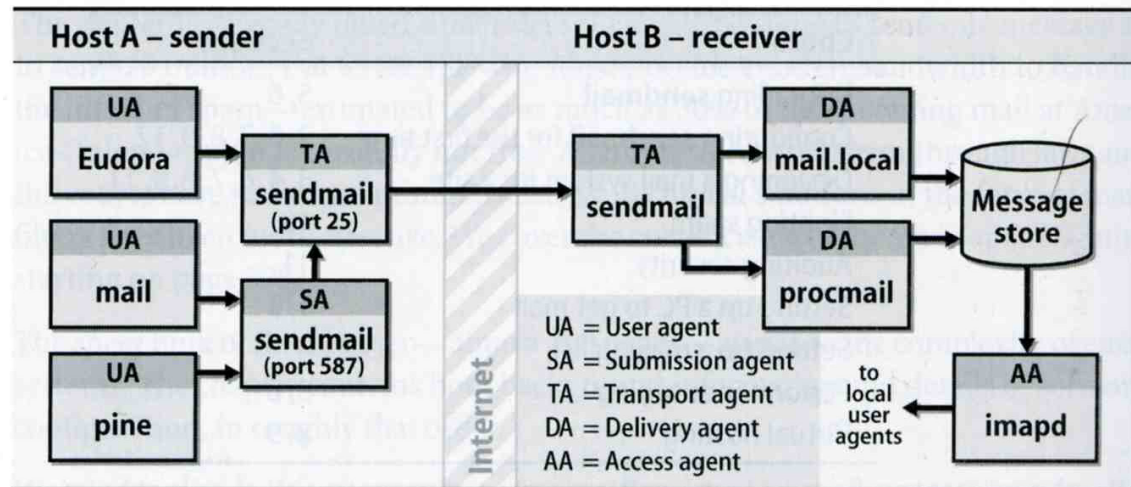


**sendmail**

# Introduction

- > sendmail is a MTA program
  - The most complete and complex mail transport program with about 70% popularity
  - Interface between MUA and MDA
  - Speak SMTP and deliver mail to remote via the Internet

Exhibit A Mail system components



# History of sendmail (1)

- > sendmail version5
  - **Eric Allman, student of UC Berkeley, in 1983**
  
- > IDA sendmail enhanced from v5
  - **Lennart Lovstrand, student of University of Linkoping in Sweden, 1987**
    - Institutionen for Datavetenskap (cs department)
  
- > KJS sendmail enhanced from IDA
  - **Paul Vixie at DECWRL during 1989-1993**
    - King James Sendmail
  
- > sendmail version8
  - **Eric included enhanced features in IDA and KJS in 1993**
  
- > Newest version
  - **Sendmail 8.13.4 on 2005-03-27**

# History of sendmail (2)

## > Check your sendmail version

- % `/usr/sbin/sendmail -d0.1 -bt < /dev/null`
- % `telnet localhost 25`

```
tytsai@tybsd:~> sendmail -d0.1 -bt < /dev/null
```

```
Version 8.13.1
```

```
Compiled with: DNSMAP LOG MAP_REGEX MATCHGECOS MILTER MIME7TO8 MIME8TO7  
NAMED_BIND NETINET NETINET6 NETUNIX NEWDB NIS PIPELINING SCANF  
STARTTLS TCPWRAPPERS USERDB XDEBUG
```

```
===== SYSTEM IDENTITY (after readcf) =====
```

```
(short domain name) $w = tybsd
```

```
(canonical domain name) $j = tybsd.csie.nctu.edu.tw
```

```
(subdomain name) $m = csie.nctu.edu.tw
```

```
(node name) $k = tybsd.csie.nctu.edu.tw
```

```
=====
```

```
tytsai@tybsd:~> telnet localhost 25
```

```
Trying 127.0.0.1...
```

```
Connected to localhost.csie.nctu.edu.tw.
```

```
Escape character is '^['.
```

```
220 tybsd.csie.nctu.edu.tw ESMTP Sendmail 8.13.1/8.13.1; Sun, 10 Apr 2005 12:21:10 GMT
```

# sendmail installation (1)

## > Major components of sendmail

- **/usr/sbin/sendmail**
  - The sendmail binary with access mode 4755 setuid to root
- **/etc/mail/sendmail.cf**
  - Configuration file
- **/var/spool/mqueue**
  - Mail queue directory, with mode 700 owned by root
- **newaliases, mailq, hoststat, ...**
  - Various link to sendmail
- **mail.local and smrsh**
  - sendmail's safer local delivery agent



# sendmail installation (2)

## > Replace your sendmail with new one

### – Install from `/usr/ports/mail/sendmail`

- `/usr/sbin/sendmail` vs. `/usr/local/sbin/sendmail`
- `/usr/libexec/mail.local` must be `setuid`

### – Let Kernel start new sendmail

- Add this in your `/etc/rc.conf`
  - > `sendmail_enable="NONE"`
  - > `mta_start_script="/usr/local/etc/rc.d/sendmail.sh"`

### – Let sendmail start with new configuration file

- Prepare new configuration file
  - > `% cd /usr/ports/mail/sendmail/work/sendmail-8.13.4/cf/cf`
  - > `% cp generic-bsd4.4.cf sendmail.cf`
- Build and install new configuration file
  - > `% ./Build sendmail.cf`
  - > `% ./Build install-cf`

# sendmail installation (3)

```
tytsai@tybsd:~> sendmail -d0.1 -bt < /dev/null
```

```
Version 8.13.4
```

```
Compiled with: DNSMAP LOG MAP_REGEX MATCHGECOS MILTER MIME7TO8 MIME8TO7  
NAMED_BIND NETINET NETINET6 NETUNIX NEWDB NIS PIPELINING SCANF  
STARTTLS TCPWRAPPERS USERDB XDEBUG
```

```
===== SYSTEM IDENTITY (after readcf) =====  
  (short domain name) $w = tybsd  
  (canonical domain name) $j = tybsd.csie.nctu.edu.tw  
  (subdomain name) $m = csie.nctu.edu.tw  
  (node name) $k = tybsd.csie.nctu.edu.tw  
=====
```

```
tytsai@tybsd:~> telnet localhost 25
```

```
Trying 127.0.0.1...
```

```
Connected to localhost.csie.nctu.edu.tw.
```

```
Escape character is '^['.
```

```
220 tybsd.csie.nctu.edu.tw ESMTP Sendmail 8.13.4/8.13.4; Mon, 11 Apr 2005 09:40:47 GMT
```

# Modes of operation

> sendmail can be run in several modes

Flag	Meaning	link
-bd	In daemon mode, on port 25	
-bD	In daemon mode, on port 25, foreground	
-bh	View recent connection information	hoststat
-bH	Purge disk copy of outdated connection info	purgestat
-bi	Initialize hashed aliases	newaliases
-bp	Print mail queue	mailq
-bt	Enter address test mode	
-bv	Verify mail address only; don't send mail	
-bs	Enter SMTP server mode (on stdin, not port 25)	



# Modes of operation – daemon mode

## > Daemon mode

- **sendmail listens on port 25 and waits for work**
- **Usually specify the `-q` flag to set the interval to process mails in queue**
  - `-q30m` to check the queue every 30 minutes
  - `-q1h` to check the queue every 1 hour
- **`/var/run/sendmail.pid`**
  - Contain the sendmail pid and command that starts it
- **Reset sendmail when you change the configuration**
  - `% kill -1 `head -1 /var/run/sendmail.pid``

```
tytsai@tybsd:/var/run> sudo less sendmail.pid
567
/usr/sbin/sendmail -L sm-mta -bd -q30m -ODaemonPortOptions=Addr=localhost
```

# Mail queue (1)

- > When to store message in queue
  - Messages that host is too busy to deliver immediately or
  - Messages that destination host is unavailable
- > Components of each queued message
  - Each message is saved in pieces in several different files
    - Filename: Two-bit-prefix + random-ID

```
tytsai@tybsd [2:43pm] /var/spool/mqueue> ls -l
total 4
-rw----- 1 root daemon 16          Dec 20 14:32 dfiBKEWSmU037293
-rw----- 1 root daemon 1215       Dec 20 14:41 qfiBKEWSmU037293
tytsai@tybsd [2:44pm] /var/spool/mqueue> mailq
/var/spool/mqueue (1 request)
-----Q-ID----- --Size--  -----Q-Time-----  -----Sender/Recipient-----
iBKEWSmU037293      16 Mon Dec 20 14:32 <tytsai@tybsd.csie.nctu.edu.tw>
                    (Deferred: Connection refused by r21607.csie.nctu.edu.tw.)
                    <shrang@r21607.csie.nctu.edu.tw>
Total requests: 1
```

# Mail queue (2)

## > Queued message prefix

### — Required pieces

- qf
  - > Message header (H)
  - > envelope address
    - Sender Address (S)
    - Recipient Address (R)
  - > The date to return as undeliverable
  - > Message priority in queue (P)
  - > The reason of why being queued (M)
  - > Time last processed (K)
  - > Time created (T)
- df
  - > Message body

# Mail queue (3)

## > Example of qf

```
V8
T1103553148
K1103553704
N2
P120520
I4/12/1343513
MDeferred: Connection refused by r21607.csie.nctu.edu.tw.
Fbs
$_localhost [127.0.0.1]
$rESMTP
$stybsd.csie.nctu.edu.tw
${daemon_flags}
${if_addr}127.0.0.1
S<tytsai@tybsd.csie.nctu.edu.tw>
MDeferred: Connection refused by r21607.csie.nctu.edu.tw.
rRFC822; shrang@r21607.csie.nctu.edu.tw
RPFD:<shrang@r21607.csie.nctu.edu.tw>
```

# Mail queue (4)

```
H??Return-Path: <<81>g>
H??Received: from tybsd.csie.nctu.edu.tw (localhost [127.0.0.1])
    by tybsd.csie.nctu.edu.tw (8.13.1/8.13.1) with ESMTP id iBKEWSmU037293
    for <shrang@r21607.csie.nctu.edu.tw>; Mon, 20 Dec 2004 14:32:28 GMT
    (envelope-from tytsai@tybsd.csie.nctu.edu.tw)
H??Full-Name: Tsung-Yi Tsai
H??Received: (from root@localhost)
    by tybsd.csie.nctu.edu.tw (8.13.1/8.13.1/Submit) id iBKEWSvL037292
    for shrang@r21607.csie.nctu.edu.tw; Mon, 20 Dec 2004 14:32:28 GMT
    (envelope-from tytsai)
H??Date: Mon, 20 Dec 2004 14:32:28 +0000
H??From: Charlie Root <root@tybsd.csie.nctu.edu.tw>
H??To: shrang@r21607.csie.nctu.edu.tw
H??Subject: test1
H??Message-ID: <20041220143228.GA37284@tybsd.csie.nctu.edu.tw>
H??Mime-Version: 1.0
H??Content-Type: text/plain; charset=us-ascii
H??Content-Disposition: inline
H??User-Agent: Mutt/1.4.2.1i
.
```



# Mail queue (5)

## > When /var/spool/mqueue is full

- we can move mqueue to another place and digest it later using this command
  - % /usr/sbin/sendmail -oQ/var/spool/cloggedqueue
- Example script to help to digest large amount of queued mails manually

```
#!/bin/sh
for suffix in 0 1 2 3 4 5 6 7 8 9
do
    mkdir clog${suffix}
    mv ?f*${suffix} clog${suffix}
    /usr/sbin/sendmail -oQclog${suffix}
done
```

# **sendmail Configuration**

# Configuration File (1)

> /etc/mail/sendmail.cf

- **Determine how sendmail to do:**
  - Choice of delivery agents
  - Address rewriting rules
  - Mail header formats
  - Security precaution
  - Spam resistance
  - Other options
- **Designed to be easy to parse**
- **Hard to manipulate it directly without “m4” macro**
  - Help to deal with above 98% sendmail.cf configuration cases

# Configuration File (2)

## Part of sendmail.cf

```
#####  
#   Format of headers   #  
#####  
  
H?P?Return-Path: <$g>  
HReceived: $?sfrom $s $. $?_($?s$|from $. $_)  
    $. ?${auth_type} (authenticated?${auth_ssf} bits=${auth_ssf}$.)  
    $. by $j ($v/$Z)$?r with $r$. id $i?${tls_version}  
    (version=${tls_version} cipher=${cipher} bits=${cipher_bits} verify=${verify})$. $?u  
    for $u; $|;  
    $. $b  
  
H?D?Resent-Date: $a  
H?D?Date: $a  
H?F?Resent-From: $?x$x <$g>$|$g$.  
H?F?From: $?x$x <$g>$|$g$.  
H?x?Full-Name: $x  
# HPosted-Date: $a  
# H?l?Received-Date: $b  
H?M?Resent-Message-Id: <$t.$i@$j>  
H?M?Message-Id: <$t.$i@$j>
```

# m4 – macro language processor (1)

## > m4 utility

- Front-end preprocessor for other languages
- Transform macros into their corresponding values based on the macro definitions
- For example:

```
tytsai@tybsd:~> cat abc.m
define(`A', `B')
define(`C', `D')
A
C
tytsai@tybsd:~> m4 abc.m

B
D
```

```
tytsai@tybsd:~> cat abc.m
define(`A', `B')dnl
define(`C', `D')dnl
A
C
tytsai@tybsd:~> m4 abc.m
B
D
```



# m4 – macro language processor (2)

## > m4 and arguments

- Each argument will be used to replace \$1, \$2 ...
- For example:

```
tytsai@tybsd:~/m4> cat argu.m
define(`MYFUNC',`$1$2$3')dnl
MYFUNC(`hello',`-you-',`haha')dnl

tytsai@tybsd:~/m4> m4 argu.m
hello-you-hahadnl
```

## > Useful m4 predefined macro

- **define**                   # define a new macro
- **undefine(arg)**       # discard a previous “arg” macro definition
- **dnl**                    # discard characters up to next newline
- **include(arg)**        # include the “arg” file
- **divert(queue)**       # select an output queue (0 ~ 9)

# Configure with m4 (1)

- > Generate .cf from .mc file in /etc/mail
  - **Edit your mc file and then**
    - % make all
    - % make install
  - **mc means “Master Config”**
    - A set of m4 macro statements
  - **mc will combine with cf.m4 to generate .cf file**
  - **For example:**

```
tytsai@tybsd:/etc/mail> sudo make all
cp freebsd.mc tybsd.mc
/usr/bin/m4 -D_CF_DIR_=/usr/share/sendmail/cf/
/usr/share/sendmail/cf/m4/cf.m4 tybsd.mc > tybsd.cf

cp freebsd.submit.mc tybsd.submit.mc
/usr/bin/m4 -D_CF_DIR_=/usr/share/sendmail/cf/
/usr/share/sendmail/cf/m4/cf.m4 tybsd.submit.mc > tybsd.submit.cf
```

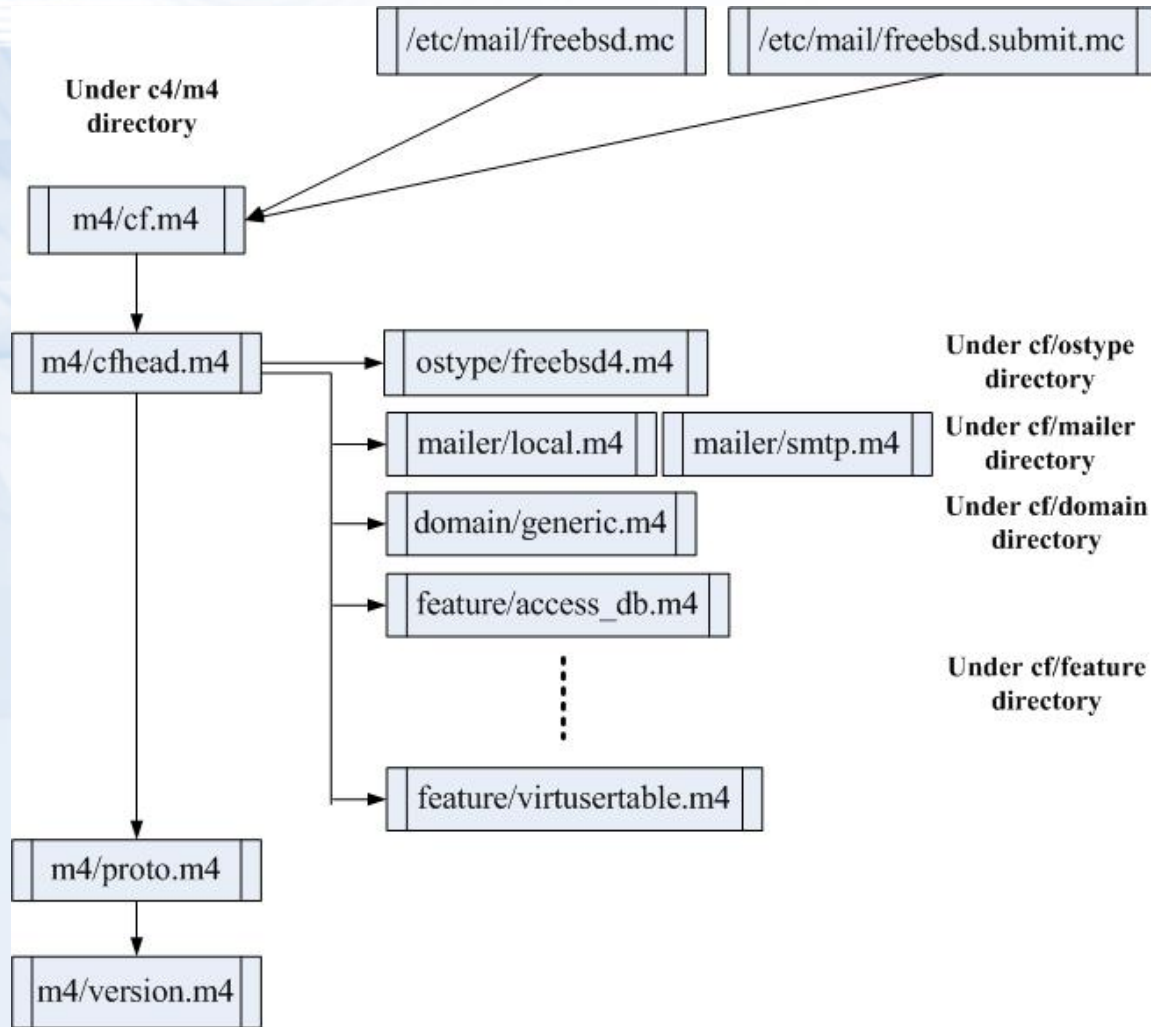
# Configure with m4 (2)

- > Generate .cf from .mc file in sendmail source directory
  - Go into *sendmail/cf/cf* directory
  - Prepare your .mc file and then (suppose config.mc)
    - % ./Build config.cf
    - % cp config.cf sendmail.cf
    - % ./Build install-cf

```
tytsai@tybsd:~/cf/cf> sudo ./Build sendmail.cf
Using M4=/usr/local/bin/gm4
rm -f sendmail.cf
/usr/local/bin/gm4 ../m4/cf.m4 sendmail.mc > sendmail.cf || ( rm -f sendmail.cf && exit 1 )
...
chmod 444 sendmail.cf
tytsai@tybsd:~/cf/cf> sudo ./Build install-cf
Using M4=/usr/local/bin/gm4
...
../devtools/bin/install.sh -c -o root -g bin -m 0444 sendmail.cf /etc/mail/sendmail.cf
...
../devtools/bin/install.sh -c -o root -g bin -m 0444 submit.cf /etc/mail/submit.cf
```

# Configure with m4 (2)

## > Relationship between various .mc file



# Configure with m4 (3)

## > Convention in sendmail .mc file

- **m4 commands**
  - all lower case (ex. define)
- **Predefined macros**
  - all capital (ex. OSTYPE)
- **Configurable variable name**
  - "conf" + all-capital variable name
  - (ex. confCOPY\_ERROR\_TO)



# Configure with m4 (4)

## > Typical order of .mc files

```
divert(-1)
#
# tybsd:/etc/mail/tybsd.mc by tytsai, 2005/04/05
#
divert(0)dnl
VERSIONID(`@(#) tybsd.mc $Revision: 8.13.4.0 $, Last updated $Date: 2005/04/05 17:21:00 $')
OSTYPE(`freebsd4')dnl
DOMAIN(`generic')dnl
option definitions
FEATURE(access_db,`hash -T<TMPF> /etc/mail/access' )dnl
macro definitions
MAILER(`local')dnl
MAILER(`smtp')dnl
ruleset definitions
```

# Configure with m4 (5)

- > Restart sendmail whenever there is new cf file
  - `% killall sendmail` (or `kill -1 `head -1 /var/run/sendmail.pid``)
  - `% sh /etc/rc.sendmail` (or `/usr/local/etc/rc.d/sendmail.sh start`)

```
tytsai@tybsd:/etc/mail> sudo cat /var/run/sendmail.pid
13606
/usr/local/sbin/sendmail -L sm-mta -bd -q30m
```

# Configure with m4 (6)

> The smallest .mc file

```
divert(0) dn1
VERSIONID(`$Id: generic-bsd4.4.mc, v 8.10 1999/02/07 07:26:02 gshapiro Exp $')
OSTYPE(bsd4.4) dn1
DOMAIN(generic) dn1
MAILER(local) dn1
MAILER(smtp) dn1
```

# Tables and Databases (1)

- > Table
  - A text file that contains information about routing, aliasing, access or others
- > Database
  - Hashed version of table
- > Database Libraries
  - dbm/ndbm
  - Berkeley DB
- > Table → Database conversion
  - Use “makemap” command
  - % /usr/bin/makemap *map-type map.db < map*
  - Map-type
    - dbm use dbm/ndbm hashing algorithm
    - hash use standard DB hashing algorithm
    - btree use DB hashing algorithm with B-tree data structure

# Tables and Databases (2)

## > Tables

- **/etc/mail/mailertable**
- **/etc/mail/genericstable**
- **/etc/mail/virtusertable**
- **/etc/mail/access**
- **/etc/mail/aliases**

# Macros



# Macros – VERSIONID macro

## > Embed version information

- Each config file should put this macro to insert an identifier
- These identifiers will appear in the final sendmail.cf file as a comment
- Ex:

In /etc/mail/freebsd.mc

```
VERSIONID(`$FreeBSD: src/etc/sendmail/freebsd.mc, v 1.29 2003/12/24 21:15:09 gshapiro Exp $')
```

In /etc/mail/sendmail.cf

```
##### $Id: cfhead.m4, v 8.116 2004/01/28 22:02:22 ca Exp $ #####  
##### $Id: cf.m4, v 8.32 1999/02/07 07:26:14 gshapiro Exp $ #####  
##### $FreeBSD: src/etc/sendmail/freebsd.mc, v 1.29 2003/12/24 21:15:09 gshapiro Exp $ #####  
##### $Id: freebsd5.m4, v 1.1 2001/10/08 22:25:34 gshapiro Exp $ #####  
##### $Id: generic.m4, v 8.15 1999/04/04 00:51:09 ca Exp $ #####  
##### $Id: redirect.m4, v 8.15 1999/08/06 01:47:36 gshapiro Exp $ #####  
##### $Id: use_cw_file.m4, v 8.11 2001/08/26 20:58:57 gshapiro Exp $ #####  
##### $Id: access_db.m4, v 8.26 2004/06/24 18:10:02 ca Exp $ #####  
##### $Id: blacklist_recipients.m4, v 8.13 1999/04/02 02:25:13 gshapiro Exp $ #####  
##### $Id: local_lmtp.m4, v 8.17 2002/11/17 04:41:04 ca Exp $ #####
```

# Macros – OSTYPE macro (1)

## > Define OS type of site

- Each OS type will correspond to one `ostype.mc` file
- `ostype.mc` file packages a variety of vendor-specific information, including
  - Expected locations of mail-related files
  - Path to sendmail related commands
  - Flags to mailer programs
- An `ostype` file looks nearly empty since everything is default

In `cf/ostype/freebsd4.mc`

```
VERSIONID(`$Id: freebsd4.m4,v 1.1 2001/03/21 22:44:58 ca Exp $')
ifdef(`STATUS_FILE',, `define(`STATUS_FILE', `/var/log/sendmail.st`))dnl
dnl turn on S flag for local mailer
MODIFY_MAILER_FLAGS(`LOCAL', `+S')dnl
ifdef(`LOCAL_MAILER_PATH',, `define(`LOCAL_MAILER_PATH', /usr/libexec/mail.local)')dnl
ifdef(`LOCAL_MAILER_ARGS',, `define(`LOCAL_MAILER_ARGS', `mail $u')')dnl
ifdef(`UUCP_MAILER_ARGS',, `define(`UUCP_MAILER_ARGS', `uux -r -z -a$g $h!rmail ($u)')')dnl
```

# Macros – OSTYPE macro (2)

- > Part of Variable sets in ostype files
  - See *sendmail/cf/READE* file, OSTYPE section

Variable	Default Value	Description
ALIAS_FILE	/etc/mail/aliases	Text version alias file
HELP_FILE	/etc/mail/helpfile	Information for HELP command
QUEUE_DIR	/var/spool/mqueue	Mail queue directory
STATUS_FILE	/etc/mail/statistics	Information of status
LOCAL_MAILER_PATH	/bin/mail	Program used to deliver local mail
LOCAL_MAILER_MAX	Undefined	Maximum size of local mail
LOCAL_SHELL_PATH	/bin/sh	Shell used to deliver piped email
SMTP_MAILER_MAX	Undefined	Maximum size of smtp like mailer
PROCMail_MAILER_PATH	/usr/local/bin/procmail	Path for procmail program
PROCMail_MAILER_MAX	Undefined	Maximum size of accepted by procmail

# Macros – OSTYPE macro (3)

- > Override the default value in ostype .mc file
  - Specify them in your config.mc file
  - For example:
    - Let sendmail use multiple alias files

```
define(`ALIAS_FILE', `/etc/mail/aliases,nis:mail.aliases@+csie.nis')dnl
```

# Macros – DOMAIN macro

## > Define DOMAIN of site

- Each DOMAIN type will correspond to one domain.mc file
- domain.mc file packages information common to the entire domain as you wish, usually including
  - Relay
    - > Rule that sends all of one type of mail to a specific destination
    - > Ex:  
`define(`LOCAL_RELAY',`smtp:relay.csie.nctu.edu.tw')`
  - Masquerading
    - > Transforming local hostname in address into another domain name
    - > Ex: `MASQUERADE_AS(csie.nctu.edu.tw)dnl`



# Macros – MAILER macro (1)

- > Declare delivery agent you want to enable
  - Put your MAILER in the bottom of .mc file
  - MAILER('local')
    - Always include this except if you relay all your mail to another site
      - > local DA, deliver mail to user's mailbox
      - > prog DA, send mail through program for delivery
  - MAILER('smtp')
    - Support for sending email to other hosts
      - > smtp DA, speak regular SMTP
      - > esmtp DA, speak extended SMTP
      - > smtp8 DA, send mail to server not knowing 8-bit MIME
      - > dsmtmp DA, send mail on demand
      - > relay DA, for transmission to various relay host



# Macros – MAILER macro (2)

## > Other MAILER

- See *sendmail/cf/READE* file, MAILER section
- **usenet**
  - Used to post message to USENET newsgroups
- **uucp**
  - Used to forward email over UUCP network
- **procmail**
  - procmail can be used as local delivery agent to do filtering or route mail to files
- **pop**
  - Provide a way to perform local delivery for user that does not have a local UNIX account
- **fax**
  - Used to deliver mail to a fax-sending program
  - Ex: To: joe@5554321.fax
- **error**
  - Used to send bounce mail with error message
- **junk**

# Macros –

## Masquerading related macros(1)

### > Masquerading

- The process of transforming local hostname in address to another domain
- Macros can be used to rewrite header-sender, header-recipient or envelope address

### > Related macros

- `MASQUERADE_AS('server')`
- `EXPOSED_USER('user')`
- `EXPOSED_USER_FILE('file')`
- `MASQUERADE_DOMAIN('otherhost.domain')`
- `MASQUERADE_DOMAIN_FILE('file')`
- `MASQUERADE_EXCEPTION('host.domain')`
- `MASQUERADE_EXCEPTION('file')`

# Macros –

## Masquerading related macros(2)

- > MASQUERADE\_AS(`server')
  - Used to make all clients' mail to appear as if it is from the specified server
  - “From:” will be changed to masqueraded server, but “Received:” and “Message-ID:” are the same
  - Ex:
    - tytsai@tybsd.csie.nctu.edu.tw → tytsai@csie.nctu.edu.tw
    - MASQUERADE\_AS(`csie.nctu.edu.tw')
- > EXPOSED\_USER(`user')
- > EXPOSED\_USER\_FILE(`/etc/mail/exposedusers')

```
Received: from tybsd.csie.nctu.edu.tw (tybsd.csie.nctu.edu.tw [140.113.235.4])
    by mgate2.csie.nctu.edu.tw (Postfix) with ESMTP id C6D7A738CE
    for <tytsai@csie.nctu.edu.tw>; Wed, 13 Apr 2005 08:38:25 +0800 (CST)
Date: Wed, 13 Apr 2005 08:38:30 +0000
From: Tsung-Yi Tsai <tytsai@csie.nctu.edu.tw>
To: tytsai@csie.nctu.edu.tw
Subject: test from tybsd
Message-ID: <20050413083830.GA26300@tybsd.csie.nctu.edu.tw>
```

# Macros –

## Masquerading related macros(3)

- > MASQUERADE\_AS(`server`) plus
- > FEATURE(`allmasquerade')
  - MASQUERADE\_AS will change “From:” header
  - allmasquerade feature will change “To:” header either
  - Ex:
    - MASQUERADE\_AS(`csie.nctu.edu.tw')
    - FEATURE(`allmasquerade')
    - tytsai@tybsd.csie.nctu.edu.tw → tytsai@tybsd.csie.nctu.edu.tw

```
From tytsai@tybsd.csie.nctu.edu.tw Wed Apr 13 14:08:53 2005
...
Date: Wed, 13 Apr 2005 14:08:52 +0000
From: Tsung-Yi Tsai <tytsai@csie.nctu.edu.tw>
To: tytsai@csie.nctu.edu.tw
...
Message-ID: <20050413140852.GA27595@tybsd.csie.nctu.edu.tw>
```

# Macros – Masquerading related macros(4)

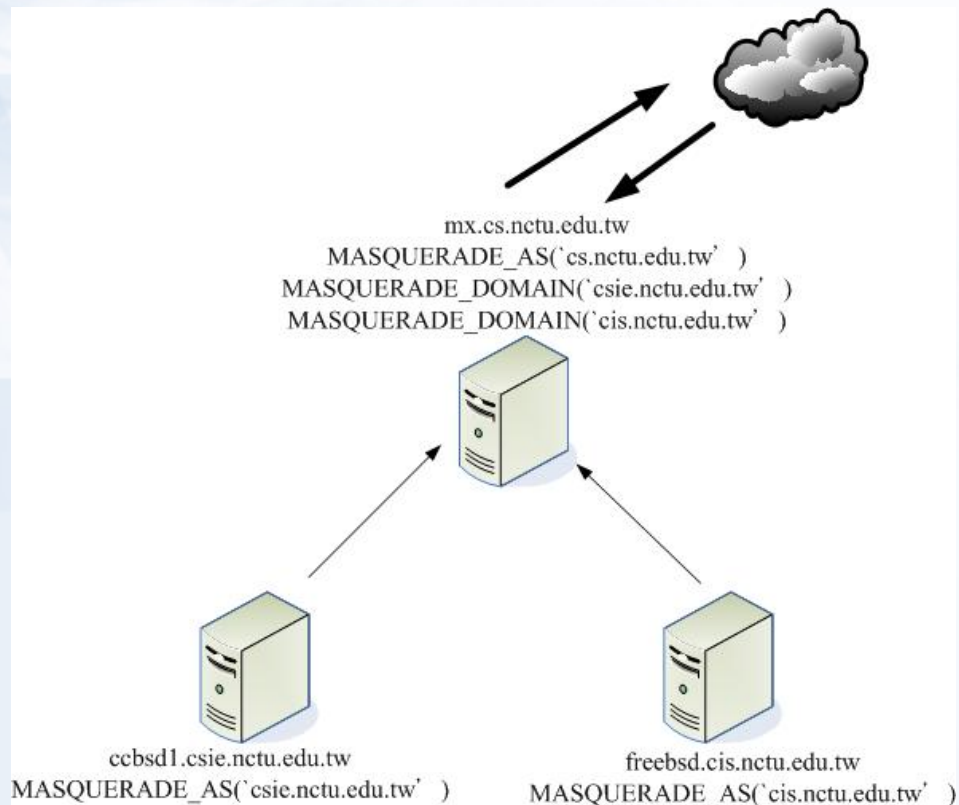
- > MASQUERADE\_AS(`server`)
- > FEATURE(masquerade\_envelope)
  - This feature will change envelope address
  - Ex:
    - MASQUERADE\_AS(`csie.nctu.edu.tw`)
    - FEATURE(`masquerade\_envelope`)
    - tytsai@tybsd.csie.nctu.edu.tw → tytsai@csie.nctu.edu.tw

```
From tytsai@csie.nctu.edu.tw Wed Apr 13 14:19:19 2005
...
Date: Wed, 13 Apr 2005 14:18:18 +0000
From: Tsung-Yi Tsai <tytsai@csie.nctu.edu.tw>
To: tytsai@csie.nctu.edu.tw
Subject: test
Message-ID: <20050413141818.GA27695@tybsd.csie.nctu.edu.tw>
```



# Macros – Masquerading related macros(5)

- > MASQUERADE\_DOMAIN(`other.domain`)
- > MASQUERADE\_DOMAIN\_FILE(`file`)
- Masquerade a domain other than your local one to the host specified in MASQUERADE\_AS
- Ex:





# Macros –

## Masquerading related macros(6)

- > MASQUERADE\_EXCEPTION(`domain')
- > MASQUERADE\_EXCEPTION\_FILE(`file')
- **Ex:**
  - MASQUERADE\_AS(`nctu.edu.tw')
  - FEATURE(`masquerade\_entire\_domain')
  - MASQUERADE\_EXCEPTION(`csie.nctu.edu.tw')

# Macros – FEATURE macros (1)

## > FEATURE

- **Some useful functionality**
- **Macro syntax:**
  - **FEATURE(keyword)**
  - **FEATURE(keyword, argument)**
  - **FEATURE(keyword, argument, argument, ...)**
- **Each FEATURE macro declaration will cause a file in feature/keyword.mc to be used to generate .cf file**
- **See cf/feature directory for feature listing**

# Macros – FEATURE macros (2)

- > FEATURE(accept\_unqualified\_senders)
- > FEATURE(accept\_unresolvable\_domains)

```
tytsai@tybsd:~/cf/feature> telnet localhost 25
Trying 127.0.0.1...
Connected to localhost.csie.nctu.edu.tw.
Escape character is '^]'.
220 tybsd.csie.nctu.edu.tw ESMTP Sendmail 8.13.4/8.13.4; Tue, 12 Apr 2005 23:12:57 GMT
HELO tybsd
250 tybsd.csie.nctu.edu.tw Hello localhost [127.0.0.1], pleased to meet you
MAIL FROM: tytsai
553 5.5.4 tytsai... Domain name required for sender address tytsai
MAIL FROM: tytsai@tybsd.csie.nctu.edu.tw
250 2.1.0 tytsai@tybsd.csie.nctu.edu.tw... Sender ok
MAIL FROM: tybsd@ttt.csie.nctu.edu.tw
553 5.1.8 tybsd@ttt.csie.nctu.edu.tw... Domain of sender address
tybsd@ttt.csie.nctu.edu.tw does not exist
```

# Macros – FEATURE macros (3)

- > FEATURE(`genericstable')
  - /etc/mail/genericstable syntax  
*user@original.domain another-user@another.domain*
  - **Aliasing for outgoing mail (change From: address)**
  - **Rewrite only header, not envelope**
    - Mail delivery is not affected, only replies
  - **Only host in generic class would be looked up in table**
  - **To use this feature:**
    - GENERICS\_DOMAIN\_FILE(`/etc/mail/local-host-names')
      - > Or GENERIC\_DOMAIN(`host') macro
    - FEATURE(`genericstable')
  - **Ex:**
    - tytsai                      shrang1978@yahoo.com.tw
    - tytsai@tybsd.csie.nctu.edu.tw → tytsai@csie.nctu.edu.tw

```
From tytsai@tybsd.csie.nctu.edu.tw Wed Apr 13 11:27:16 2005
..
Date: Wed, 13 Apr 2005 11:27:15 +0000
From: Tsung-Yi Tsai <shrang1978@yahoo.com.tw>
To: Tsung-Yi Tsai <tytsai@csie.nctu.edu.tw>
```

# Macros – FEATURE macros (4)

## > FEATURE(`virtusertable`)

- `/etc/mail/virtusertable` syntax

*user@virtual.domain*                      *another-user@another.domain*

- **Aliasing for incoming mail (compared with genericstable)**
  - Route mail to another address (header, envelope won't be changed)
- **When local delivery, if matching entry in table, this mail will send to the specify address**
- **To use this feature:**
  - VIRTUSER\_DOMAIN(`vdomain`)
    - > Or VIRTUSER\_DOMAIN\_FILE macro
  - FEATURE(`virtusertable`)
- **Ex:**
  - @abc.com            %1@real.com
  - @def.com            haha@real.com
  - joe@gh.com        error:No such user
- **Ex:**
  - tytsai@tybsd.csie.nctu.edu.tw    shrang1978@yahoo.com.tw
  - tytsai@tybsd.csie.nctu.edu.tw → tytsai@tybsd.csie.nctu.edu.tw
    - > When mail reach tybsd.csie.nctu.edu.tw, this mail will route to yahoo.com.tw for shrang1978

# Macros – FEATURE macros (5)

## > FEATURE(`mailertable')

- /etc/mail/mailertable syntax

*old\_domain*            *mailer:user@new\_domain*

- This feature redirect mail addressed to “old\_domain” to alternate “destination” via particular “mailer” when the mail goes out from a site

- **Ex:**

- |                        |   |
|------------------------|---|
| • ieee.org             | smtp:mgate1.csie.nctu.edu.tw              |
| • .hinet.net           | smtp:mgate1.csie.nctu.edu.tw              |
| • bad.csie.nctu.edu.tw | error:5.7.0:500 mail to bad is prohibited |
| • cg8848.com           | junk:                                     |



# Macros – FEATURE macros (6)

## > Canonify

- **Ensure correctly formed domain in address**

## > FEATURE(`nocanonify')

- **Used to avoid doing the DNS lookup locally**
- **This should be used when**
  - MUA do full canonicalization themselves or
  - Sites that act only as mail gateways (such as mail hub)
  - In MSA/MTA scheme that MSA do the lookup jobs

# Macros – FEATURE macros (7)

## > FEATURE(redirect)

- Allow aliases bounce with an indication of the new forwarding address
  - This feature might cause double bounce with spam mail
  - Ex: tytsai is graduated and working at abc.com.tw
    - In /etc/mail/aliases
- ```
abc: CEO@abc.com.tw.REDIRECT
```

```
----- The following addresses had permanent fatal errors -----  
CEO@abc.com.tw.REDIRECT  
    (expanded from: abc@tybsd.csie.nctu.edu.tw)  
  
----- Transcript of session follows -----  
551 5.1.1 User has moved; please try <CEO@abc.com.tw>  
550 5.1.1 tybsd@tybsd.csie.nctu.edu.tw... User unknown
```

# Macros – FEATURE macros (8)

## > FEATURE(use\_cw\_file)

- **cw\_file** is the file that contains the names of all local host for which this host accepts to local delivery
- **Default cw\_file** is /etc/mail/local-host-names
  - Use the following macro to change this default:
  - `define(`confCW_FILE', `-o /etc/mail/local.list')`
- **Each client machine should contain**
  - Its hostname
  - Nickname
  - Localhost
- **A mail hub should contain**
  - Any local hosts
  - Any accepted virtual domains

```
ccbsd1
localhost
localhost.csie.nctu.edu.tw
ccbsd1
ccbsd1.csie.nctu.edu.tw
```

```
mailgate
localhost
localhost.csie.nctu.edu.tw
mailgate
mailgate.csie.nctu.edu.tw
csie.nctu.edu.tw
eecsep.nctu.edu.tw
```

# Macros – FEATURE macros (9)

- > Default
  - Local delivery agent is `/bin/mail` and
  - Local delivery agent use `/bin/sh` to pipe mail to program
- > sendmail's security ones
  - `mail.local` and `smrsh`
- > `FEATURE(`local_lmtp', `/usr/libexec/mail.local')`
  - Change local mailer to `mail.local`
- > `FEATURE(`smrsh', `/usr/libexec/smrsh')`
  - Change shell to `smrsh`, the restricted shell provided by sendmail

# **Relay related macros**

Rule that sends all of one type of mail to a specific destination



# Relay Macros – LOCAL\_RELAY and LOCAL\_USER

## > Local delivery

- Any email address that is username only will be delivered using “local” DA

## > LOCAL\_RELAY macro

- Relay this kind of mails to other mail server
- `define(LOCAL_RELAY', `relay_host')`

### – Ex:

- `define(`LOCAL_RELAY', `fastmx.csie.nctu.edu.tw')`

## > LOCAL\_USER and LOCAL\_USER\_FILE macro

- Local delivery such users even if LOCAL\_RELAY is using
- Ex:
  - `LOCAL_USER(`operator')`



# Relay Macros – MAIL\_HUB

## > MAIL\_HUB

- Route all incoming mail to a central server for delivery
- Often used when there is a central mail box server
- **Ex:**
  - `define(`MAIL_HUB', `smtp:mailgate.csie.nctu.edu.tw')`
  - In mailgate, it use `/etc/mail/local-host-names` to decides wither to do local delivery or `/etc/mail/mailertable`, `/etc/mail/virtusertable` for further relay

# Relay Macros – SMART\_HOST

## > SMART\_HOST

- **Make external mail relay to other mail server**

## > Comparison

- **LOCAL\_RELAY**
  - Applied to unqualified names
- **MAIL\_HUB**
  - Applied to names qualified with the name in /etc/mail/local-host-names
- **SMART\_HOST**
  - Applied to name qualified with other hosts

# **Configuration Options**

# Options – queued mail related

## > confTO\_QUEUERETURN

- How long a message will remain in queue if it cannot be delivered

## > confTO\_QUEUEWARN

- How long it will sit before the sender is notified that there might be problems with delivery

## > Ex:

- `define('confTO_QUEUERETURN', '3d')`
- `define('confTO_QUEUEWARN', '4h')`

# Options – privacy related

## > confPRIVACY\_FLAGS

- Used to force other sites to adhere some SMTP conventions
- `define('confPRIVACY_FLAGS', ``authwarnings``)`
- **Flags**
  - `noetrn` Disallow all SMTP ETRN commands
  - `noexpn` Disallow all SMTP EXPN commands
  - `noverb` Disallow all SMTP VERB commands
  - `novrfy` Disallow all SMTP VRFY commands
  - `needexpnhelo` Require HELO before EXPN
  - `needmailhelo` Require HELO before MAIL FROM:
  - `needvrfyhelo` Require HELO before VRFY
  - ...

# Options – performance related (1)

## > confHOSTStatusDirectory

- When mail queue is run, sendmail will fork a child process to process each queued mail.
- Keep a file for each host's status information, which is failed to send mail
- These information can be used to prioritize the hosts when queue is run again
- Ex:
  - `define(`confHOST_STATUS_DIRECTORY', `/var/spool')`



# Options – performance related (2)

## > confFALLBACK\_MX

- **Forward all undeliverable mail to a local server**
- **This can free the regular mail server to deliver the mail with good address**
- **Ex:**
  - `define(`confFALLBACK_MX', `liuman@csie.nctu.edu.tw')`

# Options – performance related (3)

## > confQUEUE\_LA

- Let sendmail to queue message instead of delivering it when the load comes to setting value
- Default is 8#CPU
  - `define(`confQUEUE_LA', 10)`

## > confREFUSE\_LA

- Let sendmail to refuse connection rather than accepting them when the load comes to setting value
- Default is 12#CPU
  - `define(`confREFUSE_LA', 15)`