Electric Mail & Postfix

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Agenda

- Electric Mail Systems
  - Message Flow
    - MUA, MTA, MDA, (MSA, MAA)
  - Mail Addressing & DNS
  - Mail Header
  - Mail aliases, forwarding
  - Mailing list
  - MailBox, MailDir
  - Talking with MTA

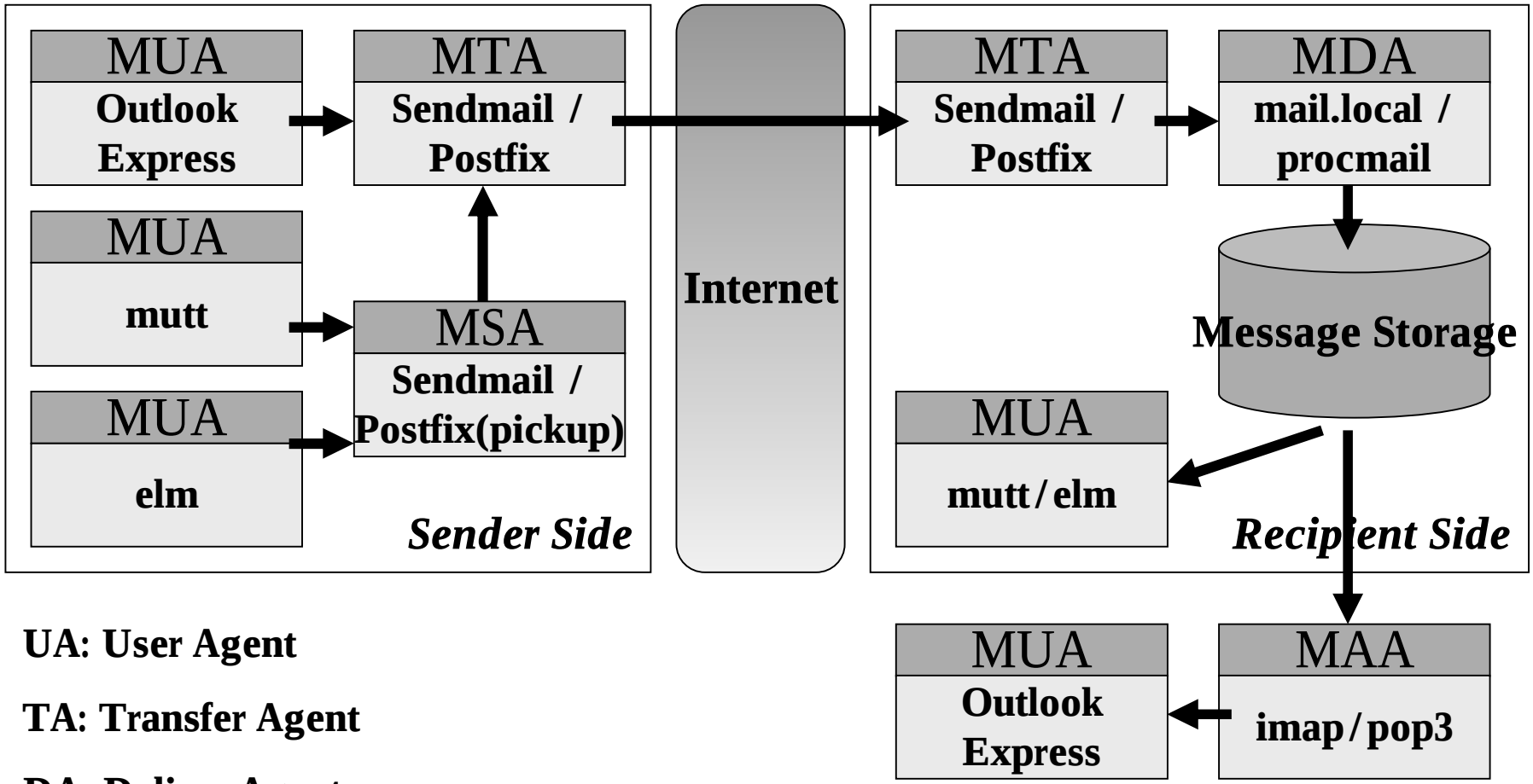
Agenda (cont.)

- Postfix
  - Installation
  - Basic Configuration
  - Running Postfix
  - How It Works
  - Advanced Postfix
    - Virtual Domain/Account
    - Mail Relay/Transport
    - SMTPD Restrictions
    - Header/Body Checks
    - Foreign Lookup Tables
    - Content Filtering
    - SASL Authentication

Part I: Electric Mail Systems

- Message Flow
  - MUA, MTA, MDA, (MSA, MAA)
- Mail Addressing & DNS
- Mail Header
- Mail aliases, forwarding
- Mailing list
- MailBox, MailDir
- Talking with MTA

Message Flow



UA: User Agent

TA: Transfer Agent

DA: Deliver Agent

SA: Submission Agent

AA: Access Agent

Related RFCs

- RFC 2821: **Simple Mail Transfer Protocol**
  - *Reliable and Efficient*
- RFC 2822: **Internet Message Format**
- RFC 1869: **SMTP Service Extensions (ESMTP)**
- RFC 1891: **ESMTP for Delivery Status Notifications**
- RFC 1894: **An Extensible Message Format for DSNs**
- RFC 2045: **MIME Part I: Format of Internet Message Bodies**
  - *Multipurpose Internet Mail Extensions*
- RFC 2476: **Message Submission**
- RFC 2554: **ESMTP for Authentication**
  - *SASL: Simple Authentication and Security Layer*

Mail Systems Agents

- MUA: Mail User Agent
  - Read and compose mail
  - mail, mutt, pine, elm, Outlook Express, Eudora, …, etc.
- MTA: Mail Transport Agent
  - Route messages among machines
  - SMTP(RFC 2821), ESMTP(RFCs 1869, 1870, …)
  - sendmail, qmail, postfix, smail, …, etc.
- MDA: Mail Delivery Agent
  - Place messages in a local message storage
  - /bin/mail, /bin/sh, mail.local, smrsh, procmail, …, etc.
  - To a person, a mailing list, a file or a program

Mail Systems Agents (cont.)

- MAA: Mail Access Agent (optional)
  - Connects the user agents to the message store
  - IMAP (**Internet Message Access Protocol**) or POP (**Post Office Protocol**)
- MSA: Mail Submission Agent
  - Split the mail submission agent from the MTA
  - Spread out the workload and maximize performance

Mail Addressing & DNS

- Route-based
  - UUCP address
    - mcvax!uunet!ucbvax!hao!boulder!lair!evi
    - evi@lair
- Location-independent
  - Internet Address
  - General form of Internet mail address
    - <user>@<host>
    - yzlai@hotmail.com

Mail Addressing & DNS (cont.)

- Mixed address
  - lair@evi@boulder.colorado.edu
- Route-based form of Internet address
  - <@site1,@site2,…,@siteN:user@final-site>
- ARPANET
  - <user>%<host1>%<host2>@<host3>
  - <user>@<host1>

Mail Addressing & DNS (cont.)

- Domain Name Service
  - Mail eXchange Record (MX Record)
  - tp.edu.tw IN MX 0 smtp.tp.edu.tw.
  - Preference number
    - Lower value / Higher Priority
  - Must be a host name, not IP Address
  - Must have valid A Record(s)
  - Can NOT be CNAME Record(s)

Mail Header

- Mail = Header + body
- Hidden by user agents
- We can add anything to mail header
- By convention, start with “X-”

```
Received: from 163.21.249.175
        by ms3.tp.edu.tw with Mail2000 ESMTP Server
V2.71N(254:0:AUTH_NONE)
        Fri, 06 Aug 2004 21:39:08 +0800 (CST);
        (envelope-from <epaper@games.epost.hinet.net>)
Return-Path: <epaper@games.epost.hinet.net>
Received: from sender.epost.hinet.net (enews.hinet.net [202.39.225.54])
        by smtp.tp.edu.tw (Postfix) with ESMTP
        id 5478F22CD57; Fri, 6 Aug 2004 21:39:04 +0800 (CST)
Message-ID: <10000519.842.ep-21@games.epost.hinet.net >
From: “HiNet 遊戲網” <epaper@games.epost.hinet.net>
To: “測試收件者” <netadm@tp.edu.tw>
Subject: HiNet遊戲網電子報20040807
Date: Fri, 6 Aug 2004 21:38:49 +0800 (CST)
X-Mailer: Microsoft Outlook Express 5.50.4522.1200
```

Mail aliases, forwarding

- Mail aliases
  - 1. In a user agent's configuration file
    - .muttrc
  - 2. In system-wide aliases
    - /etc/aliases, NIS map
      - admin: jdtsai, yzlai
      - help: :include:/etc/help-bounce
      - nobody: "/dev/null"
      - nhelp: "| /bin/mail2news tp.help"
  - 3. In a user's forwarding
    - ~/.forward
  - The order to lookup
    - 1 **è** 2 **è** 3

Mailing list

- Conventions in the aliases file:
  - mylist: :include: /etc/mail/include/mylist
  - mylist-request: “| mailing-list-program”
- Majordomo: http://www.greatcircle.com
- GNU Mailman: http://www.list.org
- ListProc: http://www.cren.net
- LISTSERV: http://www.lsoft.com

MailBox, MailDir

- MailBox (mbox)
  - All messages store in a single file for each user
    - Usually Spool Directory: /var/mail or /var/spool/mail
- MailDir
  - Using Directory Structure to store messages.
    - Avoid file locking and improve reliability
    - Usually have three sub-directory (tmp/, new/, cur/) under user's home directory

Talking with MTA

telnet smtp.tp.edu.tw 25
220 smtp.tp.edu.tw ESMTP TpEduNet(1) Official MX
EHLO smtp.ntnu.edu.tw
250-smtp.tp.edu.tw
250-PIPELINING
250-SIZE 50000000
250-ETRN
250 8BITMIME
MAIL FROM: <yzlai@hotmail.com>
250 Ok
RCPT TO: <netadm@tp.edu.tw>
250 Ok
DATA
354 End data with <CR><LF>.<CR><LF>
Mail Headers
<space line>
Mail Body
.
250 Ok: queued as 505D322987C
QUIT
221 Bye

SMTP Reply Codes

- 1yz
  - Positive Preliminary reply
- 2yz
  - Positive Completion reply
- 3yz
  - Positive Intermediate reply
- 4yz
  - Transient Negative Completion reply
- 5yz
  - Permanent Negative Completion reply

Part II: Postfix

- Installation
- Basic Configuration
- Running Postfix
- How It Works
- Advanced Postfix
  - Virtual Domain / Account
  - Mail Relay / Transport
  - SMTPD Restrictions
  - Header / Body Checks
  - Foreign Lookup Tables
  - Content Filtering
  - SASL Authentication

Introduction to Postfix

- To be fast, easy to administer and secure
- Build from over a dozen litter programs
  - Each perform only one specific task
- http://www.postfix.org
  - Postfix 2.1.4 (Postfix 2.1 Patchlevel 4)

Installation

- From FreeBSD ports
  - mail/postfix
    - make install
- From tarball
  - Download from http://www.postfix.org/download.html
  - make; make install
- Post-install on FreeBSD
  - Edit /etc/rc.conf: sendmail_enable="NONE"
  - Edit /etc/periodic.conf
- Post-install on Linux
  - Stop Original Mail Service (usually sendmail)

Basic Configuration Files

main.cf	Main configuration file. Hundreds parameters with sensible default values
master.cf	How a mailer component program should be run
access	The same as /etc/mail/access (for access control)
aliases	The same as /etc/mail/aliases
canonical	(recursive) address mapping/rewriting table
header_checks	Access list of mail headers
mynetworks	SMTP client lists
transport	Email addresses to message delivery transports and/or relay hosts mappings
virtual	Address aliases for arbitrary local or non-local recipient
relay_domains	Who treat this host as their MX (Mail eXchange)

main.cf

- parameter = value
- other_parameter = $parameter
- My own hostname

  myhostname
- My own domain name

  mydomain
- What domain name to use in outbound mail

  myorigin = $myhostname (“user@myhostname”)

  myorigin = $mydomain (“user@mydomain”)

main.cf (cont.)

- What domain to receive mail for

  mydestination
- What clients to relay mail from

  mynetwork_style

  mynetworks
- What destination to relay mail to

  relay_domains
- What delivery method: direct or indirect

  relayhost

main.cf (cont.)

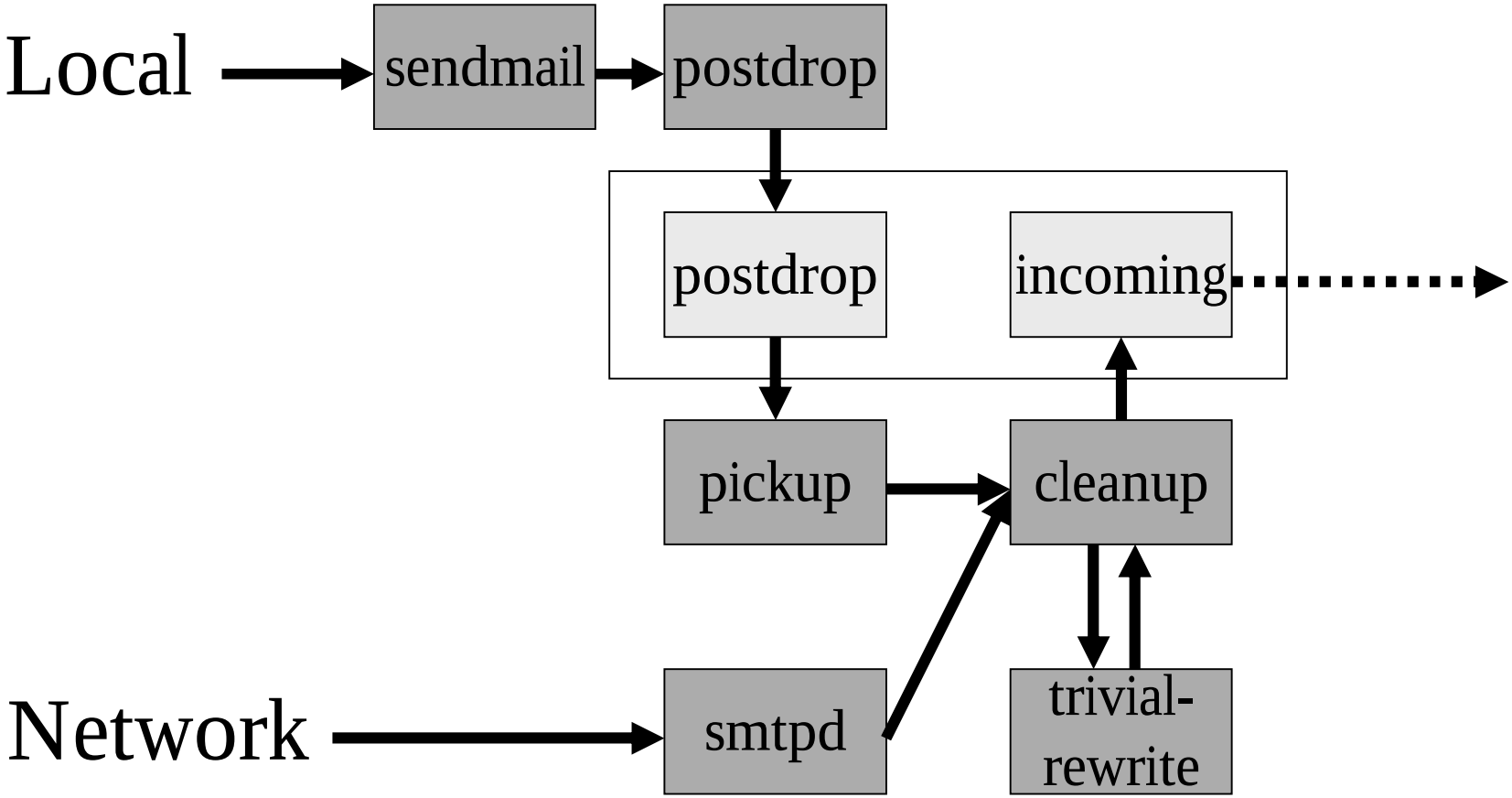
- All main.cf parameters can be found
  - http://www.postfix.org/postconf.5.html
  - `postconf`

- What you need to know about Postfix logging
  - /etc/syslog.conf
    - mail.err /dev/console
    - mail.debug /some/log/file
    - egrep '(reject|warning|error|fatal|panic):' /some/log/file

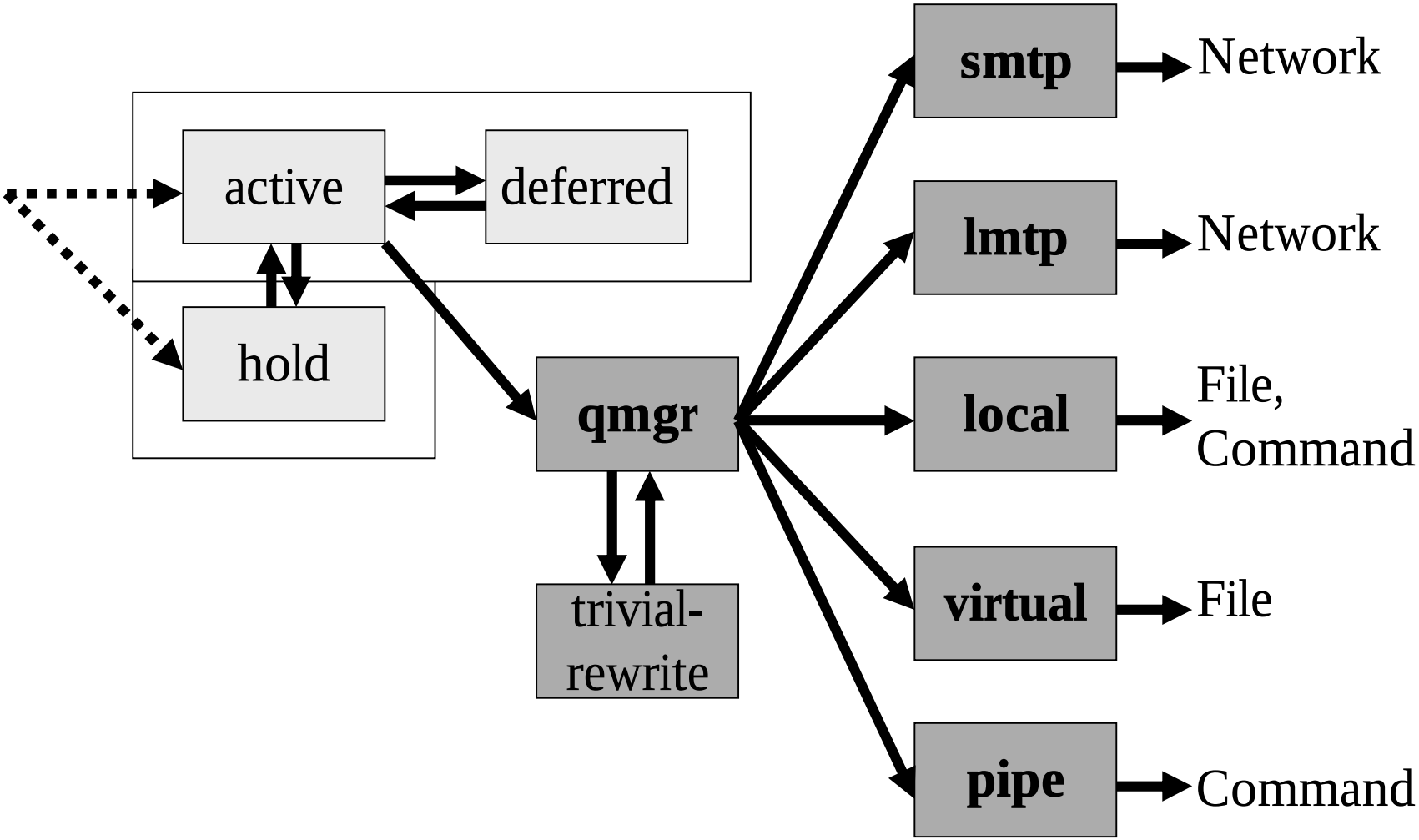
Running Postfix

- postfix
  - start
  - stop
  - reload (Re-read configuration files/Re-run postfix after minor upgrade)
  - flush (Attempt to deliver every message in the deferred mail queue)
  - check
- postqueue
  - -p (same as `mailq`)
  - -f (same as `postfix flush`)
  - -s <site>
- postsuper
  - -d
  - -h
  - -H

How Postfix receives mail



How Postfix delivers mail



Virtual Domain/Account

- shared/separate domains
- system/virtual account
- shared domain with system account

  mydestination = $myhostname, a.edu.tw, b.edu.tw
- separate domain with system account

  virtual_alias_domains = a.edu.tw, b.edu.tw

  virtual_alias_maps = hash:/some/dir/virtual_alias

qoo@a.edu.tw	qoo.a@localhost
test@b.edu.tw	test@some.where.on.earch

Virtual Domain/Account (cont.)

- separate domain with virtual account
  - Cons
    - Nologin
    - Need POP/IMAP server with virtual account support
  - Pros
    - No UID limit
    - Ease to management

virtual_mailbox_domains = a.edu.tw, b.edu.tw

virtual_mailbox_base = /var/vmail

virtual_mailbox_maps = hash:/some/dir/virtual

qoo@a.edu.tw	a/qoo
test@b.edu.tw	b/test

Mail Relay

- relay_domains

  163.21.0.0/16, /some/dir/relay_domains

- relay_recipients

  hash:/some/dir/relay_recipients

qoo@a.edu.tw	any_value
test@b.edu.tw	any_value
@c.edu.tw	catchall.c@localhost

Transport

- Change the default message delivery transport
- transport_maps = hash:/some/dir/transport

host/domain	transport:nexthop
tp.edu.tw	smtp:mail.tp.edu.tw
slhs.tp.edu.tw	smtp:[ms.slhs.tp.edu.tw]
cc.ntnu.edu.tw	smtp:[cc.ntnu.edu.tw]:10025
.mailserver.idv.tw	devnull:
zdl.net	devnull:

- master.cf

```
devnull   unix  -       n       n       -       -       pipe
  user=nobody argv=/bin/cat /dev/null
```

SMTPD Restrictions

- smtpd_client_restrictions
  - *Usually check IP/host/domain*
- smtpd_helo_restrictions
- smtpd_sender_restrictions
  - *MAIL FROM*
- smtpd_recipient_restrictions
  - *RCPT TO*
- smtpd_data_restrictions

SMTPD Restrictions (cont.)

- smtpd_client_restrictions

  reject_unknown_client

  reject_rbl_client

  reject_unknown_client

  reject_non_fqdn_hostname

  check_client_access type:mapname

  permit_mynetworks

SMTPD Restrictions (cont.)

- smtpd_helo_restrictions
  check_helo_access type:mapname
- smtpd_sender_restrictions
  reject_non_fqdn_sender
  reject_unknown_sender_domain
  check_sender_mx_access type:mapname
  check_sender_access type:mapname
- smtpd_recipient_restrictions
  reject_unknown_recipient_domain
  check_recipient_access type:mapname

SMTPD Restrictions (cont.)

- Actions in check_xxxxx_access
  - Permit, OK
  - Reject [optional text]
  - [45]yz text
  - Hold [optional text]
  - Discard [optional text]
  - Filter transport:destination

Header/Body Checks

- header_checks = regexp:/some/dir/header_checks

  /match pattern/ ACTION
- body_checks = regexp:/some/dir/body_checks
- Actions
  - Ignore (*)
  - Permit, OK
  - Reject [optional text]
  - [45]yz text
  - Hold [optional text]
  - Discard [optional text]
  - Filter transport:destination

Header/Body Checks (cont.)

/^From: [a-z][0-9]{7,}@yahoo.com/	Reject Illegal mail header.
/^From: [a-z][0-9]{7,}@hotmail.com/	Reject Illegal mail header.
/^To: .*\.txt/	Reject Illegal mail header.
/^Received: from tp.edu.tw/	Reject Illegal mail header.
/^From: .*\<[a-z0-9]*@msa.hinet.net\>/	Reject User unknown.
/^From: .*\<.+\..+@ms[0-9]+.hinet.net\>/	Reject User unknown.
/^X-Mailer: ([0-9A-Za-z]{15,})$/	Reject Mailer $1 is unacceptable.
/^X-Library: Dynamailer/	Reject Dynamailer is unacceptable.
/^X-Library: Indy/	Reject Indy is unacceptable.
/^Content-Disposition: Multipart message/	Reject mail MAY contain the SirCam virus.
/^Subject: new photos from my party!/	Reject mail MAY contain the MyParty virus.
/^Subject: Re: Your password!$/	Reject mail MAY contain the Frethem virus.
/^Message-ID: <[a-z]{19}\@/	Reject mail MAY contain the Bagle virus

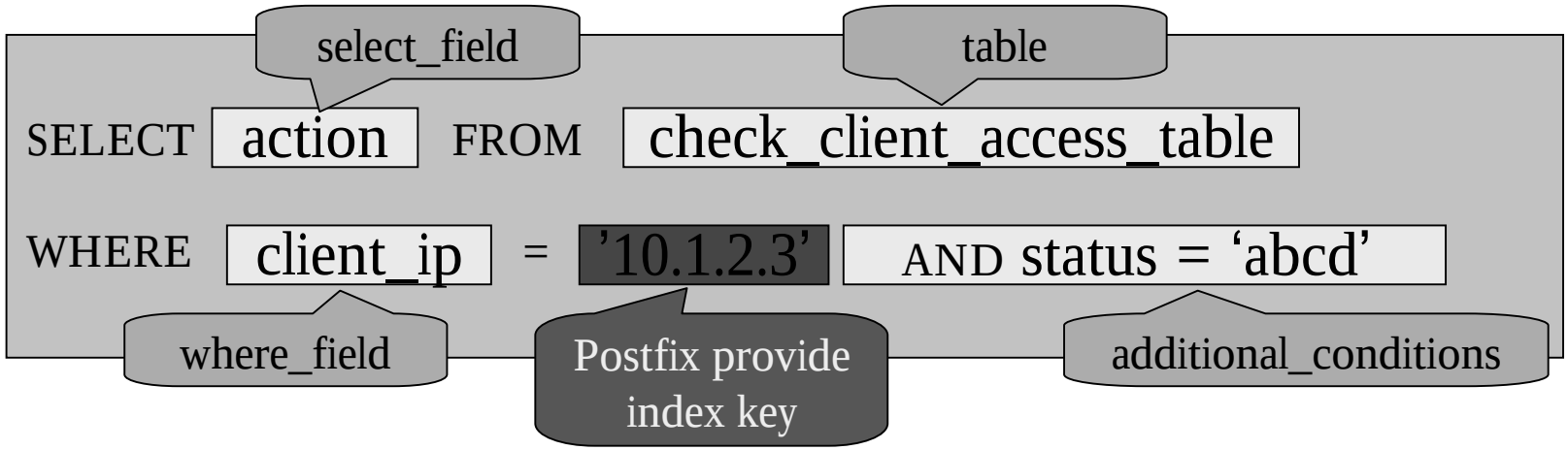
Foreign Lookup Tables

- Postfix Supports Berkeley DB, MySQL, LDAP, and PostgreSQL as his foreigh tables.
- Virtual account/Large dynamic data, IP,…

- smtpd_client_restrictions =

  check_client_access mysql:/some/dir/check_client.cf

Foreign Lookup Tables (cont.)

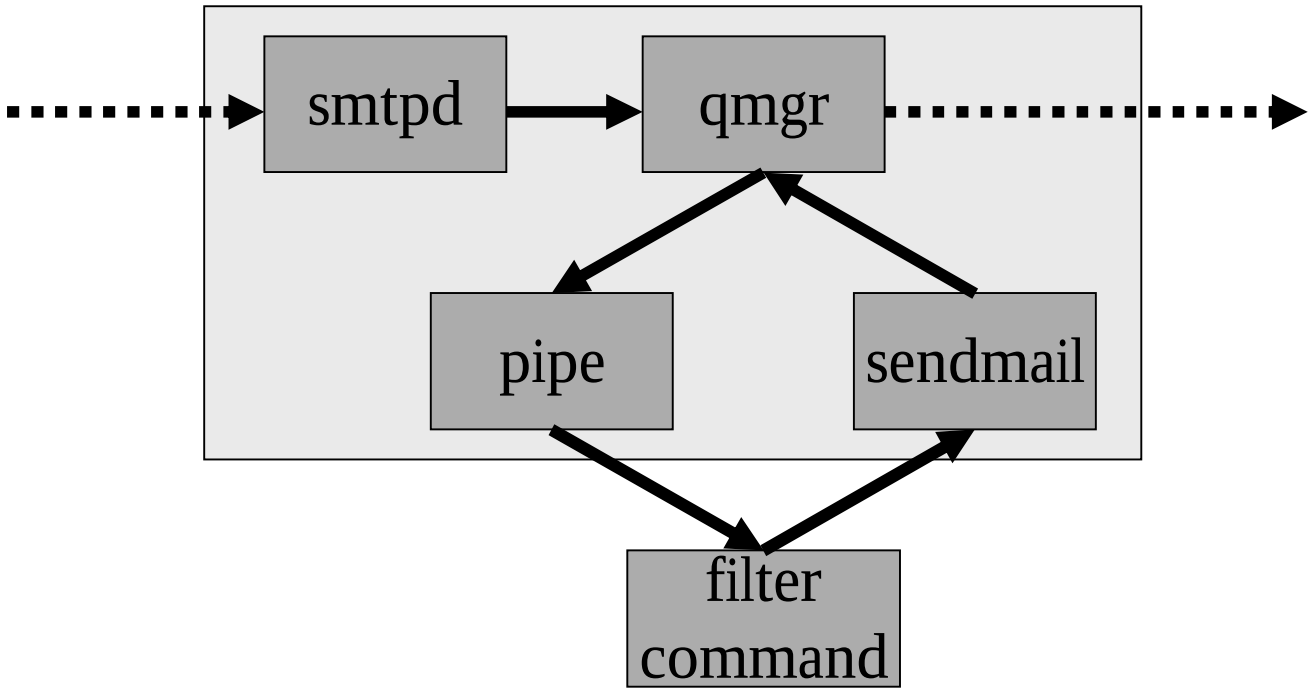


/some/dir/check_client.cf

host = 192.168.169.170
user = netadm
password = Godknows
dbname = for_postfix_20040816_introduce
table = check_client_access_table
select_field = action
where_field = client_ip
additional_conditions = and status = 'abcd'

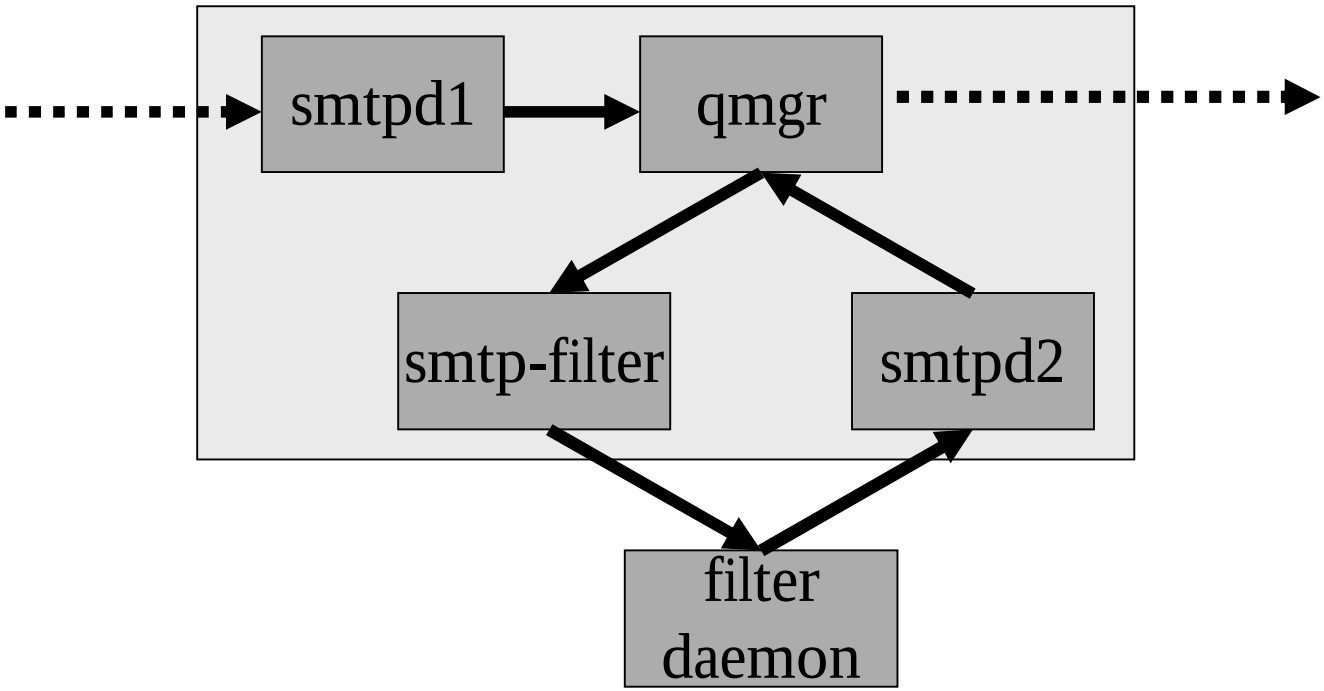
Content Filtering

- Usually for Virus/Spam Scanning
  - External-program filtering



Content Filtering (cont.)

- Daemon-based filtering
  - more efficient



Content Filtering (cont.)

- main.cf

  content-filter = smtp-filter:[127.0.0.1]:10024

- master.cf

  smtp-filter unix - - n - 10 smtp

  -o myhostname=localhost

  localhost:10025 inet n - n - 10 smtpd

  -o content_filter=

  -o mynetworks=127.0.0.0/8

  -o smtpd_client_restriction=permit_mynetworks, reject

  -o smtpd_helo_restriction=

  -o smtpd_sender_restriction=

  -o smtpd_recipient_restriction=

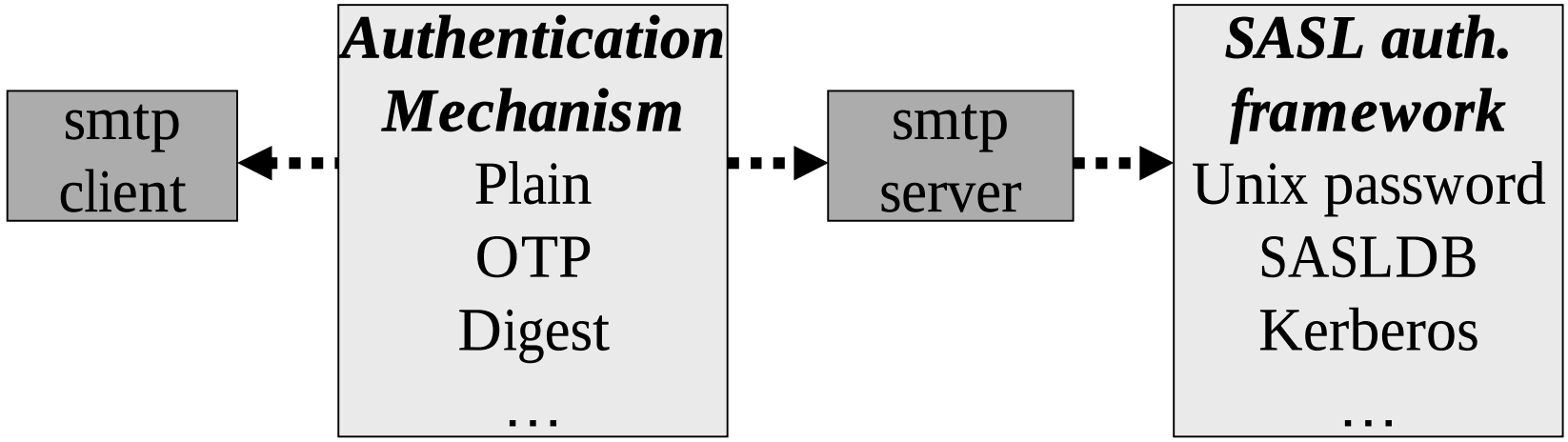
  -o header_checks=

Content Filtering (cont.)

- Anti-Virus
  - AMaViS / AMaViSd
    - McAfee VirusScan
    - Sophos Anti-Virus
    - Trend InterScan
    - Sophie + SAVI
  - Central Command Vexira MailArmor
  - Avpcheck
- Spam-Detection
  - SpamAssassin
- Amavisd-new + Razor + Spamassassin

SASL Authentication

- Simple Authentication and Security Layer
- Cyrus SASL



SASL Authentication (cont.)

telnet smtp.tp.edu.tw 25
220 smtp.tp.edu.tw ESMTP TpEduNet(1) Official MX
EHLO smtp.ntnu.edu.tw
250-smtp.tp.edu.tw
250-PIPELINING
250-SIZE 50000000
250-ETRN
250-AUTH DIGEST-MD5 PLAIN CRAM-MD5
250 8BITMIME
AUTH PLAIN dGVzdAB0ZXN0AHRlc3RwYXNz
235 Authentication successful
MAIL FROM: <yzlai@hotmail.com>
…

SASL Authentication (cont.)

- main.cf

  smtpd_sasl_auth_enable = yes

  smtpd_recipient_restrictions =

    permit_sasl_authenticated

  smtpd_sasl_security_options =

    noplaintext, noactive, nodictionary, noanonymous

- smtpd.conf (sasl)

  pwcheck_method:

    saslauthd (unix password)

    auxprop (sasl dedicate password, `man saslpasswd2`)

The End

Thank you!