# Syslog and Log Rotate

yihshih

arr. by pschiu

# Log files

- Execution information of each services
  - sshd log files
  - httpd log files
  - ftpd log files
- Purpose
  - For post tracking
  - Like insurance

```
ad3: WARNING - READ_DMA UDMA ICRC error (retrying request) LBA=96553119
ad3: WARNING - READ_DMA UDMA ICRC error (retrying request) LBA=96553119
ad3: FAILURE - READ_DMA status=51<READY,DSC,ERROR> error=84<ICRC,ABORTED>
LBA=96553119
g_vfs_done():ad3s1a[READ(offset=49435164672, length=36864)]error = 5
vnode_pager_getpages: I/O read error
vm_fault: pager read error, pid 850 (cp)
ad3: WARNING - READ_DMA UDMA ICRC error (retrying request) LBA=96556319
ad3: WARNING - READ_DMA UDMA ICRC error (retrying request) LBA=96556319
ad3: FAILURE - READ_DMA status=51<READY,DSC,ERROR> error=84<ICRC,ABORTED>
LBA=96556319
g_vfs_done():ad3s1a[READ(offset=49436803072, length=36864)]error = 5
vnode_pager_getpages: I/O read error
vm_fault: pager read error, pid 850 (cp)
```

# Logging Policies

- Common schemes
  - Throw away all log files
  - Rotate log files at periodic intervals
  - Archiving log files

```
#!/bin/sh
cd /var/log
/bin/mv logfile.2.gz logfile.3.gz
/bin/mv logfile.1.gz logfile.2.gz
/bin/mv logfile logfile.1
/usr/bin/touch logfile
/bin/kill –signal pid
/usr/bin/gzip logfile.1
```

```
0 3 * * * /usr/bin/tar czvf /backup/logfile.`/bin/date +\%Y\%m\%d`.tar.gz /var/log
```

# Finding Log Files

- Ways and locations
  - Common directory
    - /var/log, /var/adm
  - Read software configuration files
    - Ex: /usr/local/etc/apache22/httpd.conf

      **TransferLog /home/www/logs/access.log**
  - See /etc/syslog.conf

# Under /var/log in FreeBSD (1)

- You can see that under /var/log …

```
zfs[/var/log] -wutzh- ls
./                lastlog          maillog.7.bz2    sendmail.st
../               lpd-errs         messages         sendmail.st.0
auth.log          maillog          messages.0.bz2   sendmail.st.1
cron              maillog.0.bz2    messages.1.bz2   sendmail.st.2
cron.0.bz2        maillog.1.bz2    messages.2.bz2   sendmail.st.3
cron.1.bz2        maillog.2.bz2    mount.today      setuid.today
cron.2.bz2        maillog.3.bz2    mount.yesterday  wtmp
debug.log         maillog.4.bz2    pf.today         xferlog
dmesg.today       maillog.5.bz2    ppp.log
dmesg.yesterday   maillog.6.bz2    security
```

Lots of logs

# Under /var/log in FreeBSD (2)

- Logs – because of syslogd

```
bsd5[~] -wutzh- cat /etc/syslog.conf | grep -v ^#
*.*                                             /var/log/all.log
*.*                                             @loghost
*.err;kern.warning;auth.notice;mail.crit                /dev/console
*.notice;authpriv.none;kern.debug;lpr.info;mail.crit;news.err   /var/log/messages
security.*                                      /var/log/security
auth.info;authpriv.info                         /var/log/auth.log
mail.info                                       /var/log/maillog
lpr.info                                        /var/log/lpd-errs
ftp.info                                        /var/log/xferlog
cron.*                                          /var/log/cron
*.=debug                                        /var/log/debug.log
*.emerg                                         *
console.info                                    /var/log/console.log
!sudo
*.*                                             /var/log/sudo.log
```

# Under /var/log in FreeBSD (3)

- Logs are rotated – because newsyslog facility
  - In crontab

```
chbsd [/etc] -wutzh- grep newsyslog /etc/crontab
0       *       *       *       *       root    newsyslog
```

  - newsyslog.conf

```
chbsd [/etc] -wutzh- cat /etc/newsyslog.conf
# logfilename          [owner:group]  mode count size when  flags [/pid_file] [sig_num]
/var/log/all.log                      600  7     *    @T00  J
/var/log/amd.log                      644  7     100  *     J
/var/log/auth.log      root:auditor   640  7     10240 *    JC
/var/log/console.log                  600  5     100  *     J
/var/log/cron                         600  3     100  *     JC
/var/log/daily.log                    640  7     *    @T00  JN
/var/log/debug.log                    600  7     100  *     JC
/var/log/maillog                      640  7     *    @T00  JC
/var/log/messages                     644  5     100  *     JC
/var/log/monthly.log                  640  12    *    $M1D0 JN
/var/log/security                     600  10    100  *     JC
/var/log/sendmail.st                  640  10    *    168   B
```

newsyslog.conf(5)
newsyslog(8)

Log file location | Owner | permission | count | size | Time | flag | signal

# newsyslog.conf – when time (1)

- ISO 8601 restricted time format
  - 2016-12-15 19:46:15 = @20161215T194615
  - @20161215T194615
  - @161215T194615
  - @1215T194615
  - @15T194615
  - @T194615
  - @T1946
  - @T19
  - @15T
  - @T
  - @T00 = daily 00:00
  - @01T05 = 每月 01 日 05 點

# newsyslog.conf – time (1)

- FreeBSD proprietary format
  - M W D (month, week, day)
  - [Dhh], [Ww[Dhh]], and [Mdd[Dhh]]
  - hh hours, range 0..23
  - w day of week, range 0..6, 0 = Sunday
  - dd day of month, range 1..31, or one of the letters 'L' or 'l' to specify the last day of the month.
  - $D0 every night at midnight (same as @T00)
  - $D23 every day at 23:00 (same as @T23)
  - $W0D23 every week on Sunday at 23:00
  - $W5D16 every week on Friday at 16:00
  - $M5D6 every 5th day of month at 6:00 (same as @05T06)
  - $MLH22 every last day of month at 22:00

# newsyslog.conf flag

- Z use gzip compression
- J use bzip2 compression
- B save as binary file

# Vendor Specifics

- FreeBSD
  - newsyslog utility
  - /etc/newsyslog.conf
- Red Hat
  - logrotate utility
  - /etc/logrotate.conf, /etc/logrotate.d directory

```
linux1[/etc/logrotate.d] -wutzh- cat mail
/var/log/mail/maillog /var/log/mail/mail.info
/var/log/mail.warn /var/log/mail.err {
missingok
monthly
size=100M
rotate 4
create 0640 root security
nocompress
}
```

# Files Not to Manage

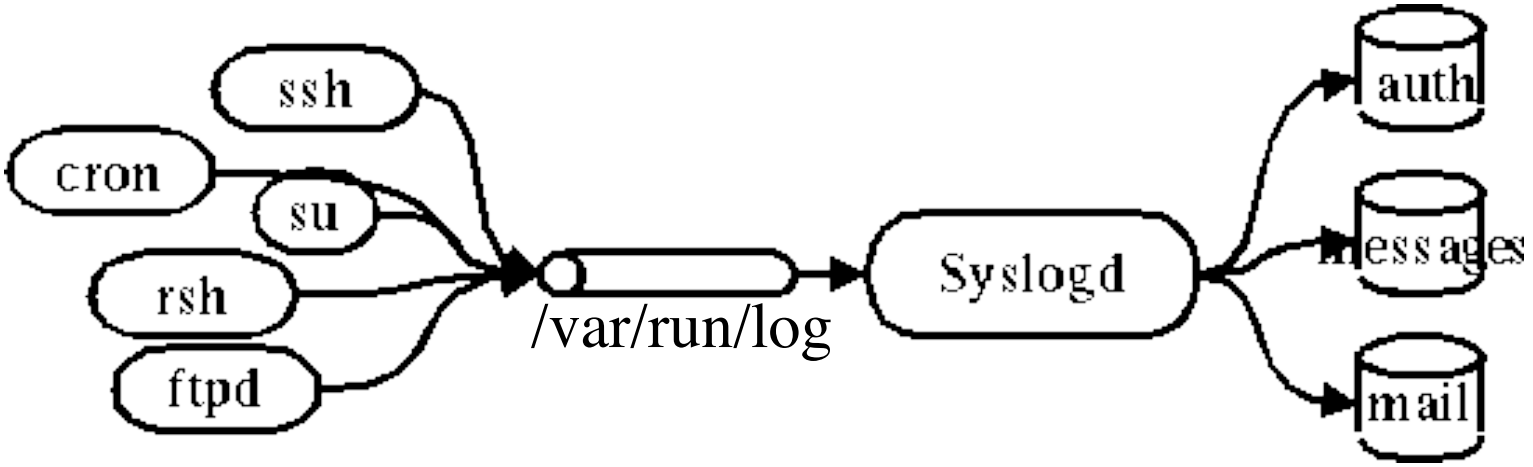
- You can manage most log files yourself, except...
  - /var/log/lastlog (/var/adm/lastlog)
    - Record of each user's last login
  - /var/run/utmp (/etc/utmp)
    - Record of each user that is currently logged in

# Syslog

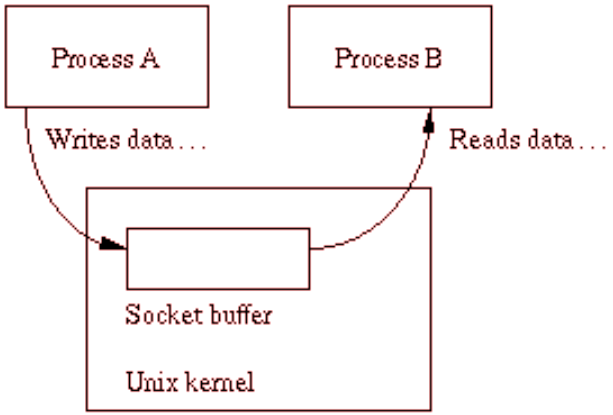
# Syslog – The system event logger (1)

- Two main functions
  - To release programmers from the tedious of writing log files
  - To put administrators in control of logging
- Three parts:
  - syslogd, /etc/syslog.conf
    - The logging daemon and configure file
  - openlog(), syslog(), closelog()
    - Library routines to use syslogd
  - logger
    - A user command that use syslogd from shell

# Syslog – The system event logger (2)




```
zfs[~] -wutzh- ls -al /var/run/log
srw-rw-rw-  1 root  wheel  0 Nov 21 17:07 /var/run/log=
```



# Configuring syslogd (1)

- Basic format
  - The configuration file /etc/syslog.conf controls syslogd's behavior
  - *selector* <Tab> *action*
    - **Selector: facility.level**
      - **Facility: the program that sends the log message**
      - **Level: the message severity level**
    - **Action: tells what to do with the message**
  - Ex:
    - mail.info /var/log/maillog

# Configuring syslogd (2)

- selector
  - Syntax: facility.level
    - Facility and level are predefined
      (see next page)
  - Combined selector
    - facility.level
    - facility1,facility2.level
    - facility1.level;facility2.level
    - *.level
  - Level indicate the minimum importance that a message must be logged
  - A message matching any selector will be subject to the line's action

# Configuring syslogd (3)

| Level | Approximate meaning |
|---|---|
| emerg | Panic situations |
| alert | Urgent situations |
| crit | Critical conditions |
| err | Other error conditions |
| warning | Warning messages |
| notice | Things that might merit investigation |
| info | Informational messages |
| debug | For debugging only |

| Facility | Programs that use it |
|---|---|
| kern | The kernel |
| user | User processes (the default if not specified) |
| mail | **sendmail** and other mail-related software |
| daemon | System daemons |
| auth | Security and authorization-related commands |
| lpr | The BSD line printer spooling system |
| news | The Usenet news system |
| uucp | Reserved for UUCP, which doesn't use it |
| cron | The **cron** daemon |
| mark | Timestamps generated at regular intervals |
| local0-7 | Eight flavors of local message |
| syslog[a] | **syslogd** internal messages |
| authpriv[a] | Private authorization messages (should all be private, really) |
| ftp[a] | The FTP daemon, **ftpd** |
| * | All facilities except "mark" |

# Configuring syslogd (4)

- Action
  - filename
    - Write the message to a local file
  - @hostname
    - Forward the message to the syslogd on hostname
  - @ipaddress
    - Forwards the message to the host at that IP address
  - user1, user2
    - Write the message to the user's screen if they are logged in
  - *
    - Write the message to all user logged in

# Configuring syslogd (5)

❑ Ex:

```
*.emerg                                          /dev/console
*.err;kern,mark.debug;auth.notice;user.none      /var/adm/console.log
*.info;kern,user,mark,auth.none                  @loghost
*.alert;kern.crit;local0,local1,local2.info      root
```

```
lpr.err        ➔  /var/adm/console.log
                  @loghost
```

| Level |
|---|
| emerg |
| alert |
| crit |
| err |
| warning |
| notice |
| info |
| debug |

# Configuring syslogd (6)

- Output of syslogd

```
Aug 28 20:00:00 chbsd newsyslog[37324]: logfile turned over due to size>100K
Aug 28 20:01:45 chbsd sshd[37338]: error: PAM: authentication error for root from 204.16.125.3
Aug 28 20:01:47 chbsd sshd[37338]: error: PAM: authentication error for root from 204.16.125.3
Aug 28 20:07:15 chbsd sshd[37376]: error: PAM: authentication error for root from 204.16.125.3
Aug 28 20:07:17 chbsd sshd[37376]: error: PAM: authentication error for root from 204.16.125.3
Aug 30 09:47:49 chbsd sudo:   wutzh : TTY=ttyp4 ; PWD=/usr/home/wutzh ; USER=root ; COMMAND=
Aug 30 22:02:02 chbsd kernel: arp: 140.113.215.86 moved from 00:d0:b7:b2:5d:89 to 00:04:e2:10:
Aug 30 22:05:13 chbsd kernel: arp: 140.113.215.86 moved from 00:04:e2:10:11:9c to 00:d0:b7:b2:
Sep  1 14:50:11 chbsd kernel: arplookup 0.0.0.0 failed: host is not on local network
Sep  3 13:16:29 chbsd sudo:   wutzh : TTY=ttyp4 ; PWD=/usr/ports ; USER=root ; COMMAND=/usr/b
Sep  3 13:18:40 chbsd sudo:   wutzh : TTY=ttyp4 ; PWD=/usr/ports ; USER=root ; COMMAND=/usr/l
Sep  3 13:25:06 chbsd sudo:   wutzh : TTY=ttyp4 ; PWD=/usr/ports ; USER=root ; COMMAND=/usr/l
Sep  3 13:27:09 chbsd kernel: arp: 140.113.215.86 moved from 00:d0:b7:b2:5d:89 to 00:04:e2:10:
Sep  3 13:27:14 chbsd kernel: arp: 140.113.215.86 moved from 00:04:e2:10:11:9c to 00:d0:b7:b2:
Sep  3 15:27:05 chbsd sudo:   wutzh : TTY=ttyp4 ; PWD=/usr/ports ; USER=root ; COMMAND=/usr/l
Sep  3 15:27:10 chbsd sudo:   wutzh : TTY=ttyp4 ; PWD=/usr/ports ; USER=root ; COMMAND=/usr/l
Sep  3 15:27:25 chbsd sudo:   wutzh : TTY=ttyp4 ; PWD=/usr/ports ; USER=root ; COMMAND=/usr/l
```

# Software that use syslog

| Program | Facility | Levels | Description |
|---|---|---|---|
| **amd** | daemon | err-info | NFS automounter |
| **date** | auth | notice | Sets the time and date |
| **ftpd** | daemon | err-debug | FTP daemon |
| **gated** | daemon | alert-info | Routing daemon |
| **halt/reboot** | auth | crit | Shutdown programs |
| **inetd** | daemon | err, warning | Internet super-daemon |
| **login/rlogind** | auth | crit-info | Login programs |
| **lpd** | lpr | err-info | BSD line printer daemon |
| **named** | daemon | err-info | Name server (DNS) |
| **nnrpd** | news | crit-notice | INN news readers |
| **ntpd** | daemon, user | crit-info | Network time daemon |
| **passwd** | auth | err | Password-setting program |
| **popper** | local0 | notice, debug | Mac/PC mail system |
| **sendmail** | mail | alert-debug | Mail transport system |
| **su** | auth | crit, notice | Switches UIDs |
| **sudo** | local2 | alert, notice | Limited **su** program |
| **syslogd** | syslog, mark | err-info | Internal errors, timestamps |
| **tcpd** | local7 | err-debug | TCP wrapper for **inetd** |
| **cron** | cron, daemon | info | System task-scheduling daemon |
| **vmunix** | kern | *varies* | The kernel |

# FreeBSD Enhancement (1)

- Severity level

| Selector | Meaning |
|---|---|
| mail.info | Selects mail-related messages of info priority and higher |
| mail.>=info | Same meaning as mail.info |
| mail.=info | Selects only messages at info priority |
| mail.<=info | Selects messages at info priority and below |
| mail.<info | Selects all priorities lower than info |
| mail.>info | Selects all priorities higher than info |

# FreeBSD Enhancement (2)

- Restriction log messages from remote hosts
  - syslogd –a *.cs.nctu.edu.tw –a 140.113.209.0/24
  - Use –ss option to prevent syslogd from opening its network port
  - rc.conf

```
syslogd_enable="YES"
syslogd_flags="-a 140.113.209.0/24:* -a 140.113.17.0/24:*"
```

# Debugging syslog

- logger
  - It is useful for submitting log from shell
- For example
  - Add the following line into /etc/syslog.conf

```
local5.warning          /tmp/evi.log
```

  - Use logger to verify
    - logger(1)

```
# logger -p local5.warning "test message"
# cat /tmp/evi.log
Nov 22 22:22:50 zfs wutzh: test message
```

# Using syslog in programs

```
#include <syslog.h>

int main() {
        openlog("mydaemon", LOG_PID, LOG_DAEMON);
        syslog(LOG_NOTICE, "test message");
        closelog();
        return 0;
}
```

```
zfs[~] -wutzh- tail -1 /var/log/messages
Nov 22 22:40:28 zfs mydaemon[4676]: test message
```

# newsyslog.conf Example

```
/home/hosts/syslog/ntu_srx_traffic.txt                  600  10    10240   *  -

#/home/hosts/syslog/SSG5/ssg5.traffic.txt               600  5     1024 *     -
#/home/hosts/syslog/SSG5/ssg5.info.txt                  600  5     1024 *     -
#/home/hosts/syslog/SSG5/ssg5.warning.txt               600  5     1024 *     -

/home/hosts/syslog/SSG550/SSG550.emerg.txt              600   6    *  $M1D0  Z
/home/hosts/syslog/SSG550/SSG550.alert.txt              600   6    *  $M1D0  Z
/home/hosts/syslog/SSG550/SSG550.crit.txt               600   6    *  $M1D0  Z
/home/hosts/syslog/SSG550/SSG550.err.txt                600   6    *  $M1D0  Z
/home/hosts/syslog/SSG550/SSG550.warning.txt            600   6    *  $M1D0  Z
/home/hosts/syslog/SSG550/SSG550.notice.txt             600   6    *  $M1D0  Z
/home/hosts/syslog/SSG550/SSG550.info.txt               600   6    *  $M1D0  Z
/home/hosts/syslog/SSG550/SSG550.debug.txt              600   6    *  $M1D0  Z
```

# syslog.conf example

```
+P6
*.=emerg                                        /home/hosts/syslog/P6/P6.emerg.txt
*.=alert                                        /home/hosts/syslog/P6/P6.alert.txt
*.=crit                                         /home/hosts/syslog/P6/P6.crit.txt
*.=err                                          /home/hosts/syslog/P6/P6.err.txt
*.=warning                                      /home/hosts/syslog/P6/P6.warning.txt
*.=notice                                       /home/hosts/syslog/P6/P6.notice.txt
*.=info                                         /home/hosts/syslog/P6/P6.info.txt
*.=debug                                        /home/hosts/syslog/P6/P6.debug.txt

+AX1030
*.*                                             /home/hosts/syslog/AX1030/AX1030.txt

+@
*.err;kern.warning;auth.notice;mail.crit        /dev/console
*.notice;authpriv.none;kern.debug;lpr.info;mail.crit;news.err   /var/log/messages
security.*                                      /var/log/security
auth.info;authpriv.info                         /var/log/auth.log
#auth.info;authpriv.info                        |exec /usr/local/sbin/sshit
```