Exim and Internet Mail

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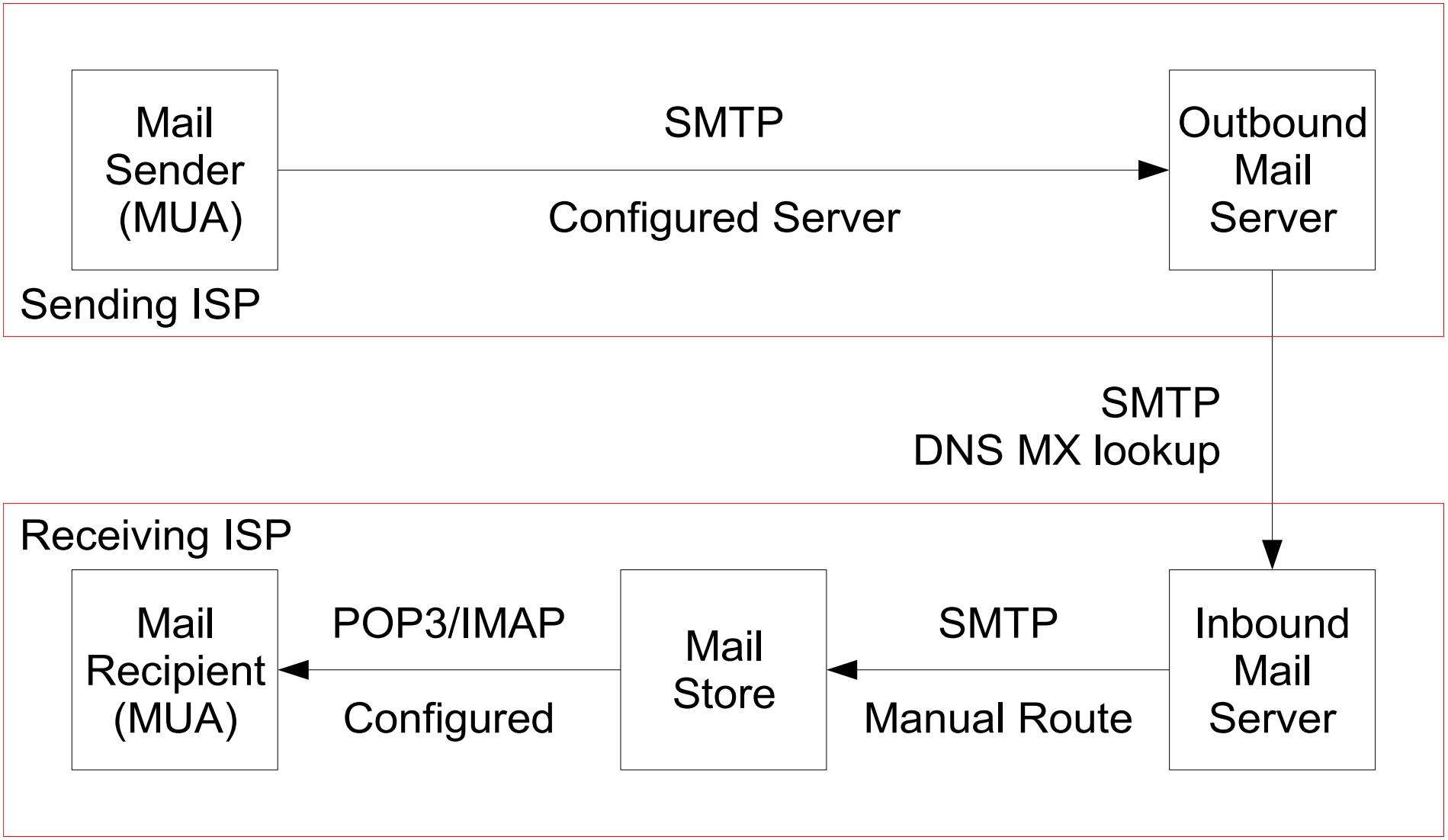
How Internet Email Works



What is Exim

- Listens on port 25 (smtp)
- Accepts mail
- Delivers it somewhere

Who uses Exim

- University of Cambridge, UK
- Energis Squared (formerly Planet Online), UK
- Shore.Net (large regional ISP in the Northeastern US)
- Esat Net (longest serving ISP in Ireland)
- Aptivate

Why use Exim

- Flexible (lots of features)
- Reasonably secure
- Reasonably scalable
- Good debugging options
- Sane configuration syntax

Why not to use Exim

- Not every problem is a nail
- Simplicity? Use postfix or qmail
- Top security? Use qmail
- Faster delivery? Use postfix or sendmail
- Insane configuration file? Use sendmail
- Note: Exim is not designed for spooling large amounts of mail and not very good at it

Conventions

- File names and technical terms are in *italics*
- Commands to type are shown in monospaced bold italic purple type:
  - ***cat /etc/monospaced/bold/italic/purple***
- Long command lines are wrapped, but with a single bullet point at the start:
  - ***cat /usr/local/etc/foo/bar | less | more | grep | sed | awk > /usr/local/tmp/foo/bar***
- Text that is output by a program, or should already be in a file, is shown in plain monospaced type:
  - `sshd_enable="YES"`

Root and Sudo

- We will use "`sudo`" wherever *root* access is required
- Please work through this tutorial as a normal user, not as *root*
- If you use *root*, some error messages from Exim will be different and this may confuse you

Installing Exim

- Install some dependencies as packages, not ports:
  - ***sudo pkg_add -r libspf2 cyrus-sasl-saslauthd***
- Compile Exim from the ports tree:
  - ***cd /usr/ports/mail/exim***
  - ***sudo make***
    SUBDIR=old
    WITH_MYSQL=yes
    WITH_CONTENT_SCAN=yes
    WITH_AUTH_RADIUS=yes
    WITH_RADIUS_TYPE=RADLIB
    EXTRALIBS_EXIM=/usr/lib/libradius.so
    WITH_SASLAUTHD=yes
    WITH_SPF=yes
    install clean

Checking Exim Installation

- ***/usr/local/sbin/exim -bV***
- `Exim version 4.69 ...`
- `Support for: crypteq iconv() IPv6 use_setclassresources PAM Perl Expand_dlfunc OpenSSL Content_Scanning Old_Demime Experimental_SPF`
- `Lookups: lsearch wildlsearch nwildlsearch iplsearch cdb dbm dbmnz dnsdb dsearch mysql nis nis0 passwd`
- `Authenticators: cram_md5 dovecot plaintext spa`
- If you don't have these options:
  - ***cd /usr/ports/mail/exim***
  - ***make deinstall clean***
  - Try the installation again (from the previous slide)

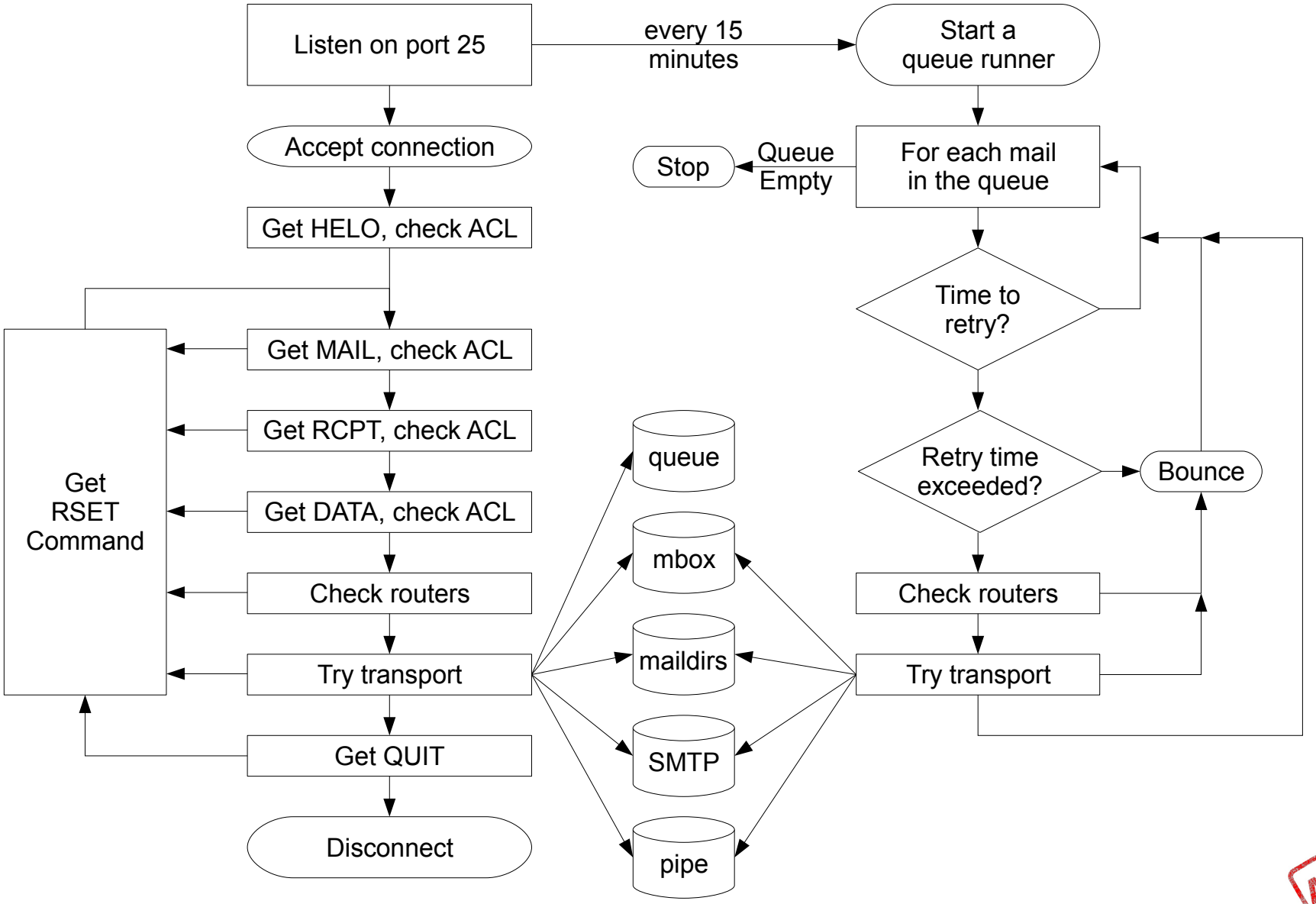
Replacing Sendmail with Exim

- Stop Sendmail:
  - ***sudo /etc/rc.d/sendmail stop***
- Edit */etc/rc.conf* and add these lines:
  - ***sendmail_enable="NONE"***
  - ***sendmail_submit_enable="NO"***
  - ***exim_enable="YES"***
- Edit */etc/mail/mailer.conf* and change these lines:
  - `sendmail` ***/usr/local/sbin/exim***
  - `send-mail` ***/usr/local/sbin/exim***
  - `mailq` ***/usr/local/sbin/exim -bp***
  - `newaliases` ***/bin/true***

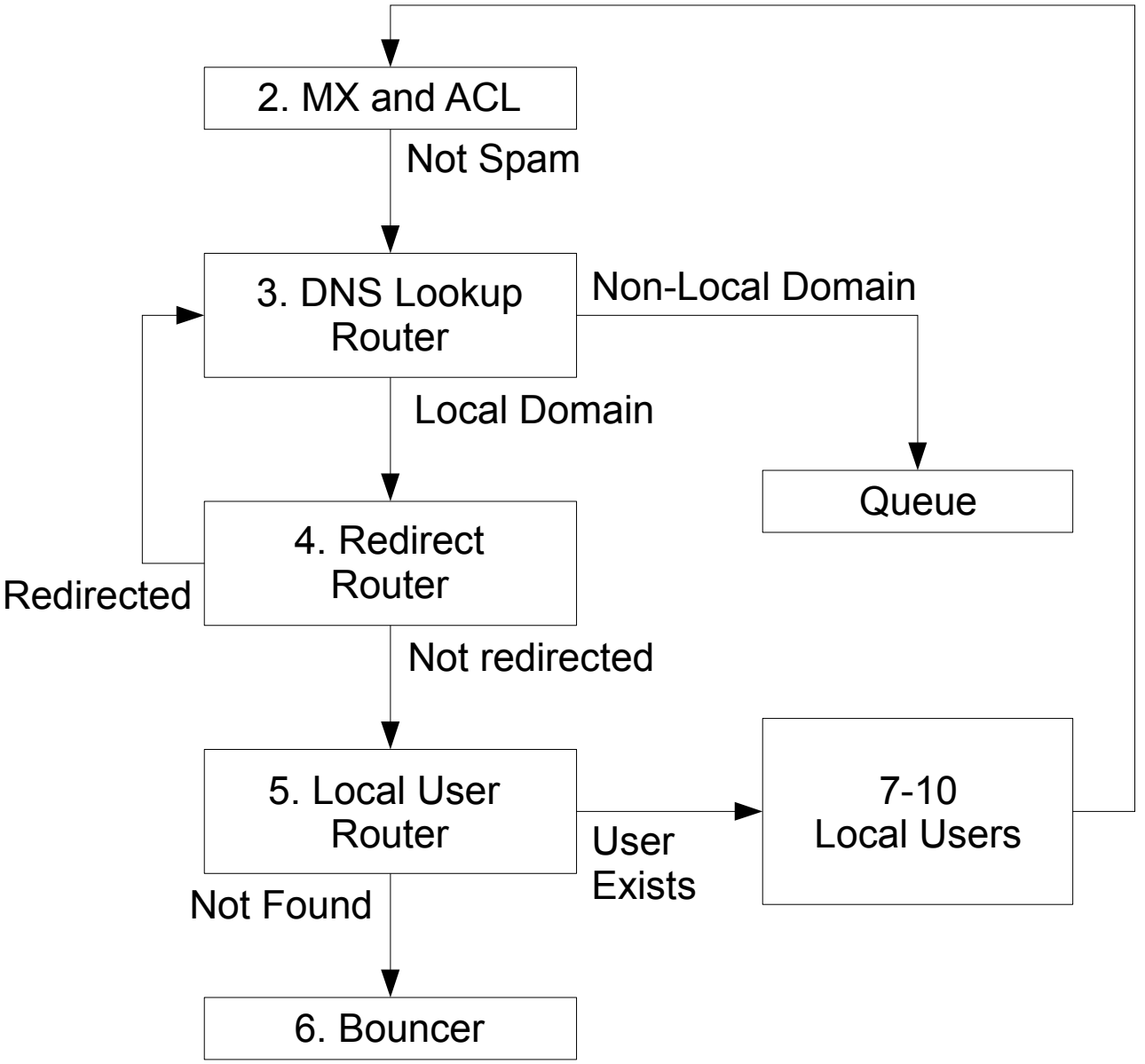
Starting Exim

- Try the following commands:
  - ***sudo /usr/local/etc/rc.d/exim start***
    ```
    Starting exim.
    ```
  - ***sudo /usr/local/etc/rc.d/exim status***
    ```
    exim is running as pid XXX
    ```
  - ***sudo /usr/local/etc/rc.d/exim restart***
    ```
    Stopping exim.
    Starting exim.
    ```
- Create */etc/periodic.conf.local* and add these lines:
  - ***daily_status_include_submit_mailq="NO"***
  - ***daily_clean_hoststat_enable="NO"***

Exim Overview



The Exim Game



Basic Configuration

- Configuration file is */usr/local/etc/exim/configure*
- First section has global options
- Other sections start with the word “begin”
- What are they?

Configuration Sections

- **Global** (no name)
- ACL (access control lists, allow or deny mail)
- Routers (decide what to do with mail)
- Transports (control how exactly it is delivered)
- Retry rules (advanced feature)
- Rewrite (advanced feature)
- Authenticators (will cover this later)
- Local Scan (advanced feature)

Global Settings

- The most important default settings:
  - # primary_hostname =
  - domainlist local_domains = @
  - domainlist relay_to_domains =
  - hostlist relay_from_hosts = localhost
  - acl_smtp_rcpt = acl_check_rcpt
  - acl_smtp_data = acl_check_data
  - host_lookup = *
  - rfc1413_hosts = *
  - rfc1413_query_timeout = 5s
  - ignore_bounce_errors_after = 2d
  - timeout_frozen_after = 7d
- See Exim manual, chapter 7 for more details

Testing the default configuration

- Send email to afnog@pcXX.sse.ws.afnog.org:
  - ***telnet localhost 25***
    ```
    Trying 127.0.0.1...
    Connected to localhost.
    Escape character is '^]'.
    220 pcXX.sse.ws.afnog.org ESMTP Exim 4.69 ...
    ```
  - ***mail from:<afnog@pcXX.sse.ws.afnog.org>***
    ```
    250 OK
    ```
  - ***rcpt to:<afnog@pcXX.sse.ws.afnog.org>***
    ```
    250 Accepted
    ```
  - ***data***
    ```
    354 Enter message, ending with "." on a line by itself
    ```
  - ***hello world***
    .
    ```
    250 OK id=1M3RuH-0006WJ-Ia
    ```
  - ***quit***
    ```
    221 pcXX.sse.ws.afnog.org closing connection
    ```

Terminology

- In the email address *joe@example.com*:
  - *joe* is the local part
  - *example.com* is the mail domain (or just domain)
- Exim tends to split them apart, so it's easier to treat them separately in the Exim config

Adding another local domain

- Tell Exim to accept mail for *mydomain.example.com*
- Use a domain that doesn't exist yet (no MX records), otherwise Exim will try to deliver it by SMTP (why?)
- How will we know when we've done it?
  - Use an "address test" to see what Exim will do with the mail:
  - ***exim -bt afnog@mydomain.example.com***
    ```
    afnog@mydomain.example.com is undeliverable
    ```
  - Let's make it deliverable!

Adding another local domain

- Add a new entry to the domain list, using the ":" character to separate it from the previous entry:
  - ***sudo vi /usr/local/etc/exim/configure***
    - `domainlist local_domains = @ :` ***`mydomain.example.com`***
- Now what does the address test say?
  - ***`exim -bt afnog@mydomain.example.com`***

```
afnog@mydomain.example.com
  router = localuser, transport = local_delivery
```

Testing the new local domain

- Send email to afnog@mydomain.example.com:
  - ***exim -bs***
    220 *pcXX*.sse.ws.afnog.org ESMTP Exim 4.69 ...
  - ***mail from:<afnog@pcXX.sse.ws.afnog.org>***
    250 OK
  - ***rcpt to:<afnog@mydomain.example.com>***
    250 Accepted
  - ***data***
    354 Enter message, ending with "." on a line by itself
  - ***hello my lovely new domain!***
    .
    250 OK id=1M3RuH-0006WJ-Ia
  - ***quit***
    221 *pcXX*.sse.ws.afnog.org closing connection
  - ***tail /var/mail/afnog***
    ...
    hello my lovely new domain!

Testing Notes

- **`exim -bs`** is “command-line SMTP mode”
  - similar to connecting to port 25
  - can quit with Control+C
  - no need to restart exim in this case
  - useful for testing new configurations
- we did not restart Exim, so the daemon listening on port 25 is still running the old configuration
  - ***`sudo /usr/local/etc/rc.d/exim restart`***

```
Stopping exim.
Starting exim.
```

Relay Testing

- `exim -bs` and `telnet localhost 25` both connect "from" localhost
- localhost has special privileges:
  - `hostlist relay_from_hosts = localhost`
  - `accept hosts = +relay_from_hosts`
- try using `exim -bh` to simulate mail relaying by an untrusted server
  - ***exim -bh 1.2.3.4***
    220 noc.sse.ws.afnog.org ESMTP Exim 4.69 ...
  - ***mail from:<afnog@pcXX.sse.ws.afnog.org>***
    250 OK
  - ***rcpt to:<afnog@anotherdomain.example.com>***
    550 relay not permitted

Allow Relaying

- Change hostlist relay_from_hosts:
  - `hostlist relay_from_hosts = localhost` ***: 1.2.3.0/24***
- Try exim -bh again:
  - ***exim -bh 1.2.3.4***
    `220 noc.sse.ws.afnog.org ESMTP Exim 4.69 ...`
  - ***mail from:<afnog@pcXX.sse.ws.afnog.org>***
    `250 OK`
  - ***rcpt to:<afnog@anotherdomain.example.com>***
    `250 Accepted`
- What would you expect to happen with:
  - ***exim -bh 1.2.3.19***
  - ***exim -bh 1.2.5.4***

Types of Lists

- domainlist
  - `*.mydomain.com : @`
- hostlist
  - `192.168.1.0/24 : hostname.domain.com`
- addresslist
  - `*@example.com : example.com : *.example.com :`
- local parts list (not covered here)
- string list (simple)
- see Exim manual chapter 10 for more details

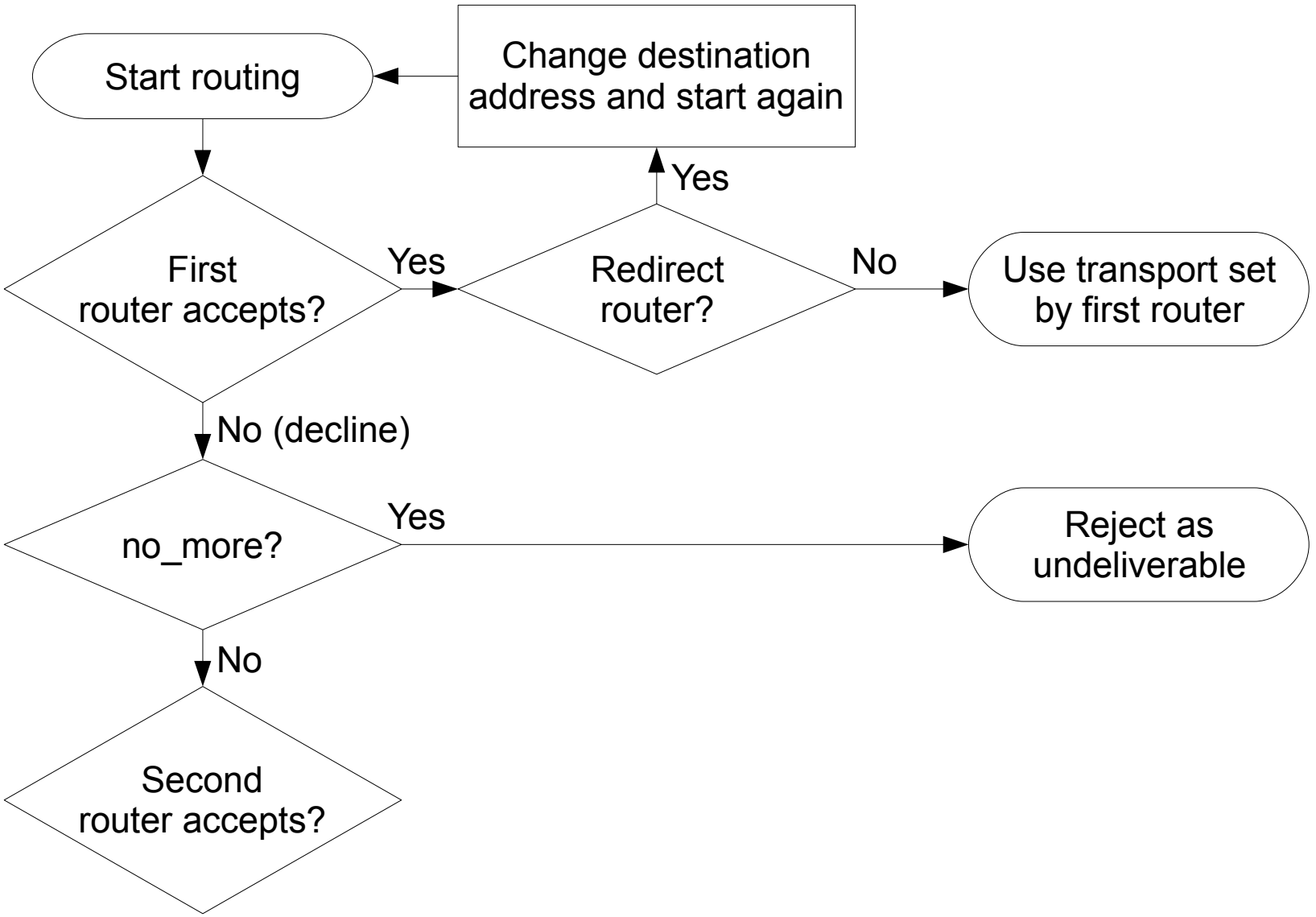
Next up: Routers

- Global (no name)
- **Routers (decide what to do with mail)**
- Transports (control how exactly it is delivered)
- Access Control (who is allowed to send mail)
- Authenticators (logging in to relay mail)
- Troubleshooting (when things go wrong)

Routers

- Decide where to deliver mail to
  - Run in order until one accepts the mail
  - Accepting router sets the transport for the mail
- Can also redirect mail (change the destination)
- Can check whether mail is deliverable:
  - local recipients exist
  - remote domains are routable
- Routers should not be used to reject mail except for undeliverable mail (nonexistent recipients)

Routing Overview



Anatomy of a Router

- Conditions control whether the driver runs:
  - address_test, check_local_user, condition
  - domains = +local_domains
  - user = mail
  - transport = trotro (or matatu)
- A driver is specified:
  - driver = redirect
- Options control what the driver does (if run)
- Specified driver is run
  - Result may be *accept*, *decline* or *fail*

The Default Routers

- dnslookup (for outbound email via SMTP)
- system_aliases (lookup in /etc/aliases, redirect)
- userforward (local user .forward files, redirect)
- localuser (deliver to local mbox or maildir)

The *dnslookup* Router

- **domains = ! +local_domains**
  - only if destination domain is not in *local_domains*
- **driver = dnslookup**
  - check that the destination domain has MX or A
- ignore_target_hosts = 0.0.0.0 : 127.0.0.0/8
- **no_more**
  - if conditions match but router declines then bounce
- **transport = remote_smtp**
  - if router accepts, then use remote_smtp to deliver

The *system_aliases* Router

- **driver = redirect**
- allow_fail
- allow_defer
- **data = ${lookup{$local_part}lsearch{/etc/aliases}}**
- user = mailnull
- group = mail
- file_transport = address_file
- pipe_transport = address_pipe

The *userforward* Router

```
driver = redirect
  check_local_user
  file = $home/.forward
  no_verify
  no_expn
  check_ancestor
  file_transport = address_file
  pipe_transport = address_pipe
  reply_transport = address_reply
  condition = ${if exists{$home/.forward} {yes} {no} }
```

- The contents of `$home/.forward` is read and used as "data" for the redirect router driver
- The `condition` could be replaced by:
  `require_files = $home/.forward`

The *localuser* Router

- ```
  localuser:
    driver = accept
    check_local_user
    transport = local_delivery
    cannot_route_message = Unknown user
  ```
- This is the last router, so if it does not accept, the message is bounced as undeliverable
- This driver always accepts, if the conditions are met
- `check_local_user` means that the local user must exist
- `cannot_route_message` sets the message that will be returned to the SMTP client when this happens
  ```

The Redirect Driver

- Tells Exim to call an internal router module called *redirect* to do the routing
- redirect is used for aliases files, virtual domains, .forward files... anything that redirects mail
- In the manual this driver is called the “redirect router” (chapter 22)
- Not the same as a router called “redirect”, which could use any driver you like
- I prefer to call it “the redirect driver”
- The `data` option is expanded to the new destination

Testing the system_aliases Router

- Redirect root's mail to the afnog user
  - ***exim -bt root***

    ```
    root@pcXX.sse.ws.afnog.org
      router = localuser, transport = local_delivery
    ```
  - ***sudo vi /etc/aliases***
    - ***root: afnog***
  - ***exim -bt root***

    ```
    afnog@pcXX.sse.ws.afnog.org
        <-- root@pcXX.sse.ws.afnog.org
      router = localuser, transport = local_delivery
    ```
- Did it work? How do you know?

Simple Redirecting Router

- Redirect a single local part to another local part
  - ***exim -bt foo@mydomain.example.com***
    foo@mydomain.example.com is undeliverable
  - ***sudo vi /usr/local/etc/exim/configure***
    - begin routers
    - ***redirect_foo_to_afnog:***
      driver = redirect
      domains = mydomain.example.com
      local_parts = foo
      data = afnog
  - ***exim -bt foo@mydomain.example.com***
    afnog@pcXX.sse.ws.afnog.org
    <-- foo@mydomain.example.com
    router = localuser, transport = local_delivery
- Did it work? How do you know?

Adding a Virtual Domain

- Tell Exim what to do with the mail domain *virtual.example.com*:
  - ***exim -bt foo@virtual.example.com***
    foo@virtual.example.com is undeliverable
  - ***sudo vi /usr/local/etc/exim/configure***
    - begin routers
    - ***virtual_domain_router:***
      driver = redirect
      domains = virtual.example.com
      ***data = ${lookup {$local_part} lsearch ***
      {/usr/local/etc/exim/virtual.example.com}}
  - ***exim -bt foo@virtual.example.com***
    foo@virtual.example.com cannot be resolved at this time
- What's wrong?

Debugging Routers

- ***sudo exim -bt -d-all+route foo@virtual.example.com***
  - routing foo@virtual.example.com
  - --------> virtual_domain_router router <--------
    local_part=foo domain=virtual.example.com
  - virtual_domain_router router: defer for
    foo@virtual.example.com
  - message: failed to expand "${lookup {$local_part} lsearch

    {/usr/local/etc/exim/virtual.example.com}}": failed to open
    /usr/local/etc/exim/virtual.example.com for linear search:
    No such file or directory

- Exim tried to open */usr/local/etc/exim/virtual.example.com*
- The file did not exist
- So the router deferred the message.

Fixing the Problem

- Create the file */usr/local/etc/exim/virtual.example.com:*
  - ***sudo vi /usr/local/etc/exim/virtual.example.com***
    - ***foo: afnog***
- Test again:
  - ***exim -bt foo@virtual.example.com***

```
afnog@pcXX.sse.ws.afnog.org
    <-- foo@virtual.example.com
  router = localuser, transport = local_delivery
```

- Note that we did not add *virtual.example.com* to our local_domains list. Why did it work?

Running many Virtual Domains

- ***exim -bt john@toomany.example.com***

  john@toomany.example.com is undeliverable

- ***sudo vi /usr/local/etc/exim/configure***
  - virtual_domain_router:
    driver = redirect
    require_files = /usr/local/etc/exim/$domain
    data = ${lookup {$local_part} lsearch \
    {/usr/local/etc/exim/***$domain***}}
  - don't forget to remove the "domains" line!
- ***sudo vi /usr/local/etc/exim/toomany.example.com***
  - ***john: afnog***
- ***exim -bt john@toomany.example.com***

  afnog@pcXX.sse.ws.afnog.org
  <-- john@toomany.example.com
  router = localuser, transport = local_delivery

Manual Routing a Domain

- ***exim -bt foo@manual.example.com***
  foo@manual.example.com is undeliverable
- ***sudo vi /usr/local/etc/exim/configure***
  - ***manual_router:***
    driver = manualroute
    domains = manual.example.com
    route_data = noc.sse.ws.afnog.org
    transport = remote_smtp
- ***exim -bt foo@manual.example.com***
  foo@manual.example.com
  router = manual_router, transport = remote_smtp
  host noc.sse.ws.afnog.org [196.200.219.200]

Manual Routing all Domains

- ***exim -bt foo@example.com***

```
foo@example.com
  router = dnslookup, transport = remote_smtp
  host example.com [208.77.188.166]
```

- ***sudo vi /usr/local/etc/exim/configure***
  - # replace the default dnslookup router

```
smarthost:
  driver = manualroute
  route_data = noc.sse.ws.afnog.org
  domains = ! +local_domains
  transport = remote_smtp
  ignore_target_hosts = 0.0.0.0 : 127.0.0.0/8
  no_more
```

- ***exim -bt foo@example.com***

```
foo@example.com
  router = smarthost, transport = remote_smtp
  host noc.sse.ws.afnog.org [196.200.219.200]
```

Delivering to RADIUS users (1)

- No local account, so *localuser* router won't work
- Edit */usr/local/etc/exim/configure*
- Add the MySQL login details to global section, before `begin acl`:
  - ***hide mysql_servers = localhost/radius/radius/radpass***
- Add a new router, before the *localuser* router:
  - ***radius:***
  - *** driver = accept***
  - *** local_parts = mysql;SELECT 1 FROM radcheck WHERE username = '${quote_mysql:$local_part}';***
  - *** transport = local_delivery***

Delivering to RADIUS users (2)

- Edit */usr/local/etc/exim/configure*, find the *local_delivery* transport, and comment out this line:
  - `user = $local_part`
- Test with exim -bt:
  - ***sudo exim -bt afnog@pcXX.sse.ws.afnog.org***
    - `afnog@pcXX.sse.ws.afnog.org`
    - `router = localuser, transport = local_delivery`
  - ***sudo exim -bt fred@pcXX.sse.ws.afnog.org***
    - `fred@pcXX.sse.ws.afnog.org`
    - `router = radius, transport = local_delivery`
  - ***sudo exim -bt fredd@pcXX.sse.ws.afnog.org***
    - `fredd@pcXX.sse.ws.afnog.org is undeliverable: Unknown user`

Delivering to RADIUS users (3)

- Restart Exim
- Test with SWAKS (thanks Joost!)
  - ***pkg_add -r swaks***
  - ***swaks -t pcXX.sse.ws.afnog.org***
    ```
    <-  250 OK id=1OHduc-0005Qx-CO
    ```
  - ***grep -A2 "Message-Id.*1OHduc-0005Qx-CO" /var/mail/afnog***
    ```
    This is a test mailing
    ```
  - ***swaks -t fred@pcXX.sse.ws.afnog.org***
    ```
    <-  250 OK id=1OHdxG-0005RH-HC
    ```
  - ***sudo grep -A2 "Message-Id.*1OHdxG-0005RH-HC" /var/mail/fred***
    ```
    This is a test mailing
    ```
  - ***swaks -t fredd@pcXX.sse.ws.afnog.org***

Aptivate's Routers

- **net4dev** (manualroute)
- dnslookup
- **domain_aliases** (redirect, virtual domains)
- **domain_aliases_suffixed** (ditto)
- **default_aliases** (renamed system_aliases)
- **no_more_aliases** (not local_domains)
- user_forward
- **procmail** (user ~/.procmailrc files)
- **localuser_nosuffix** (renamed localuser)

Local Part Suffixes

- Allows you to send mail to afnog-anything and have it delivered to afnog
- Users can filter mail to different boxes
- Configured in the router:
  - `local_part_suffix = +* : -*`
  - `local_part_suffix_optional`
- If user names contain a suffix character, that part of the username will be removed!
  - Put a router without suffixes before the one with suffixes
- Prefix is possible as well

Next up: Transports

- Global (no name)
- Routers (decide what to do with mail)
- **Transports (control how exactly it is delivered)**
- Access Control (who is allowed to send mail)
- Authenticators (logging in to relay mail)
- Troubleshooting (when things go wrong)

Transports

- Control how messages are delivered
- Only used when referenced from routers
- Order does not matter
- Standard transports:
  - remote_smtp
  - local_delivery
  - address_pipe
  - address_file
  - address_reply

The *remote_smtp* Transport

- ```
  remote_smtp:
    driver = smtp
  ```
- no options or conditions
- driver specifies a chunk of Exim code
- this time a transport driver (not a router driver)
- the *smtp* driver delivers mail to another server using SMTP
- the remote server is set by the *dnslookup* or *manualroute* driver
  ```

The *local_delivery* Transport

```
local_delivery:
  driver = appendfile
  file = /var/mail/$local_part
  delivery_date_add
  envelope_to_add
  return_path_add
  group = mail
  user = $local_part
  mode = 0660
  no_mode_fail_narrower
```

- Delivers mail to a file in mbox format
- One large file, bad for scalability

Procmail Router

- ***sudo pkg_add -r procmail***
- ***vi /home/afnog/.procmailrc:***
  - ***:0f***
    | sed -e 's/foo/bar/'
- ***echo food | mail afnog***
- ***tail -2 /var/mail/afnog***
  food
- ***sudo vi /usr/local/etc/exim/configure***
  - begin routers
  - ***procmail_router:***
    driver = accept
    check_local_user
    transport = procmail_pipe
    require_files = ${home}/.procmailrc
    no_verify

Procmail Transport

- ***sudo vi /usr/local/etc/exim/configure***
  - begin transports
  - ***procmail_pipe:***
    driver = pipe
    command = "/usr/local/bin/procmail"
    return_path_add
    delivery_date_add
    envelope_to_add
- ***sudo /usr/local/etc/rc.d/exim restart***
- ***echo food | mail afnog***
- ***tail -2 /var/mail/afnog***
  bard
- ***rm ~/.procmailrc***

Switch to Maildirs

- ***sudo vi /usr/local/etc/exim/configure***
  - local_delivery:
    driver = appendfile
    maildir_format
    directory = $home/mail
    delivery_date_add
    envelope_to_add
    return_path_add
    group = mail
    user = $local_part
    mode = 0660
    no_mode_fail_narrower
- ***sudo /usr/local/etc/rc.d/exim restart***
- ***ls /home/afnog/mail***
- ***echo test | mail afnog***
- ***ls /home/afnog/mail***

Next up: Access Control

- Global (no name)
- Routers (decide what to do with mail)
- Transports (control how exactly it is delivered)
- **Access Control (who is allowed to send mail)**
- Authenticators (logging in to relay mail)
- Troubleshooting (when things go wrong)

Access Control

- Controls who is allowed to send you mail, or not
- Most useful weapon in the war against spam
- Most SMTP commands are subject to an Access Control List (ACL) (see chapter 40 of the manual)
- Most commonly used are RCPT and DATA ACLs
  - Why not MAIL?
- DATA ACL applies at the end of the DATA command, after the message body has been sent
  - Too late to reject individual recipients
  - Too late to save bandwidth

Using Access Control Lists

- ACLs are named followed by a colon : and usually start with *acl_*
  - which ACLs does Exim include by default?
- ACLs can appear in any order in the “acl” section
- ACLs are not used unless:
  - referenced in the global configuration, or
  - called by another ACL
- Look for acl_* statements in the global section
  - which ACLs does Exim use by default?

Anatomy of an ACL

- Every ACL consists of Access Control Entries
- Every entry starts with a **verb**
  - every verb ends the previous entry and starts a new one
- Other lines are **conditions** and **options**
  - Conditions control **whether** the verb is executed
  - Options control **what** the verb does when executed
- Order of entries and lines in an ACL is important
  - Processing of an entry stops as soon as a condition fails
  - Options after a condition that fails are not used
  - Can change the options and then apply more conditions

Access Control Verbs

- **accept:** the command is allowed
- **defer:** command refused, returns a temporary error
- **deny:** command refused, returns a permanent error
- **discard:** returns success but throws away the recipient or message
- **drop:** like deny, but drops the connection too
- **require:** opposite of deny, denies the message if not all conditions are met
- **warn:** writes a warning message to the logs, but allows command to proceed

The *acl_check_rcpt* ACL

```
• accept  hosts = :

• deny    message       = Restricted characters in address
          domains       = +local_domains
          local_parts   = ^[.] : ^.*[@%!/|]

• accept  local_parts   = postmaster
          domains       = +local_domains

• require verify        = sender

• accept  hosts         = +relay_from_hosts
          control       = submission

• accept  authenticated = *
          control       = submission

• require message = relay not permitted
          domains = +local_domains : +relay_to_domains

• require verify = recipient
```

Address Verification

- *verify = sender* or *verify = recipient*
- $sender_verify_failure or $recipient_verify_failure will contain one of the following words:
  - **qualify** (the address was unqualified (no domain), and the message was neither local nor came from an exempted host)
  - **route** (routing failed)
  - **mail** (routing succeeded, and a callout was attempted; rejection occurred at or before the MAIL command)
  - **recipient** (the RCPT command in a callout was rejected)
  - **postmaster** (the postmaster check in a callout was rejected)

Callouts

- Standard address verification only uses the Exim configuration file and the DNS
- Callouts make a pretend SMTP connection
  - Sender callouts connect to the sender domain's MX
  - Recipient callouts connect to the recipient domain's MX
- Callouts can reduce spam by rejecting invalid addresses
- Callouts do block some legitimate email
- Callouts are controversial, some consider them abuse

Testing Callouts

- ***sudo vi /usr/local/etc/exim/configure***
  - domainlist relay_to_domains = ***rl.example.com***
  - require ***message = Sender verify failed***
    verify = sender***/callout=120s***
  - require ***message = Recipient verify failed***
    verify = recipient***/callout=120s***
- ***exim -bh 1.2.3.4***
  - ***mail from:<nonexist@pcXX.sse.ws.afnog.org>***
  - ***rcpt to:<afnog@pcXX.sse.ws.afnog.org>***
    550 Sender verify failed
- ***exim -bhc 1.2.5.4***
  - ***mail from:<afnog@pcXX.sse.ws.afnog.org>***
  - ***rcpt to:<nonexist@rl.example.com>***
    550 Recipient verify failed

Blocking Senders and Recipients

- ```
  deny    senders = naNaijaadmin@list.nanaija.com
  ```
- ```
  deny    senders = *@web-performers.com
          message = Get lost, you lying link exchange \
                    spammers
  ```
- ```
  deny    hosts   = *.mailserve.net
          message = Get lost, you lying link exchange \
                    spammers
  ```
- ```
  deny    senders = bfsummit@bfsummit.com
          message = I hope you catch bird flu and die
  ```
- ```
  deny    senders    = \N^.*mission2007.*@dgroups.org$\N
          recipients = info@aidworld.org
          message    = Please remove me from your list.
  ```


  ```

Hate your neighbour?

- Add to your RCPT ACL:
  - ***deny hosts = pcYY.sse.ws.afnog.org***
    message = I don't like your socks
  - ***sudo /usr/local/etc/rc.d/exim restart***
- Ask your neighbour to test it:
  - ***telnet pcXX.sse.ws.afnog.org 25***
  - ***mail from:<afnog@pcYY.sse.ws.afnog.org>***
  - ***rcpt to:<afnog@pcXX.sse.ws.afnog.org>***
    `550 I don't like your socks`
- How would you block everyone in the classroom?
- What do you see in the logs?

Sender Policy Framework

- Allows you to say which IPs are allowed to send from your domain (prevent spammers from using it)
- Useful when you want to block all mail from a domain, or only participate in SRS mailing lists
- Only works when people reject mails that fail SPF
- Causes problems for mailing lists not using SRS
- Many people complain, but it works for me!

Enable SPF for your domain

- Generate your SPF record for your domain using www.openspf.org that only allows your PC to send:
  - e.g. "`v=spf1 a:pcXX.sse.ws.afnog.org ~all`"
- Edit the zone file for XXXX.afnogws.gh and add:
  - ***@ IN TXT "v=spf1 a:pcXX.sse.ws.afnog.org ~all"***
- Reload the zone and query the TXT record using *dig*
- Add an SPF check high up in your RCPT ACL:
  - ```
    deny spf = fail
         message = SPF check failed: $spf_smtp_comment
         log_message = SPF check failed: $spf_result
    ```
    ```

Blackmail

```
• deny     ! hosts = +relay_from_hosts
           ! authenticated = *
           dnslists = zen.spamhaus.org
           message = $sender_host_address \
           blacklisted by Spamhaus\n\
           (http://www.spamhaus.org/query/bl?
  ip=$sender_host_address)\n\
           $dnslist_text

• warn     ! hosts = +relay_from_hosts
           ! authenticated = *
           dnslists = bl.spamcop.net
           message = X-Warning: \
             $sender_host_address blacklisted \
             by $dnslist_domain ($dnslist_text)
```

Name Calling

```
deny condition = ${if match \
     {${lookup dnsdb \
        {zns=${sender_address_domain}}}} \
     {.*\.ip4dns\.com}}
     message = You look like a spammer to me
```

- Searches for nameservers for the sender's mail domain, and recursively up until it finds some
- Pattern match against `.*\.ip4dns\.com`
  - ns1.ip4dns.com
  - ns2.ip4dns.com

Don’t Pretend to be Me

- ```
  drop ! hosts = :
       ! hosts = 80.248.178.170
       condition = ${if eq \
         {$smtp_command_argument} \
         {80.248.178.170}}
       message = You are SO lying
  ```
- Catches people who say HELO `80.248.178.170` (my own IP address) but are not me!
  ```

Bad Juju

- acl_smtp_helo = acl_check_helo
- acl_check_helo:
- drop condition = ${if or { \
      {!match{$smtp_command_argument}
              {\\.}} \
      { match{$smtp_command_argument}
              {\\d+[.-]\\d+[.-]\\d+[.-]\\d+}} \
      }}
      message = Please configure your mail \
                server with a real hostname
      log_message = Invalid HELO
- acl_check_rcpt:
- deny condition = ${if eq {$sender_helo_name}{}}
      message   = Please say HELO first

Assassinating Spam(mers)

- ***sudo pkg_add -r p5-Mail-SpamAssassin***
  Do you wish to run sa-update to fetch new rules [N]? ***n***
- ***cd /usr/local/etc/mail/spamassassin***
- ***sudo cp local.cf.sample local.cf***
- ***sudo vi local.cf***
  - ***use_pyzor 0***
    use_razor2 0
    skip_rbl_checks 1
    use_bayes 0
- ***sudo vi /etc/rc.conf***
  - ***spamd_enable="YES"***
- ***sudo /usr/local/etc/rc.d/sa-spamd start***
- ***spamc -R***
  - ***subject: penis enlargement***
- press Ctrl+D to end message

Filtering Mail through SpamAssassin

- Uncomment the following lines in the configuration:
  - ```
    deny    spam        = nobody
            add_header = X-Spam_score: $spam_score\n\
                         X-Spam_score_int: $spam_score_int\n\
                         X-Spam_bar: $spam_bar\n\
                         X-Spam_report: $spam_report
    ```
- Test with *exim -bs*:
  - ```
    exim -bs
    mail from:<>
    rcpt to:<afnog@pcXX.sse.ws.afnog.org>
    data
    message-id: abcd
    subject: BUY VIAGRA HERE!!!

    <html><p>Dear friend</p>
    <p>VIAGRA $10.99</p>
    <p>RISK FREE</P></HTML>
    .
    quit
    ```

Installing Clam Antivirus

- ***sudo pkg_add -r clamav***
- ***sudo freshclam***
- ***sudo pw usermod clamav -G mail***
- ***sudo vi /etc/rc.conf***
  - ***clamav_clamd_enable="YES"***
  - ***clamav_freshclam_enable="YES"***
- ***sudo /usr/local/etc/rc.d/clamav-clamd start***
- ***fetch http://noc.sse.ws.afnog.org/sse/exim/eicar***
- ***clamdscan eicar***

```
/usr/home/afnog/eicar: Eicar-Test-Signature FOUND

Infected files: 1
```

Filtering Mail through ClamAV

- ***sudo vi /usr/local/etc/exim/configure***
  - ***av_scanner = clamd:/var/run/clamav/clamd.sock***
  - acl_check_data:
  - ***deny malware = *
        message = This message contains a virus \
    ($malware_name).***
- ***cat eicar***
- ***exim -bs***

```
mail from:<afnog@noc.sse.ws.afnog.org>
rcpt to:<afnog@noc.sse.ws.afnog.org>
data
subject: test
X5O!P%@AP[4\PZX54(P^)7CC)7}$EICAR-STANDARD-
ANTIVIRUS-TEST-FILE!$H+H*
.
550 This message contains a virus...
```

Next up: Authenticators

- Global (no name)
- Routers (decide what to do with mail)
- Transports (control how exactly it is delivered)
- Access Control (who is allowed to send mail)
- **Authenticators (logging in to relay mail)**
- Troubleshooting (when things go wrong)

Why use SMTP Authentication?

- Your boss wants to send outbound mail from home
- You want to reduce spam from your customers
- You want to use the same server for inbound and outbound mail
- **Warning:** it's easy to enable SMTP authentication and not use SSL, resulting in plain text passwords being sent over the Internet
- PAM doesn't work directly from Exim on FreeBSD, so we'll install *saslauthd* for PAM authentication

Installing *saslauthd*

- Install the binary package (may already be installed):
  - ***sudo pkg_add -r cyrus-sasl-saslauthd***
- Enable and start it:
  - ***sudo vi /etc/rc.conf***
    - ***saslauthd_enable="YES"***
  - ***sudo /usr/local/etc/rc.d/saslauthd start***
- Test that it authenticates properly:
  - ***sudo testsaslauthd -u afnog -p sse***
    `0: OK "Success."`
  - ***sudo testsaslauthd -u afnog -p wrong***
    `0: NO "authentication failed"`

Enabling SMTP Authentication

- ***sudo vi /usr/local/etc/exim/configure***
  - begin authenticators
  - LOGIN:

```
    driver = plaintext
    server_prompts = <| Username: | Password:
    server_condition = ${if saslauthd{{$auth1} \
  {$auth2}{smtp}}}
    server_set_id = $1
  # server_advertise_condition = ...
```

- ***exim -bs***

```
220 noc.sse.ws.afnog.org ESMTP Exim 4.69 ...
```

- ***ehlo 0***

```
250-noc.sse.ws.afnog.org Hello afnog at 0
250-SIZE 52428800
250-PIPELINING
250-AUTH LOGIN
250 HELP
```

Testing SMTP Authentication

- ***sudo pkg_add -r base64***
- ***echo -n afnog | base64***
  YWZub2c=
- ***echo -n sse | base64***
  c3Nl
- ***sudo -u mailnull exim -bh 1.2.4.5***
  220 noc.sse.ws.afnog.org ESMTP Exim 4.69 ...
- ***ehlo 0***
  ... 250-AUTH LOGIN ...
- ***auth login***
  334 VXNlcm5hbWU6
- ***YWZub2c=***
  334 UGFzc3dvcmQ6
- ***c3Nl***
  235 Authentication succeeded

Using RADIUS for Authentication

- ***radtest afnog afnog localhost 0 afnog***
  rad_recv: Access-Accept packet ...
- ***vi /etc/radius.conf***
  - ***auth localhost afnog***
- ***sudo vi /usr/local/etc/exim/configure***
  - LOGIN:
  - server_condition = ***${if radius {$auth1:$auth2}}***
- ***sudo -u mailnull exim -bh 1.2.4.5***
  220 noc.sse.ws.afnog.org ESMTP Exim 4.69 ...
- ***ehlo 0***
  ... 250-AUTH LOGIN ...
- ***auth login***
  334 VXNlcm5hbWU6
- ***YWZub2c=***
- ***YWZub2c=***
  235 Authentication succeeded

Testing Authenticated Relaying

- ***sudo -u mailnull exim -bh 1.2.4.5***
  220 noc.sse.ws.afnog.org ESMTP Exim 4.69 ...
- ***mail from:<afnog@mydomain.example.com>***
  250 OK
- ***rcpt to:<example@example.com>***
  550 relay not permitted
- ***ehlo 0***
- ***auth login***
- ***YWZub2c=***
- ***c3Nl***
  235 Authentication succeeded
- ***mail from:<afnog@mydomain.example.com>***
- ***rcpt to:<example@example.com>***
  250 Accepted

Encrypting SMTP Sessions

- Sending password without encryption is a bad idea!
- SSL encryption requires a certificate for the server
- We will re-use the self-signed SSL certificate we generated for Apache earlier
- In production you should use a purchased SSL certificate, to avoid man-in-the-middle attacks
- Encryption on port 25 uses STARTTLS to start encryption
- Port 465 forces encryption without STARTTLS, but conflicts with some Cisco routers

Enabling SSL Encryption

- Copy the certificates from Apache:
  - ***cd /usr/local/etc/apache22***
  - ***sudo cp server.* ../exim***
- Edit the Exim configuration and uncomment:
  - ***sudo vi /usr/local/etc/exim/configure***
    - `tls_advertise_hosts = *`
    - `tls_certificate = /usr/local/etc/exim/server.crt`
    - `tls_privatekey = /usr/local/etc/exim/server.key`
    - `daemon_smtp_ports = 25 : 465 : 587`
    - `tls_on_connect_ports = 465`
- Restart Exim to activate the changes
  - ***sudo /usr/local/etc/rc.d/exim restart***

Testing SSL Encryption

- Use the *openssl s_client* command to make an encrypted SMTP connection to Exim:
  - ***openssl s_client -connect localhost:25 \ -starttls smtp***
    ```
    250 HELP
    ```
  - ***ehlo 0***
    ```
    250-AUTH LOGIN
    250 HELP
    ```
  - ***auth login***
    ```
    334 VXNlcm5hbWU6
    ```
- Also test the SMTPS service on port 465:
  - ***openssl s_client -connect localhost:465***

Requiring SSL for Authentication

- Disable advertising the SMTP AUTH command when the session is not encrypted (chapter 33)
  - ***sudo vi /usr/local/etc/exim/configure***
    - LOGIN:

```
server_advertise_condition = \
  ${if def:tls_cipher}
```

  - ***exim -bs***

```
220 noc.sse.ws.afnog.org ESMTP Exim 4.69 ...
```

  - ***ehlo 0***

```
250-noc.sse.ws.afnog.org Hello afnog at 0
250-SIZE 52428800
250-PIPELINING
250-STARTTLS
250 HELP
```

Next up: Troubleshooting

- ✔ Global (no name)
- ✔ Routers (decide what to do with mail)
- ✔ Transports (control how exactly it is delivered)
- ✔ Access Control (who is allowed to send mail)
- ✔ Authenticators (logging in to relay mail)
- ➢ **Troubleshooting (when things go wrong)**

Logs and Debugging

- The main Exim log files are:
  - */var/log/exim/mainlog* (everything)
  - */var/log/exim/rejectlog* (rejected messages only)
  - */var/log/exim/paniclog* (errors about lost messages)
- What do the logs say for a successful mail?
- Use exigrep to find messages matching an address, user or message ID:
  - ***sudo exigrep john /var/log/exim/mainlog***
- What does it output? Why is it better than *grep*?

The Mail Queue

- When Exim accepts a message that it cannot deliver immediately, it is placed in the queue
- Stored in */var/spool/exim/input*
- Two files per message: *id*-D and *id*-H
- What do they contain? Have a look:
  - Put a message in the queue:
    - ***exim -odq afnog@mydomain.example.com***
      This is a test
      .
  - Run ***sudo mailq*** or ***sudo exim -bp*** to see the message ID

The Mail Queue

- Viewing messages on the queue:
  - ***sudo exim -Mvb <message-id>*** (view body only)
  - ***sudo exim -Mvh <message-id>*** (view headers only)
  - ***sudo exim -Mvc <message-id>*** (view whole message)
  - ***sudo exim -Mvl <message-id>*** (view logs)
- Force a queue run, to see why the message is failing:
  - ***sudo exim -v -qf <message-id>***

Where to Get Help

- The Exim Book
  - You should get a free copy this week
- The Exim Manual
  - http://www.exim.org/docs.html
- AfNOG Mailing List
  - http://www.afnog.org/mailinglist.html
  - Please subscribe to this list!
- Exim Users Mailing List
  - http://lists.exim.org/mailman/listinfo/exim-users
- The Aptivate Team!