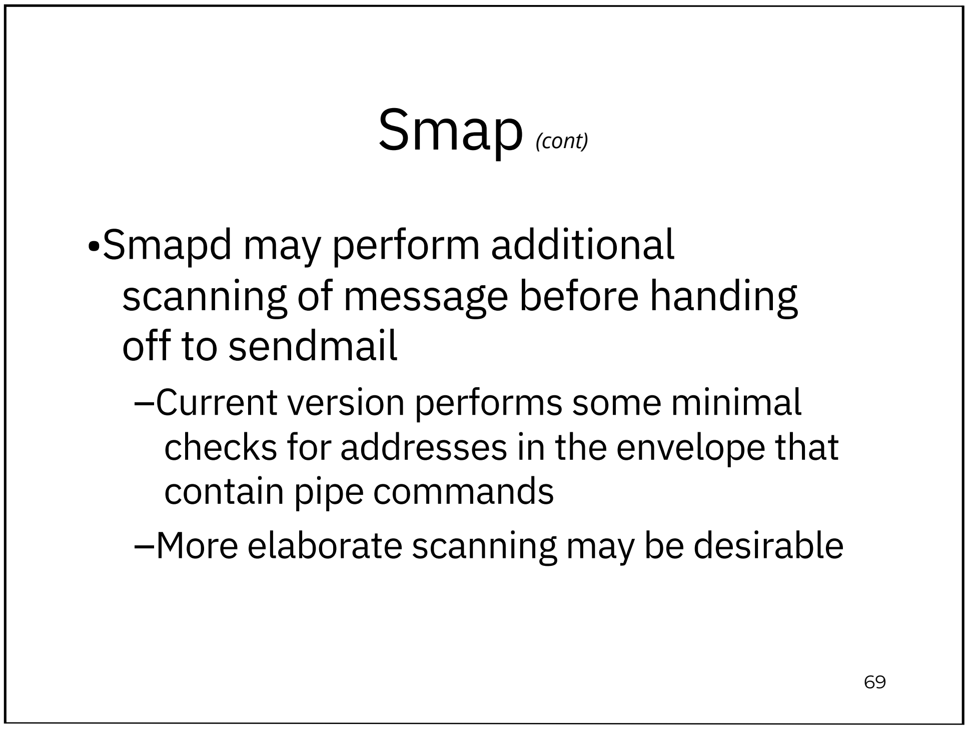
- Http-gw accepts defaults for http servers or gopher servers
- No (real) authentication supported
- May selectively filter URLs or sites

```
http-gw:          permit-hosts 111.111.*
```



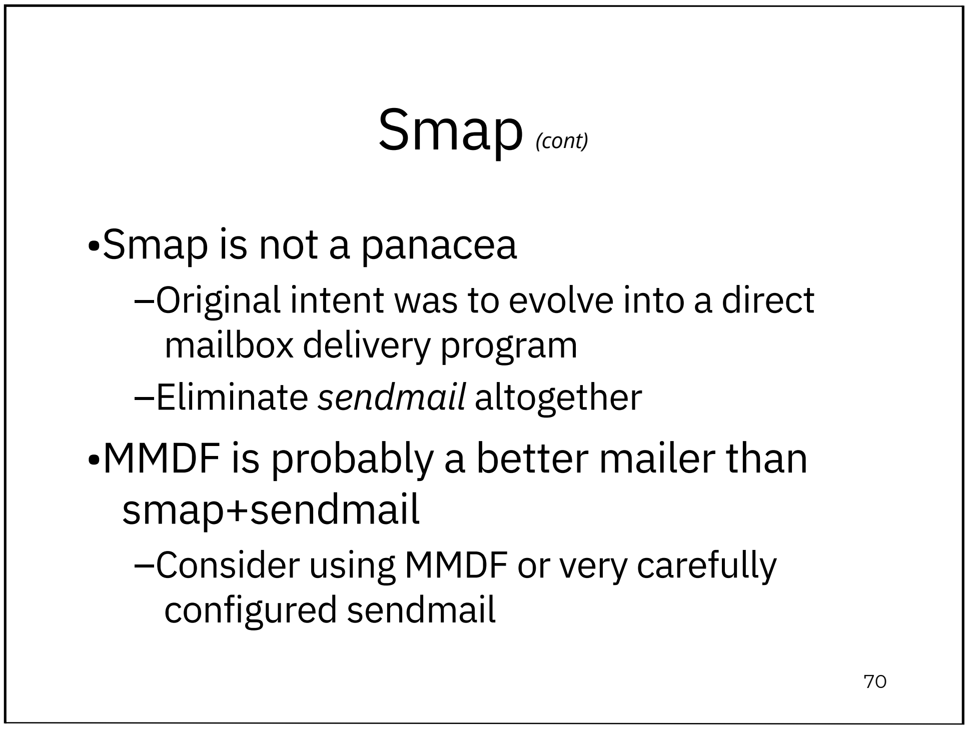
Smap - SMTP queuer

- Goal is to prevent outsiders from communicating directly with large privileged processes like sendmail
- Mail is gathered to disk under chroot as unprivileged user
- Daemon process (*smapd*) sweeps spool directory and hands mail off to sendmail for delivery



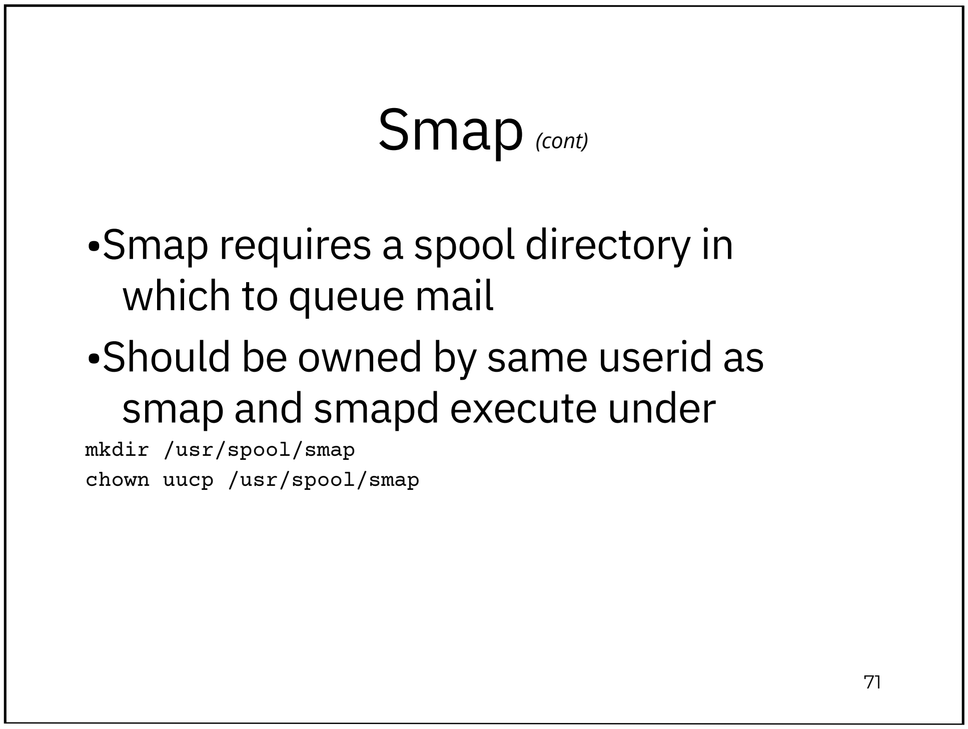
Smap *(cont)*

- Smapd may perform additional scanning of message before handing off to sendmail
  - –Current version performs some minimal checks for addresses in the envelope that contain pipe commands
  - –More elaborate scanning may be desirable



Smap *(cont)*

- Smap is not a panacea
  - –Original intent was to evolve into a direct mailbox delivery program
  - –Eliminate *sendmail* altogether
- MMDF is probably a better mailer than smap+sendmail
  - –Consider using MMDF or very carefully configured sendmail



Smap *(cont)*

- Smap requires a spool directory in which to queue mail
- Should be owned by same userid as smap and smapd execute under

```
mkdir /usr/spool/smap
chown uucp /usr/spool/smap
```

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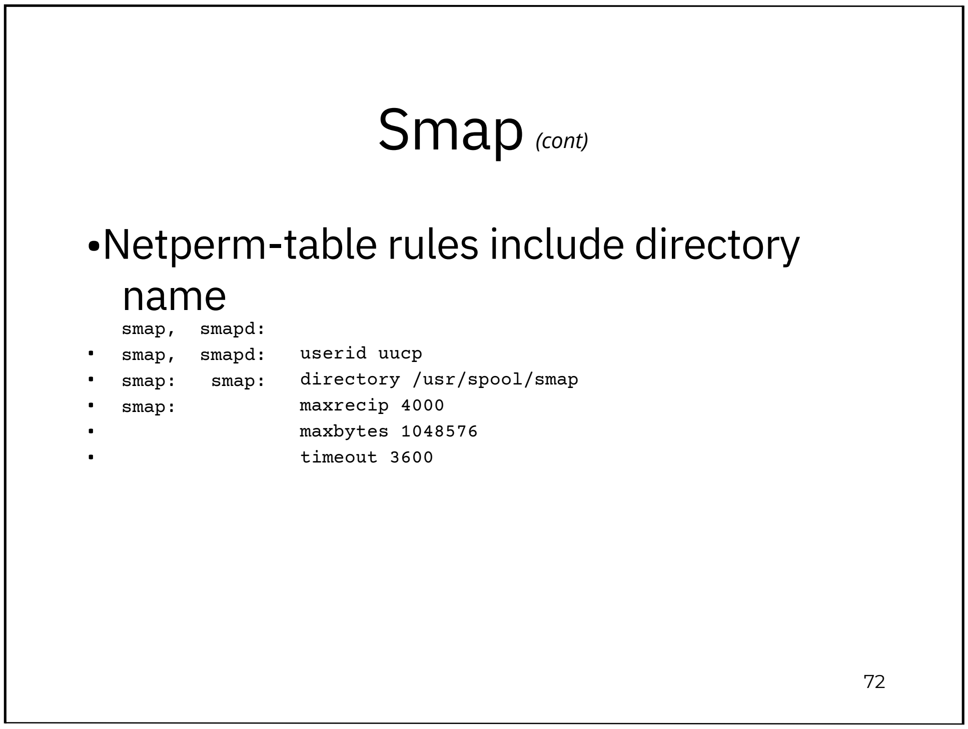

Smap *(cont)*

- Netperm-table rules include directory name

```
   smap,  smapd:
▪  smap,  smapd:   userid uucp
▪  smap:    smap:   directory /usr/spool/smap
▪  smap:            maxrecip 4000
▪                   maxbytes 1048576
▪                   timeout 3600
```

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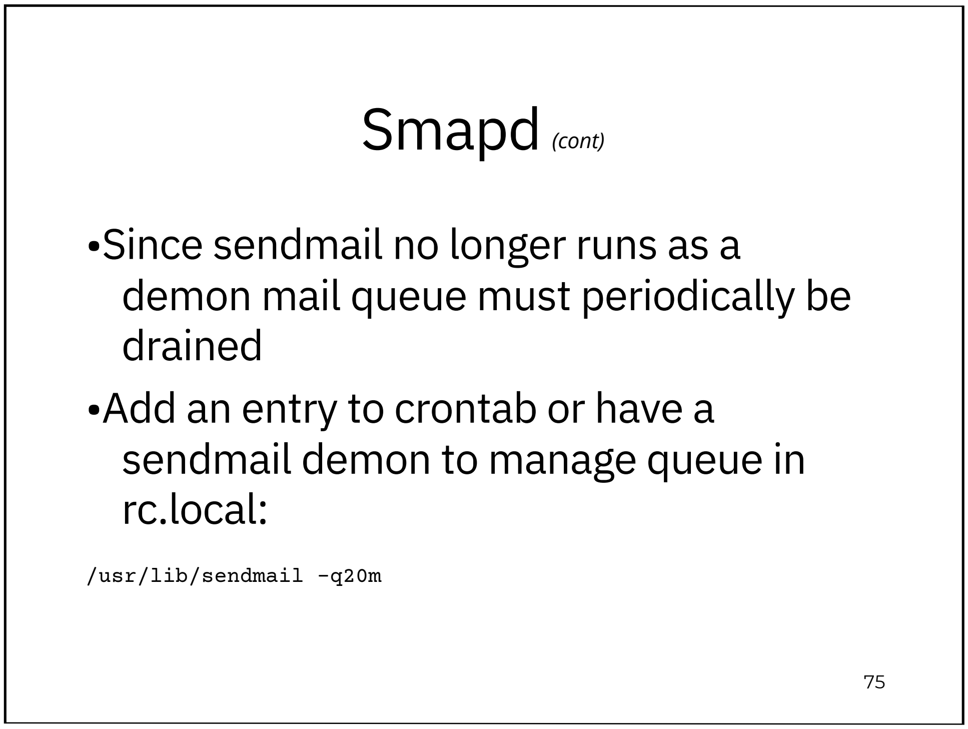
Smapd

- Smapd starts at system initialization
- Changes user-id and enters wait loop
- Periodically wakes up and hands mail off to sendmail
- Add to /etc/rc.local

```
if [ -f /usr/local/etc/smapd ]; then
     /usr/local/etc/smapd; echo -n “smapd”
fi
```

Smapd *(cont)*

- Sendmail needs to be configured normally
  - Optionally sendmail executable may be made setuid *uucp*
  - Change ownership of */etc/aliases* /usr/spool/mqueue* to *uucp*
- Sendmail no longer runs as a demon



Smapd *(cont)*

- Since sendmail no longer runs as a demon mail queue must periodically be drained
- Add an entry to crontab or have a sendmail demon to manage queue in rc.local:

```
/usr/lib/sendmail -q20m
```

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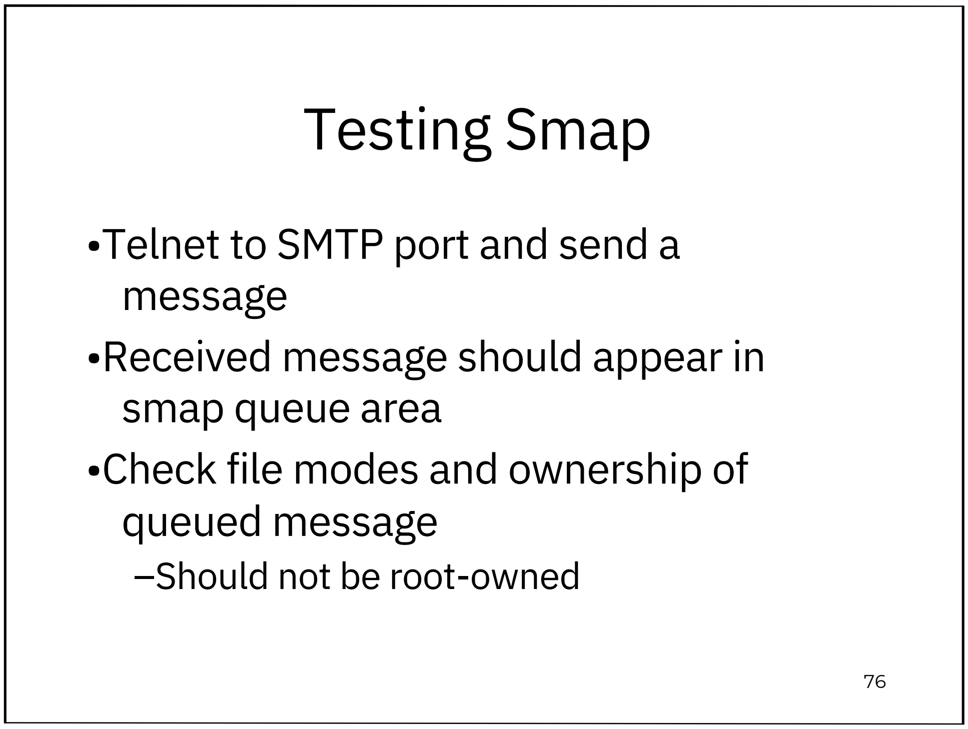

Testing Smap

- Telnet to SMTP port and send a message
- Received message should appear in smap queue area
- Check file modes and ownership of queued message
  - Should not be root-owned

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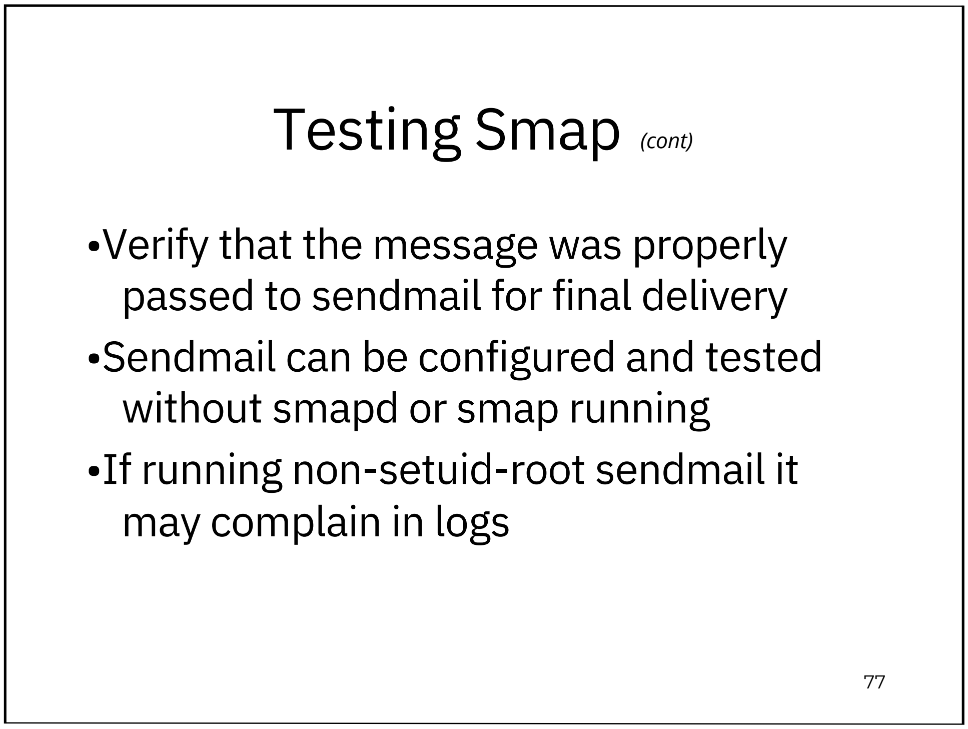

Testing Smap *(cont)*

- Verify that the message was properly passed to sendmail for final delivery
- Sendmail can be configured and tested without smapd or smap running
- If running non-setuid-root sendmail it may complain in logs

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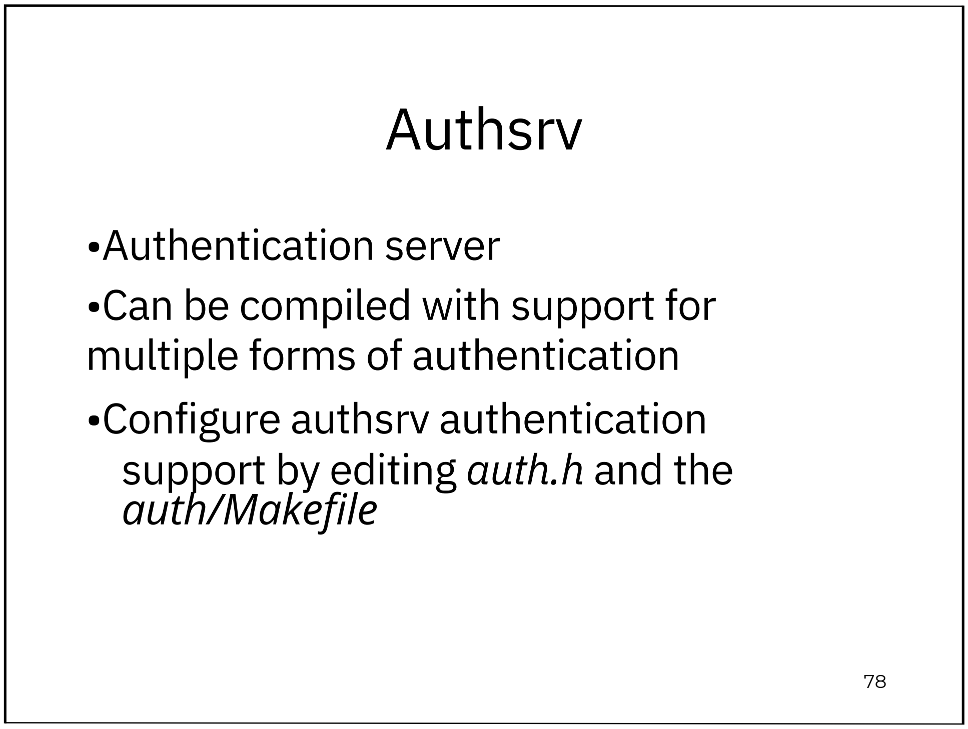

Authsrv

- Authentication server
- Can be compiled with support for multiple forms of authentication
- Configure authsrv authentication support by editing *auth.h* and the *auth/Makefile*

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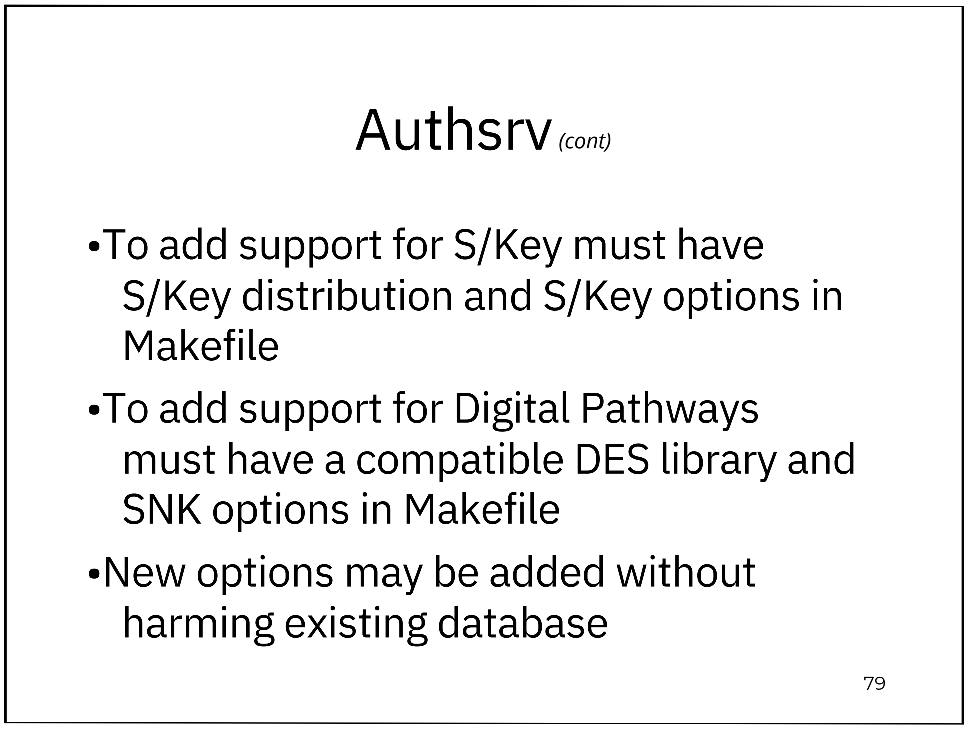
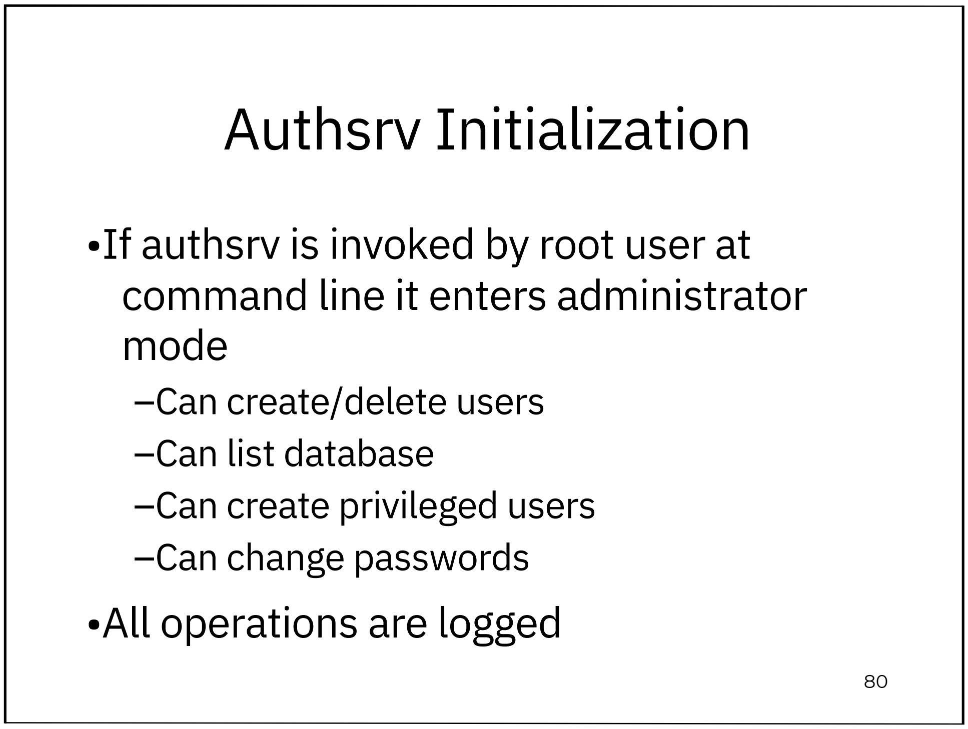


Authsrv *(cont)*

- To add support for S/Key must have S/Key distribution and S/Key options in Makefile
- To add support for Digital Pathways must have a compatible DES library and SNK options in Makefile
- New options may be added without harming existing database



Authsrv Initialization

- If authsrv is invoked by root user at command line it enters administrator mode
  - –Can create/delete users
  - –Can list database
  - –Can create privileged users
  - –Can change passwords
- All operations are logged

Authsrv Initialization*(cont)*

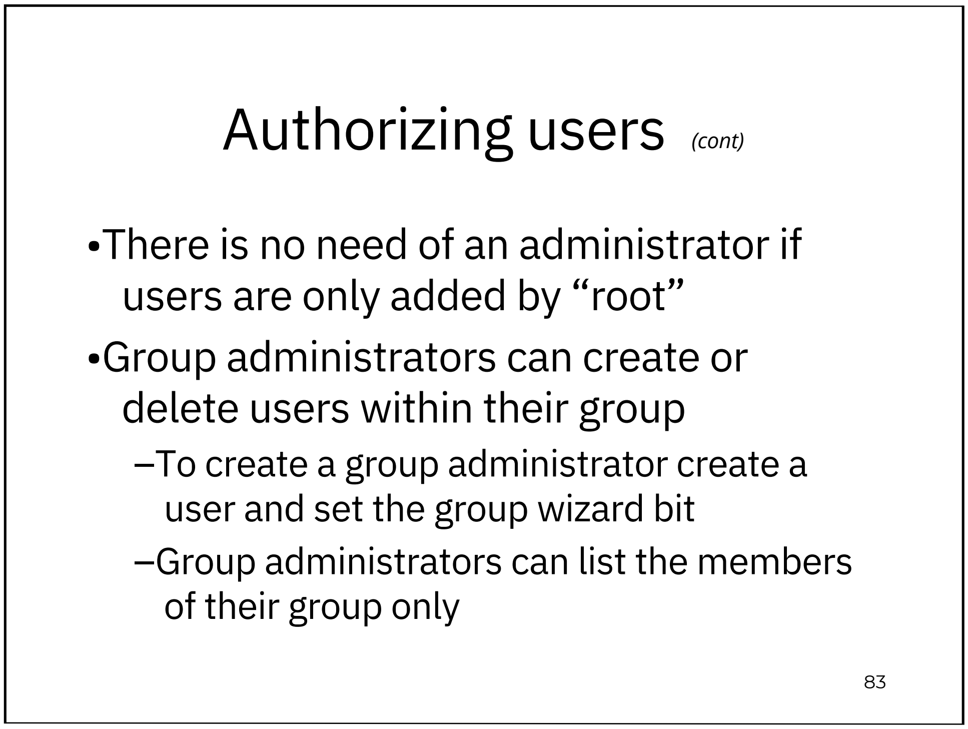
- Authsrv entries in netperm-table define location of database and other options

```
authsrv:                permit-hosts  127.0.0.1  permit-
authsrv:                hosts  111.111.111.111  database
authsrv:                /usr/local/etc/auth.db  nobogus
authsrv:                true badsleep 900
authsrv:
```

Authorizing a User

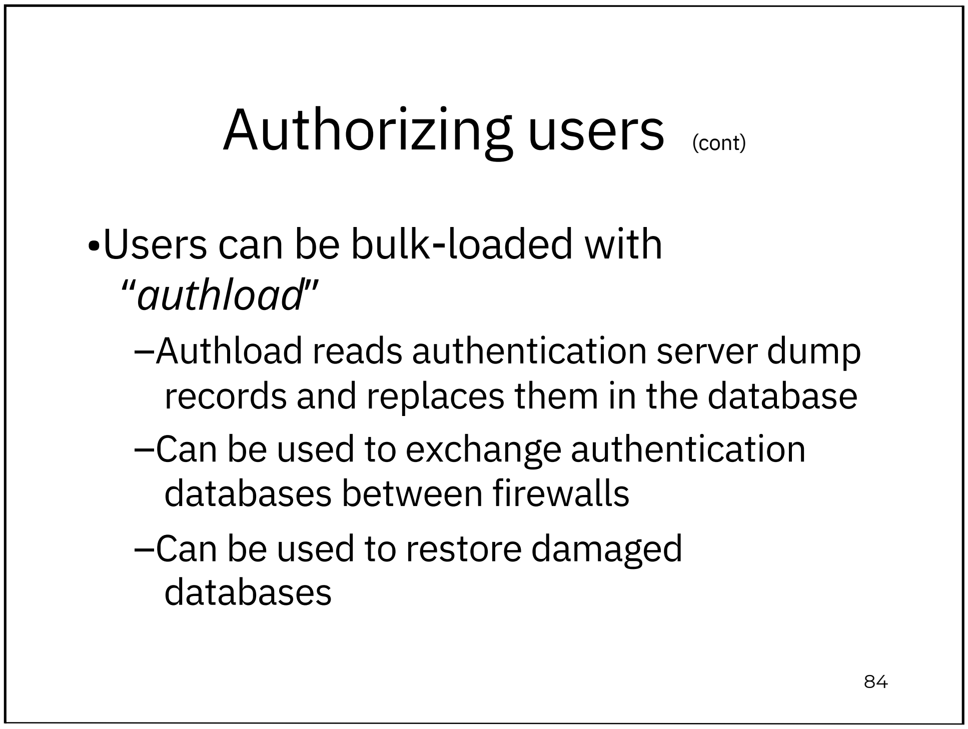
- To initialize database just add users

```
# authsrv
-administrator mode-
authsrv# ls
authsrv# adduser admin "Auth DB admin"
ok - user added initially disabled
authsrv# ena admin
enabled
authsrv# proto admin pass
changed
authsrv# pass admin "plugh"
Password changed.
authsrv# superwiz admin
set wizard
authsrv# ls
Report for users in database


user   ----group      longname  ----  ok?   proto     last
admin      -----      ----  Auth  DB  ---   -----     ----
authsrv#              admin           ena passw       neve
^D                                                    r
```



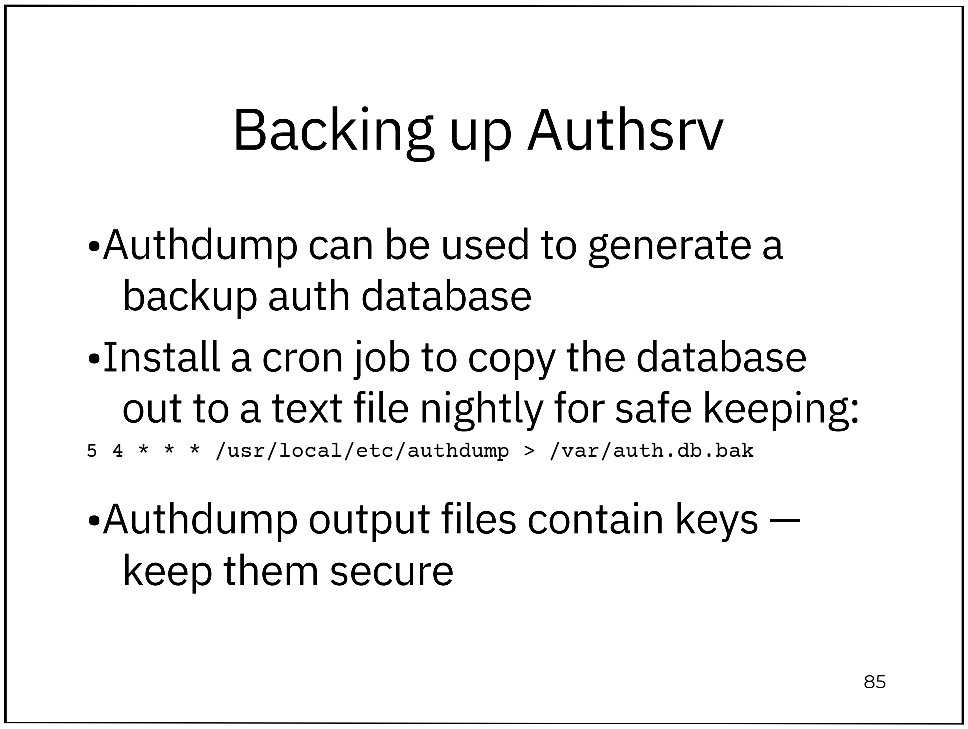
Authorizing users *(cont)*

- There is no need of an administrator if users are only added by “root”
- Group administrators can create or delete users within their group
  - To create a group administrator create a user and set the group wizard bit
  - Group administrators can list the members of their group only



Authorizing users (cont)

- Users can be bulk-loaded with “*authload*”
  - Authload reads authentication server dump records and replaces them in the database
  - Can be used to exchange authentication databases between firewalls
  - Can be used to restore damaged databases

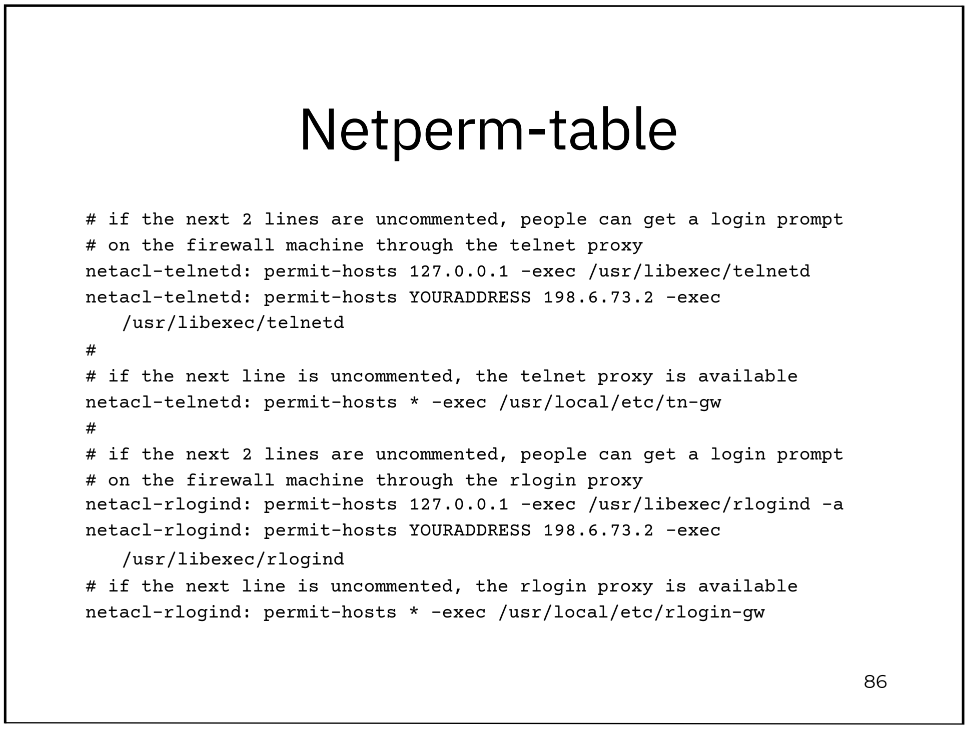


Backing up Authsrv

- Authdump can be used to generate a backup auth database
- Install a cron job to copy the database out to a text file nightly for safe keeping:

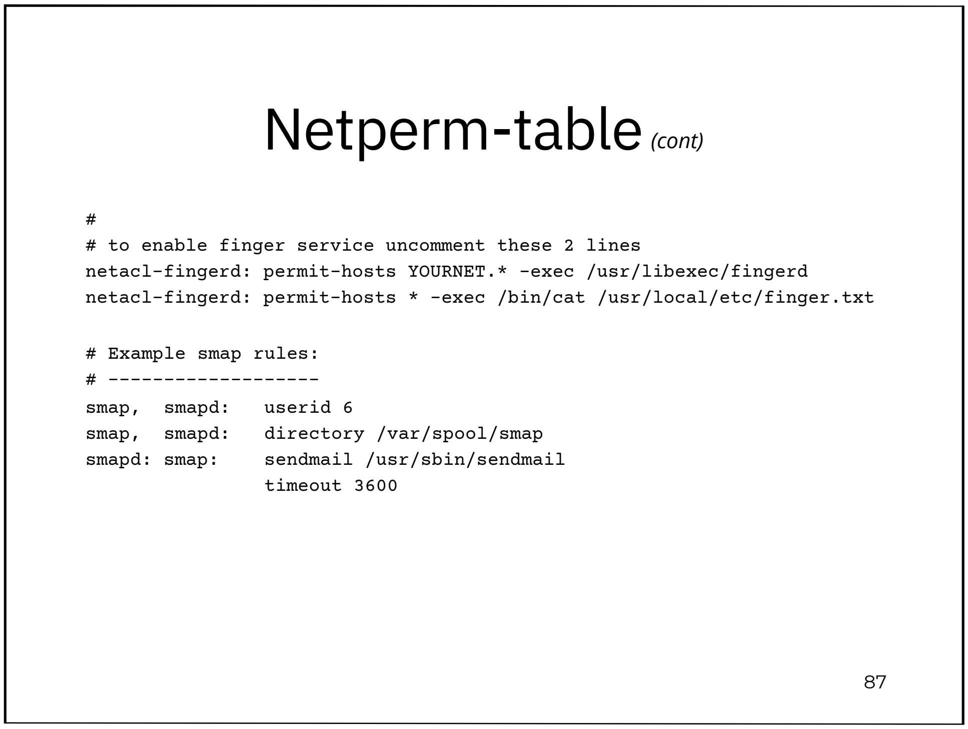
```
5 4 * * * /usr/local/etc/authdump > /var/auth.db.bak
```

- Authdump output files contain keys — keep them secure



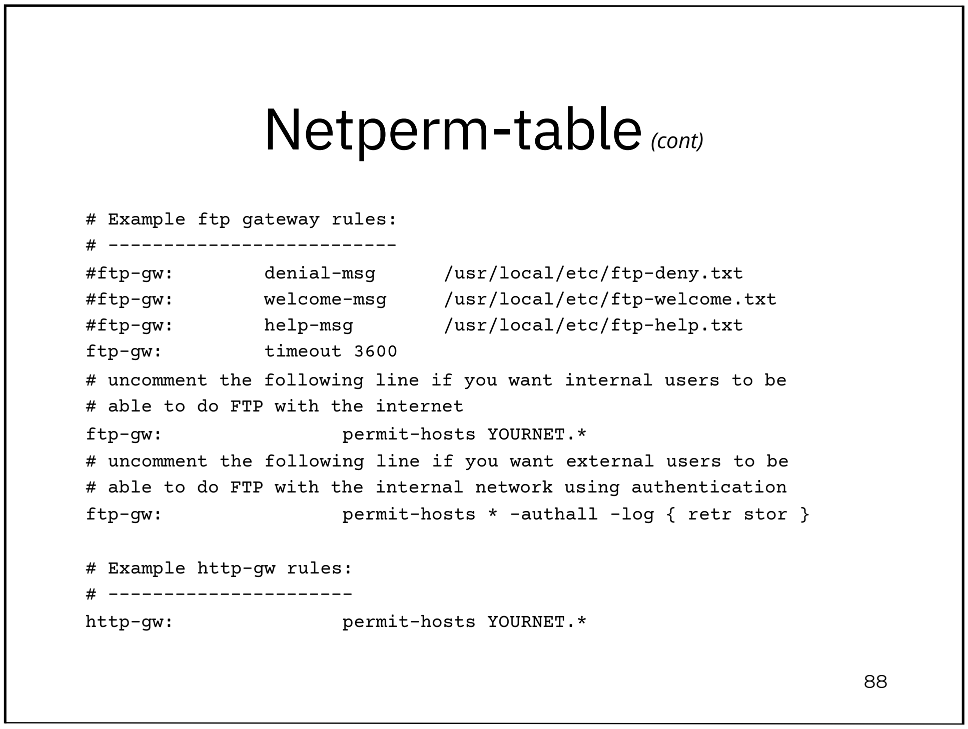
Netperm-table

```
# if the next 2 lines are uncommented, people can get a login prompt
# on the firewall machine through the telnet proxy
netacl-telnetd: permit-hosts 127.0.0.1 -exec /usr/libexec/telnetd
netacl-telnetd: permit-hosts YOURADDRESS 198.6.73.2 -exec
   /usr/libexec/telnetd
#
# if the next line is uncommented, the telnet proxy is available
netacl-telnetd: permit-hosts * -exec /usr/local/etc/tn-gw
#
# if the next 2 lines are uncommented, people can get a login prompt
# on the firewall machine through the rlogin proxy
netacl-rlogind: permit-hosts 127.0.0.1 -exec /usr/libexec/rlogind -a
netacl-rlogind: permit-hosts YOURADDRESS 198.6.73.2 -exec
   /usr/libexec/rlogind
# if the next line is uncommented, the rlogin proxy is available
netacl-rlogind: permit-hosts * -exec /usr/local/etc/rlogin-gw
```



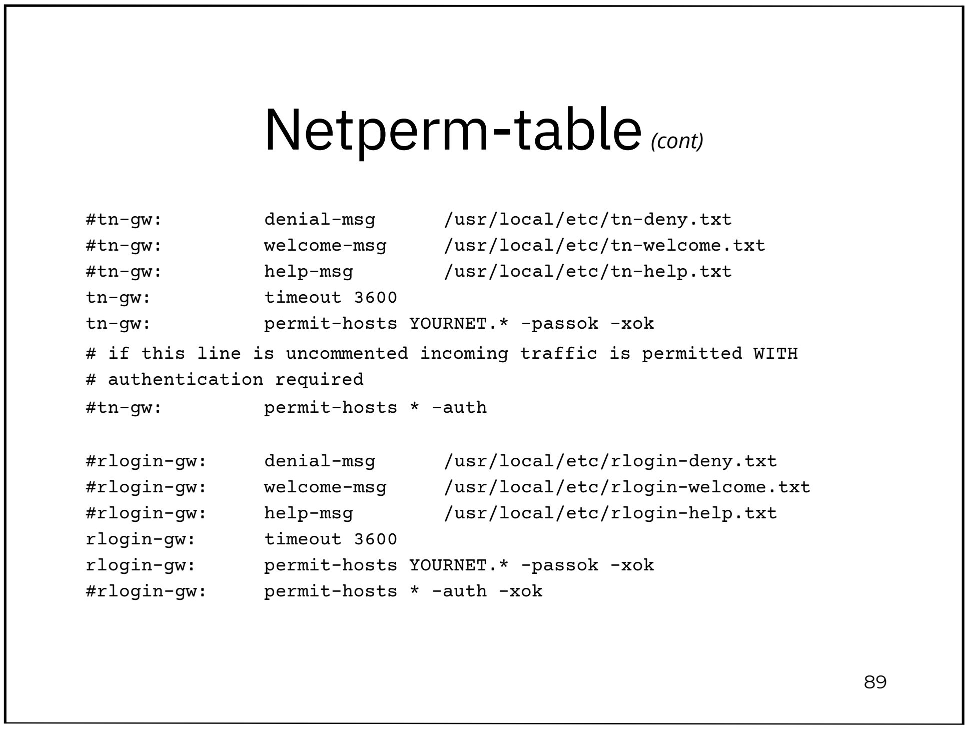
Netperm-table *(cont)*

```
#
# to enable finger service uncomment these 2 lines
netacl-fingerd: permit-hosts YOURNET.* -exec /usr/libexec/fingerd
netacl-fingerd: permit-hosts * -exec /bin/cat /usr/local/etc/finger.txt

# Example smap rules:
# -------------------
smap,  smapd:   userid 6
smap,  smapd:   directory /var/spool/smap
smapd: smap:    sendmail /usr/sbin/sendmail
                timeout 3600
```



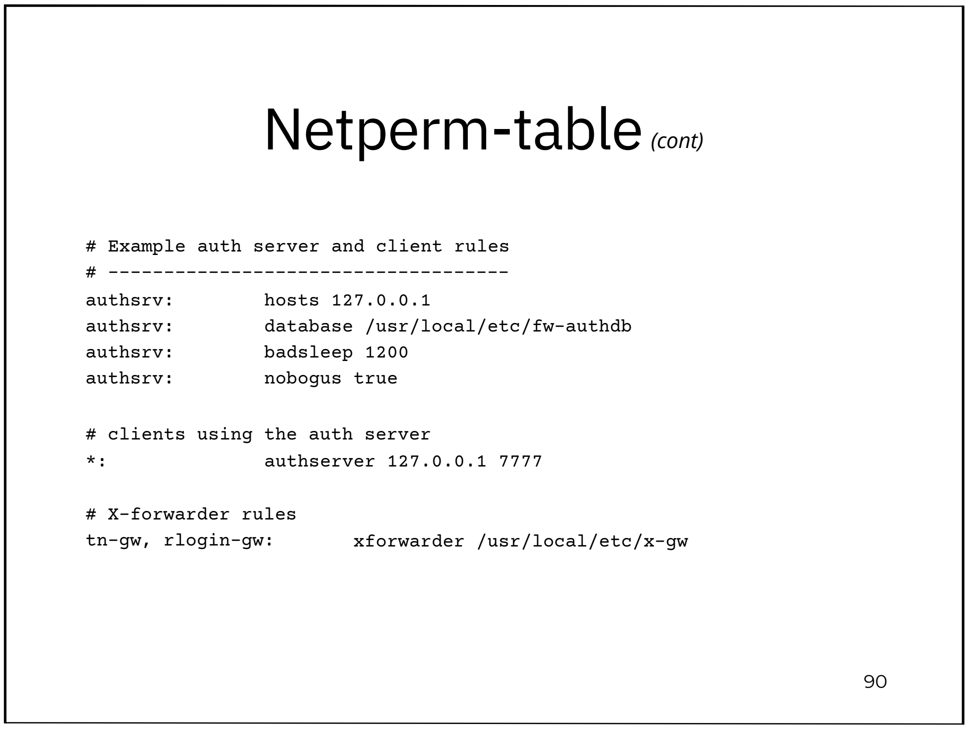
Netperm-table *(cont)*

```
# Example ftp gateway rules:
# --------------------------
#ftp-gw:        denial-msg      /usr/local/etc/ftp-deny.txt
#ftp-gw:        welcome-msg     /usr/local/etc/ftp-welcome.txt
#ftp-gw:        help-msg        /usr/local/etc/ftp-help.txt
ftp-gw:         timeout 3600
# uncomment the following line if you want internal users to be
# able to do FTP with the internet
ftp-gw:                permit-hosts YOURNET.*
# uncomment the following line if you want external users to be
# able to do FTP with the internal network using authentication
ftp-gw:                permit-hosts * -authall -log { retr stor }

# Example http-gw rules:
# ----------------------
http-gw:               permit-hosts YOURNET.*
```



Netperm-table *(cont)*

```
#tn-gw:         denial-msg      /usr/local/etc/tn-deny.txt
#tn-gw:         welcome-msg     /usr/local/etc/tn-welcome.txt
#tn-gw:         help-msg        /usr/local/etc/tn-help.txt
tn-gw:          timeout 3600
tn-gw:          permit-hosts YOURNET.* -passok -xok
# if this line is uncommented incoming traffic is permitted WITH
# authentication required
#tn-gw:         permit-hosts * -auth

#rlogin-gw:     denial-msg      /usr/local/etc/rlogin-deny.txt
#rlogin-gw:     welcome-msg     /usr/local/etc/rlogin-welcome.txt
#rlogin-gw:     help-msg        /usr/local/etc/rlogin-help.txt
rlogin-gw:      timeout 3600
rlogin-gw:      permit-hosts YOURNET.* -passok -xok
#rlogin-gw:     permit-hosts * -auth -xok
```



Netperm-table *(cont)*

```
# Example auth server and client rules
# ------------------------------------
authsrv:        hosts 127.0.0.1
authsrv:        database /usr/local/etc/fw-authdb
authsrv:        badsleep 1200
authsrv:        nobogus true

# clients using the auth server
*:              authserver 127.0.0.1 7777

# X-forwarder rules
tn-gw, rlogin-gw:       xforwarder /usr/local/etc/x-gw
```

Reporting

- Toolkit includes some summarizer scripts in tools/admin/reporting
  - ftp-summ.sh
  - http-summ.sh
  - tn-gw-summ.sh
  - weekly-report.sh
- Useful to run from crontab to mail admins

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Testing Procedures

- Check what network services are available
- Check (from outside) that inside systems are not reachable
- Test authentication system
  - Attempt an operation that requires authentication

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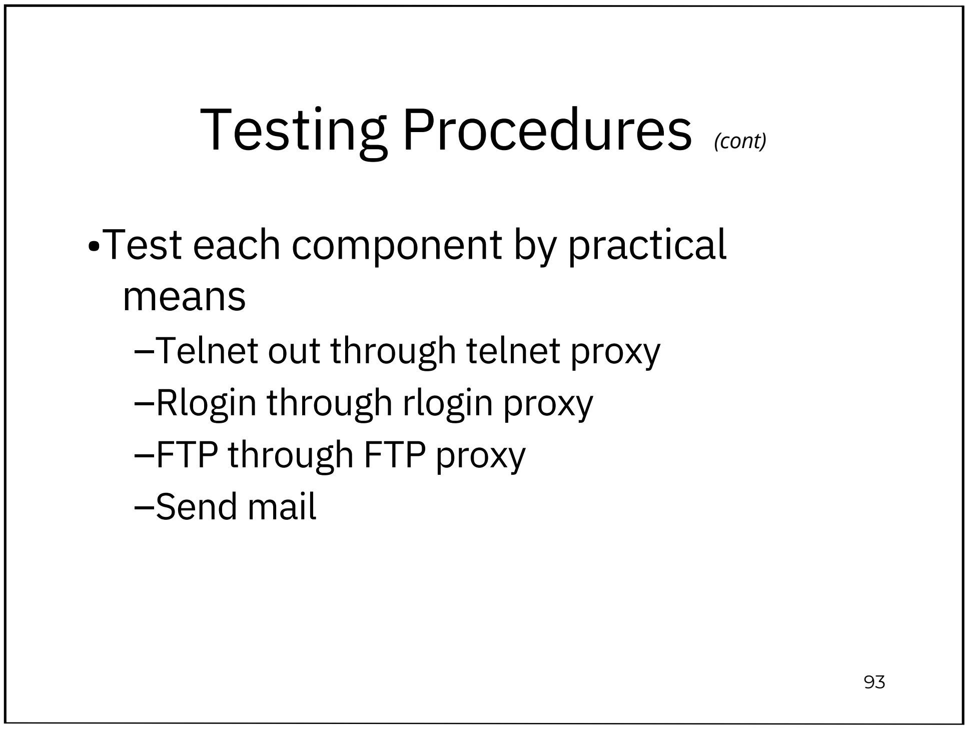
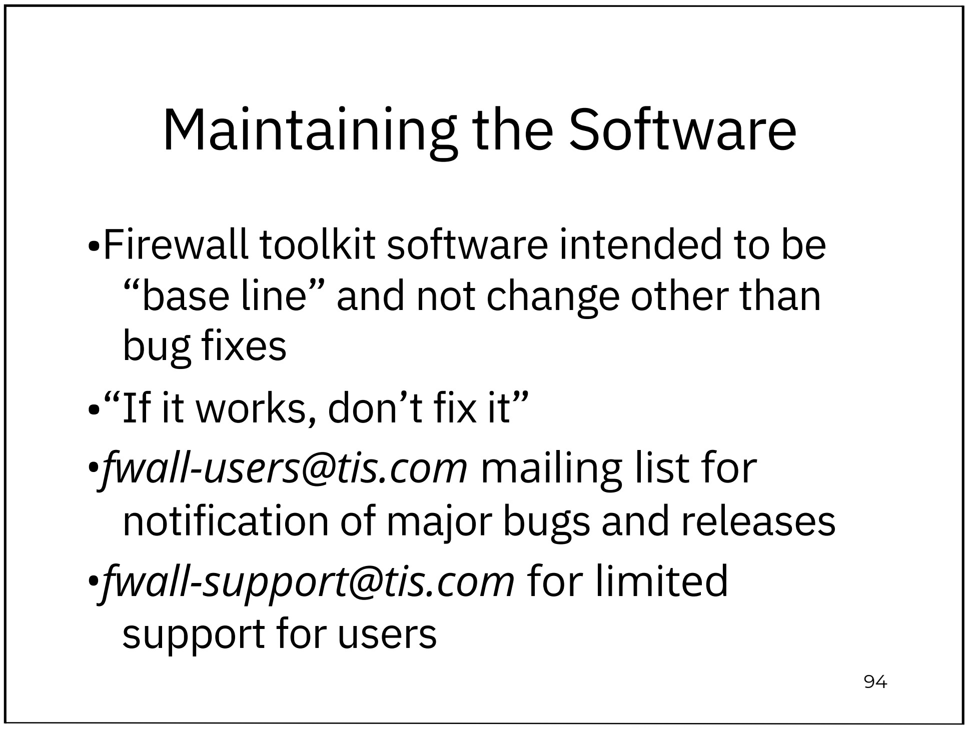


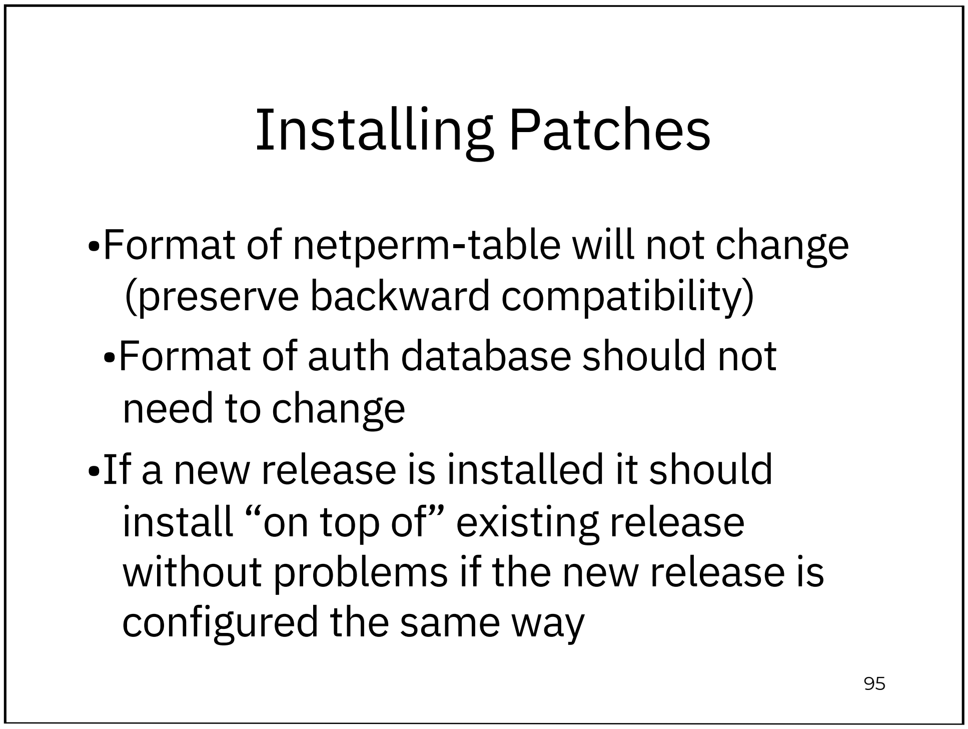
Testing Procedures *(cont)*

- Test each component by practical means
  - Telnet out through telnet proxy
  - Rlogin through rlogin proxy
  - FTP through FTP proxy
  - Send mail



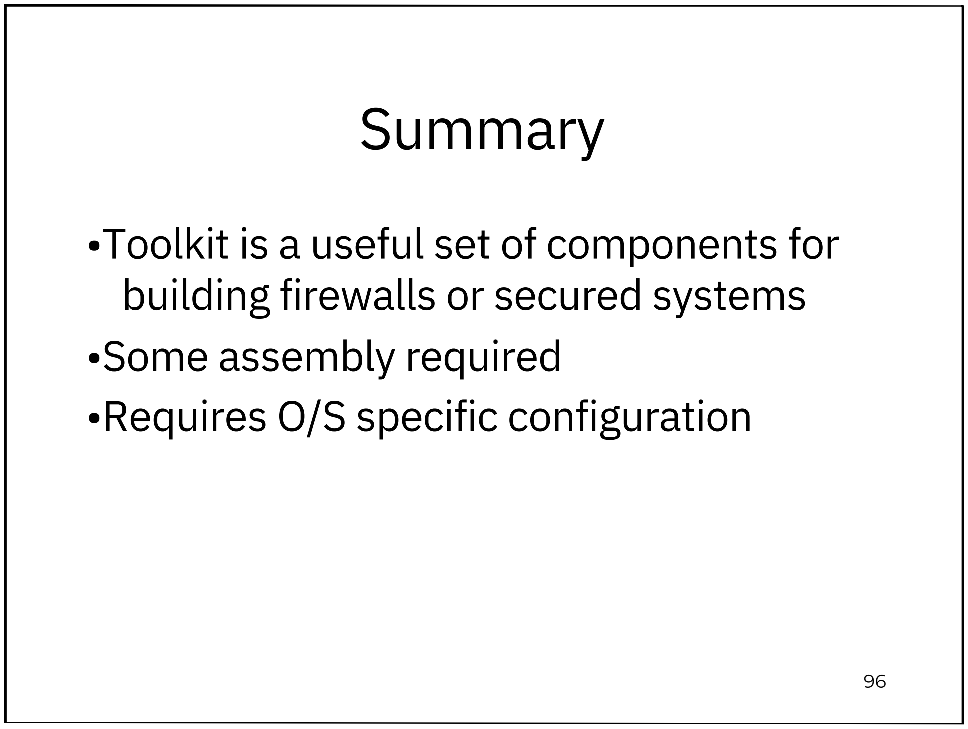
Maintaining the Software

- Firewall toolkit software intended to be “base line” and not change other than bug fixes
- “If it works, don’t fix it”
- *fwall-users@tis.com* mailing list for notification of major bugs and releases
- *fwall-support@tis.com* for limited support for users



Installing Patches

- Format of netperm-table will not change (preserve backward compatibility)
- Format of auth database should not need to change
- If a new release is installed it should install “on top of” existing release without problems if the new release is configured the same way



Summary

- Toolkit is a useful set of components for building firewalls or secured systems
- Some assembly required
- Requires O/S specific configuration