Hardening Maintenance

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Universidad da Coruña

Universidade de Vigo

Antonio Yáñez Izquierdo
José Rodríguez Pereira
David Otero

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Introduction

Maintaining a system

- once we have hardened our system, the task ahead is to maintain it that way
- security, as said many times, is not a goal but a continuing process
- to keep our system safe we must
  - keep it up day with the corresponding system and/or application patches
  - keep ourselves informed about possible system/application vulnerabilities not already patched so we can uninstall/disable them
  - monitor the system in search of vulnerabilities, attacks or suspicious activities

Maintaining a system

- the primary source of information on one system is the log subsystem
- everything that happens can be logged, should we want to
- **authentication logs and system critical logs should always be also sent to another (or various) machines**
- in addition we can have external programs check our system for known vulnerabilities or misconfigurations, to make them more secure, such as lynis, openvas . . .

logs, logfiles and syslogd

logs, logfiles and syslogd
→systemd and the logs

systemd and the logs

- *systemd* fuctionality is relentless taking over all the services of the machine
- contrary to de traditional UNIX philosophy: `one small program to do just one thing and do it well`, *systemd* is taking more and more functionality every day.
- the log system has also fallen under systemd
- *systemd* keeps the logs of the system in what it calls `systemd-journald`
- the jounal is stored in binary form and can be examined with the program *journalctl*

systemd and the logs

- on systems with systemd we still can install one of the traditional log programs (syslog, rsyslog. . .)
- **I find this highly advisable** because
  - logs are easier to configure, maintain, examine and rotate
  - logs are kept on textfile, which can be directly examined in case some goes wrong (we do not need the *journalctl* program)
  - syslog (and its alternatives) can easily interact with other non linux machines in the network that run compatible syslog programs

logs, logfiles and syslogd
→logs, logfiles and syslogd

logs

- a *log* is a description of an event that happened to a process in the system
- although some programs can use and maintain their partigular log files it is usual the log daemon in the system (typically named *syslogd*) takes cares of the logs in a centraliced way. (linux usually replaces syslog with another *"more advanced"* utility like *syslog-ng* or *rsyslog*)
- usually a *log* is a single line of text containing
  - time and date of the event
  - the machine and service where it has originated,
  - the type and severity of event

logfiles

- a *logfile* is a file where the system stores the logs
- typically is a plain text file containing one line per event
- there can exist different files for different services
- instead of logging to files, logs can also be sent to some device (for example a *terminal*), to users on the system or even to other systems on the network

location of logs files

- the location of the log files varies from system to system. Nearly every system has them under the `/var` directory
- the location of the files can also be defined by the system administrator.
- most of linux distributions store the logs directly under directory **/var/log/** (or one of its subdirectories)

syslogd

- *syslogd* is the daemon that takes care of the logs on the system
  - although in most linux distributions this daemon has been substituted by `rsyslogd` or `syslog-ng`
- applications submit messages to *syslogd*
- *syslogd* reads its configuration file when it starts and decides what to do with the messages it receives

logs, logfiles and syslogd
→log configuration

log configuration

- for syslogd (or any of its alternatives) to know what to do with the messages, it must be specified in its configuration file.
- this file is typically **/etc/syslog.conf** (**/etc/rsyslog.conf** if rsyslog is being used . . .)
- a log message is classified according to
  - its *facility*: which service has generated the log. One of a predefined list on the system.
  - its *severity*: how important the log is. One of a predefined list on the system.

syslog facilities

- this are the more usual facilities on syslog

auth	security/authorization messages
authpriv	security/authorization messages (private)
cron	cron and at
daemon	system daemons without separate facility value
ftp	ftp daemon
kernel	kernel messages
lpr	line printer subsystem
mail	mail subsystem
news	USENET news subsystem
syslog	messages generated internally by syslogd(8)
user	generic user-level messages
uucp	uucp subsystem (obsolete)

syslog severities

- this are the more usual severities on syslog

emerg	system is unusable
alert	action must be taken immediately
crit	critical conditions
err	error conditions
warning	warning conditions
notice	normal, but significant, condition
info	informational message
debug	debug-level message

syslog file format

- each line of the file specifies what to do with some logs. Lines starting with # are treated as comments
- the format of one lines is

  `selector  <tab>  action`

- selector selects logs based on the facility and severity. It has the form `facility.severity`.
  - some systems accept the * as a wildcard for facility and/or severity
  - some systems also accept the format `facility1,facility2.severity` or `facility1.severity1; facility2.severity2`

syslog file format

- action representes what must be done with the log selected by *'selector'*. It can be one of the following
  - write the log to a file. This is represented by the name of the file (starting with /, if we preceed the / with a -, the file is not synced after logging). A log can also get sent to a device (for example a terminal) using the device name as the logfile
  - notify users. In this case, action is a comma separated list of users that would get the log provided they are logged in the system. Usually the symbol * stands for all users

syslog file format

- send the log to another machine running *syslogd*. If action starts with **@** the log is sent to the machine specified after the character **@** (name or ip).

```
cron.emrg;cron.alert  @192.168.1.5
cron.alert   root,cronmaster
cron.err   /var/log/cron-errors.log
cron.*    /var/log/cron.log
```

- modern syslog alternatives allow us to send the logs to a named pipe (|), discard the log, specify another protocol (tcp) or port ...
- syslog behaviour used to be that **logs comming from other machine do not get resent to another** to avoid collapsing a local network. Today some syslogd (or alternatives) implementations **DO** allow to be configured to resend logs received from remote machines

extensions to syslog

- for logs comming from other machine to be accepted, we need to tell syslog (or its substitute) about.
- In some *syslog* alternatives, this is done as a parameter when we start syslog (see man page). This parameter is typically set somewhere in `/etc/default/syslog`)
- In other implementations, for example *rsyslog* this is specified as an option in its configuration file.
  - we have to explicity allow that connection in the firewall, should we have one

extensions

- there are a number of functionalities that, although not standard, can be found on many systems, (specially on linux systems, where a great number of *syslogd* alternatives are available)
  - the existence a directory (typically `/etc/syslog.d` where different software packages can place their particular log configuration
  - the possibility of, instead writing the logs to a file (or sending them to another machine), start a program and pass the log to its standard input

rotating of logs

rotating of logs

- the problem with log files is that they keep growing in time. Large files use up a lot of disk space and are difficult to manage
- the solution is to *rotate* the logs: create a new file once the log file has a certain size or a certain age.
- in linux **logrotate** is the standard log rotating program

linux logrotate

- logrotate takes care of rotating, compressing, removing,. . . of log files in linux systems
- it is usually run daily through cron
- *logrotate* has its configuration file `/etc/logrotate.conf`
  - it has some global options which can be overriden by per-file options
  - specific options for some logfile can be specified in the format

    ```
    logfile  {
      options
    }
    ```
  - additional specific file configurations can be put in the *logrotate* configuration directory, specified in *logrotate* configuration file (typically `/etc/logrotate.d`)

sample linux logrotateconfiguration file

```
# see "man logrotate" for details
# rotate log files weekly
weekly

# keep 4 weeks worth of backlogs
rotate 4

# create new (empty) log files after rotating old ones
create

# uncomment this if you want your log files compressed
#compress

# packages drop log rotation information into this directory
include /etc/logrotate.d

# no packages own wtmp, or btmp -- we'll rotate them here
/var/log/wtmp {
    missingok
    monthly
    create 0664 root utmp
    rotate 1
}

/var/log/btmp {
    missingok
    monthly
    create 0660 root utmp
    rotate 1
}
```

sample /etc/logrotate.d/apache

```
/var/log/apache2/*.log {
        weekly
        missingok
        rotate 52
        compress
        delaycompress
        notifempty
        create 640 root adm
        sharedscripts
        postrotate
                /etc/init.d/apache2 reload > /dev/null
        endscript
        prerotate
                if [ -d /etc/logrotate.d/httpd-prerotate ]; then \
                        run-parts /etc/logrotate.d/httpd-prerotate; \
                fi; \
        endscript
}
```

lynis

lynix and openvas

- there are multiple tools to help on auditing systems security. Two of the most common in linux world are

lynis
- available as a package on most linux distros
- foccused on checking the local system for vulnerable unpatched packages, misconfigurations ...

openvas
- Open Vulnerability Assesment System focusses on network vulnerabilities
- can also be executed through a web interface

lynis

- available through the repositories
- we install the package (as well as its dependencies) with

```
# apt-get install lynis
```

- we execute the program `lynis` from the command line, specifying what we want it to check as arguments
- it writes to the standard output a summary of what it has checked and what it has found