Services & Settings

Basic Knowledge about Services

For FreeBSD

Common Flow of Running a Service

1. Installation
   - Through ports, packages, or source tarballs
     - pkg install kde4
2. Configuration
   - Service specific configuration file(s)
   - Update /etc/rc.conf
     - kdm4_enable="YES”
   - service kdm4 enable
3. Start
   - rc.d/*
     - /usr/local/etc/rc.d/kdm4 start
   - service kdm4 start
4. Maintenance
   - Updating、Restarting

Configuration Files (1/3)

- ❑ Local installed programs' configuration files are located under /usr/local/etc
  - Daemon → *program-name*.conf
    - ➢ pure-ftpd.conf
  - user-program → *program-name***rc**
    - ➢ vimrc
    - ➢ screenrc

- ❑ Default config file usually installed with .sample or .default suffix
  - pure-ftpd.conf.sample

  or different suffix for different purpose
  - php.ini-dist
  - php.ini-recommended

  copy and rename before use it

Configuration Files (2/3)

- A program with multiple config files are usually located in /usr/local/etc/*program-name*/
  - apache*
  - postfix

- Most configuration files have clear comment at the beginning or before each description

```
# pure-ftpd.conf

# IP address/port to listen to (default=all IP and port 21)
Bind                        127.0.0.1,21

# Fork in background
Daemonize                     yes
```

- Most popular styles
  - *key* <space>*value*
  - *key* = *value*

Read documents to know each option’s meaning

Configuration Files (3/3)

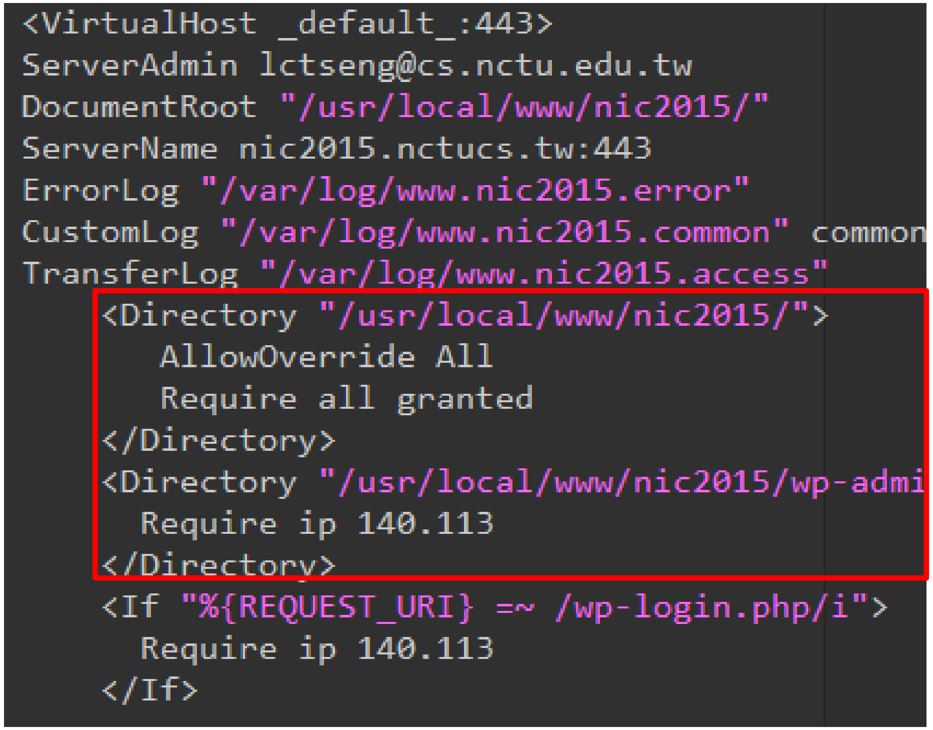
❑ Some with local effectiveness (e.g. http server)

- Markup language-like

  <directory /path>

  setting-for-this-path…

  </directory>



```
<VirtualHost _default_:443>
ServerAdmin lctseng@cs.nctu.edu.tw
DocumentRoot "/usr/local/www/nic2015/"
ServerName nic2015.nctucs.tw:443
ErrorLog "/var/log/www.nic2015.error"
CustomLog "/var/log/www.nic2015.common" common
TransferLog "/var/log/www.nic2015.access"
    <Directory "/usr/local/www/nic2015/">
       AllowOverride All
       Require all granted
    </Directory>
    <Directory "/usr/local/www/nic2015/wp-admi
      Require ip 140.113
    </Directory>
    <If "%{REQUEST_URI} =~ /wp-login.php/i">
      Require ip 140.113
    </If>
```

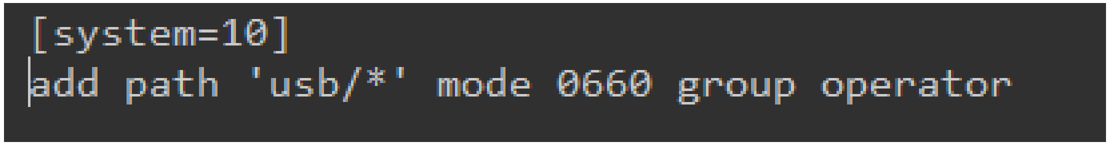
- Samba、rsync、devfs…

  [xxxx]

  settings…

  [yyyy]

  settings….



```
[system=10]
add path 'usb/*' mode 0660 group operator
```

RC Script

Scripts for starting / stopping a service

What does RC means?

- Run Commands (RunCom)
- Command scripts for auto-reboot and daemon startup
- rc(8)

- https://www.freebsd.org/doc/handbook/configtuning-rcd.html

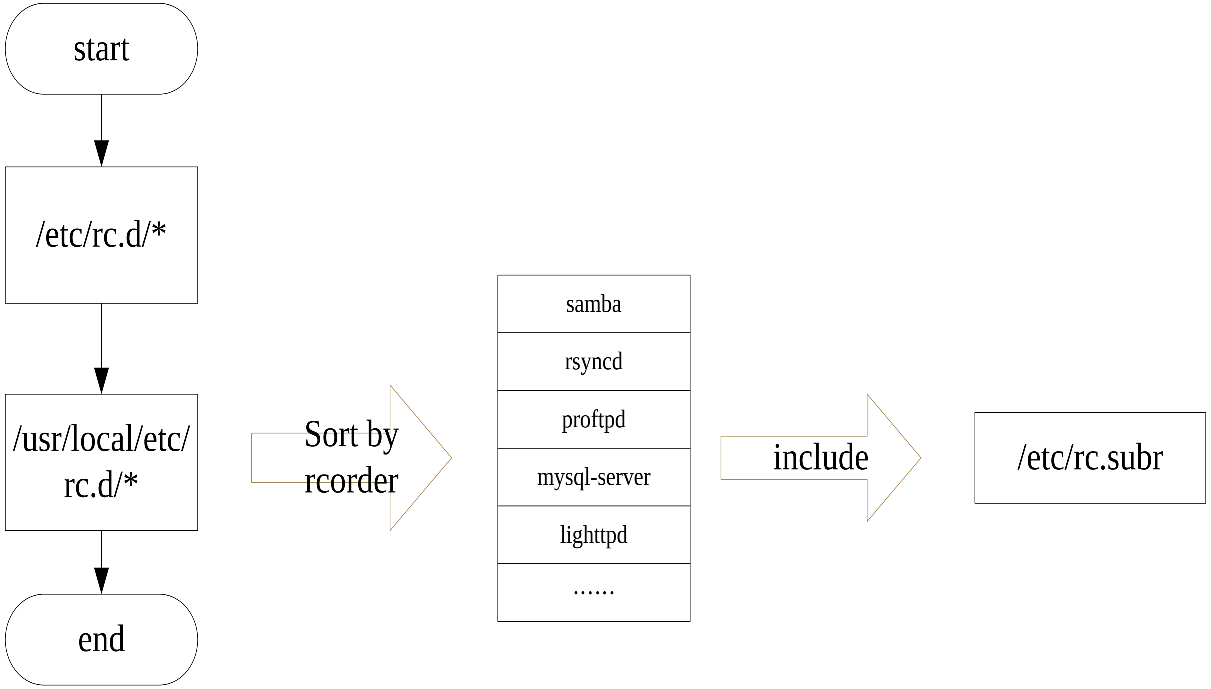
Why do we need RC Script?

- ❑ Start services on system startup
- ❑ Starting and Stopping services in a standard way
  - Without rc
    - ➢ /usr/local/sbin/pure-ftpd -g /var/run/pure-ftpd.pid -A -c50 -B -C8 -D -fftp -H -I15 -lpam -lunix -L10000:8 -m4 -s -U133:022 -u100 -k99 -Z

v.s.

  - With rc
    - ➢ service pure-ftpd start
    - ➢ Write configuration in the rc script for easy launch

RC Script



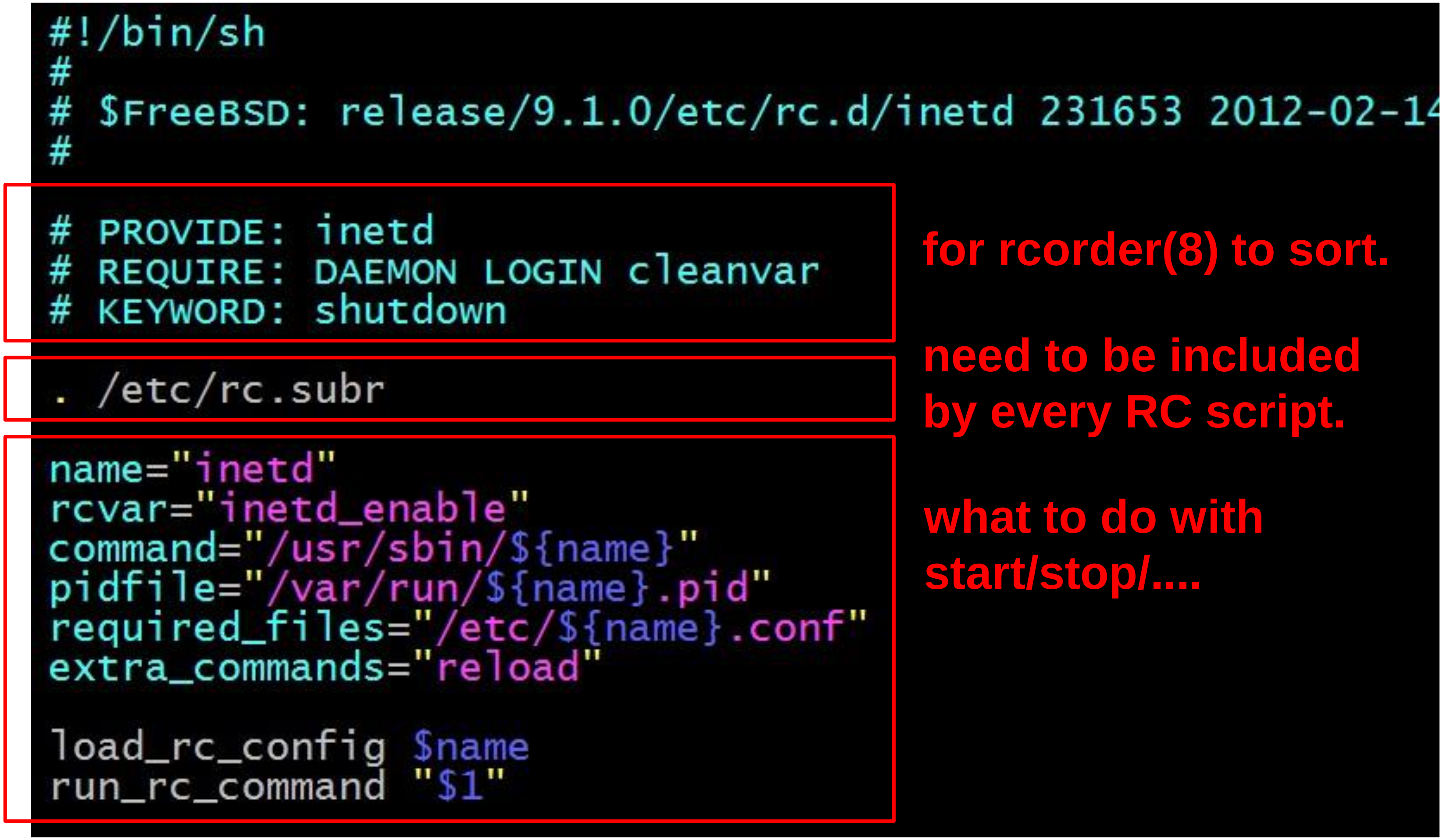
- ❑Dependency between each service is described in header of the script
- ❑rcorder is used to find out dependency ordering of each script
- ❑Each rc script defines what to do when start / stop …
- ❑/etc/rc.subr defines what to do & check before / after start stop ….
- ❑rc.subr(8)

Components to launch daemon processes

- ❑ To launch a daemon process in background, we need:
- ❑ Launch command
  - Path to the executable binary/script
  - /usr/sbin/inetd
- ❑ Path to configuration file
  - Program-specified configuration (ports to use, files to read/write, …)
  - /etc/inetd.conf
- ❑ Pidfile
  - Records (master) process id of the service
  - Other process (like “service” tool) can know what PID to show/kill
  - /var/run/inetd.pid

Inside the RC Script

- ❑ Example: /etc/rc.d/inetd



```
#!/bin/sh
#
# $FreeBSD: release/9.1.0/etc/rc.d/inetd 231653 2012-02-14
#

# PROVIDE: inetd
# REQUIRE: DAEMON LOGIN cleanvar
# KEYWORD: shutdown

. /etc/rc.subr

name="inetd"
rcvar="inetd_enable"
command="/usr/sbin/${name}"
pidfile="/var/run/${name}.pid"
required_files="/etc/${name}.conf"
extra_commands="reload"

load_rc_config $name
run_rc_command "$1"
```

for rcorder(8) to sort.

need to be included by every RC script.

what to do with start/stop/....

How to use rc script (1)

- Example: ntpd

```
nctucs [~] -lctseng- /etc/rc.d/ntpd
Usage: /etc/rc.d/ntpd [fast|force|one|quiet](start|stop|restart|rcvar|enable|disable|delete|enab
led|describe|extracommands|fetch|needfetch|status|poll
```

- After booting… (rc.conf)

```
nctucs [~] -lctseng- cat /var/db/ntp/ntpd.pid
4239
nctucs [~] -lctseng- ps aux | grep ntp
ntpd 4239   0.0  0.8 16488 16580  -  Ss   08:45      0:00.02 /usr/sbin/ntpd -p
/var/db/ntp/ntpd.pid -c /etc/ntp.conf -f /var/db/
```

- An easy way to access: “service”
  - $ service ntpd start/stop/restart/reload/…
    - Search /etc/rc.d and /usr/local/etc/rc.d

How to use rc script (2)

- ❑ Start
  - Start the service and write PID files now
- ❑ Stop
  - Terminates the service by killing the process with PID recorded in pidfile
- ❑ Restart
  - Restart the service (or just start a new one if not running)
  - Some services implement ’restart’ by ‘stop + start’
- ❑ Enable/Disable
  - Edit /etc/rc.conf with XXX_enable=“YES” or “NO”
  - Will automatically launch when booting

How to use rc script (3)

- ❑ Status
  - Check the service is running or not
- ❑ Reload
  - Reload configuration file if the service support
- ❑ Rcvar
  - Show the variables used in rc.conf

```
nctucs [~] -lctseng- service pure-ftpd rcvar
# pureftpd
#
pureftpd_enable="no"
#   (default: "")
```

How to use rc script (4)

- [one | fast | force]
  - One
    - ➢ Skip the check of rcvar="YES"
    - ➢ Start the service even if XXXX_enable="NO"
  - Force
    - Force start the service
    - Ignore any error it encountered (no prerequisite test)
    - ➢ ignore rcvar="YES" and set rc_force="YES"
  - Fast
    - ➢ Skip the check for an existing running process (pid check)
    - ➢ Set rc_fast="YES"

Local installed service

- ❑ More about how to use rc.conf for an installed service, read comments from that script
  - /usr/local/etc/rc.d/pure-ftpd

```
# Add the following lines to /etc/rc.conf to enable pure-ftpd:
#
# pureftpd_enable="yes"
# pureftpd_flags="<set as needed>"
#
# Add the following lines to /etc/rc.conf to enable pure-authd daemon:
#
# pureftpd_authd_enable="yes"
# pureftpd_authdscript="/full/path/to/auth_script"
# pureftpd_authsocket="/var/run/ftpd.sock"
#
# Add the following lines to /etc/rc.conf to enable uploadscript daemon:
#
# pureftpd_upload_enable="yes"
# pureftpd_uploadscript="/full/path/to/upload_script"
```

System-V

Startup Scripts

❑ SystemV-style startup scripts

- Sun
- /etc/init.d/
- /etc/rc.d/rc*n*.d/
- Each script is responsible for one daemon or one aspect of system.

Symbolic link

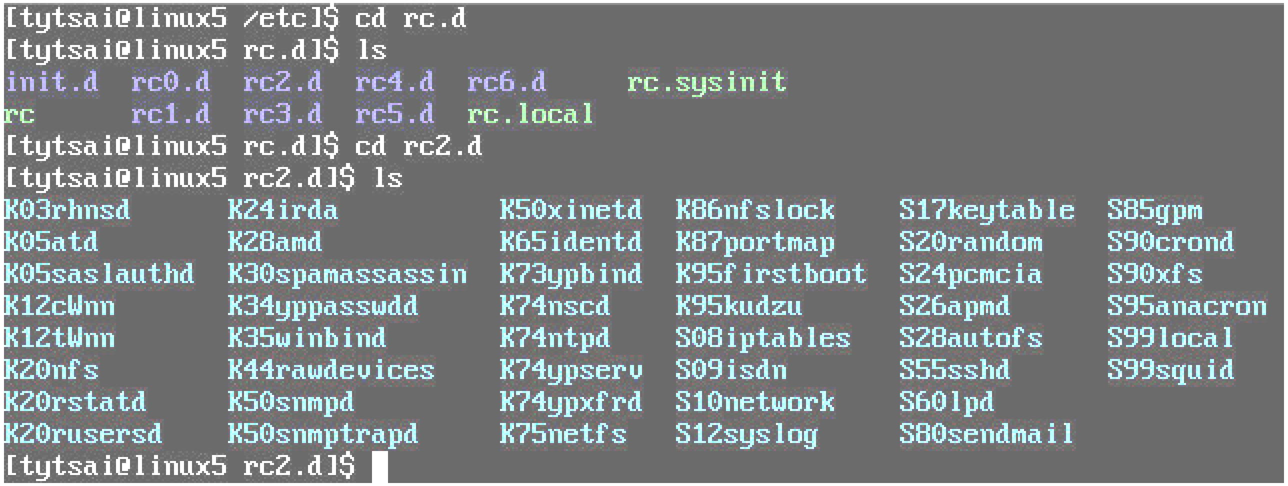
Example: sshd in SunOS

```
case "$1" in
'start')
        if [ -x /usr/local/sbin/sshd ]; then
                echo "Starting the secure shell daemon"
                /usr/local/sbin/sshd &
        fi
        ;;

'stop')
        echo "Stopping the secure shell daemon "
        pkill -TERM sshd
        ;;
*)
        echo "Usage: /etc/init.d/sshd { start | stop }"
        ;;
esac
exit 0
```

Startup Scripts – SystemV-style startup scripts (1)

- /etc/rc.d/rc*n*.d/
  - When init transitions from lower run level to higher one,
    - it runs all the scripts that start with "S" in ascending order with "start" argument
  - When init transitions from high run level to lower one,
    - it runs all the scripts that start with "K" in descending order with "stop" argument



```
[tytsai@linux5 /etc]$ cd rc.d
[tytsai@linux5 rc.d]$ ls
init.d  rc0.d  rc2.d  rc4.d  rc6.d      rc.sysinit
rc      rc1.d  rc3.d  rc5.d  rc.local
[tytsai@linux5 rc.d]$ cd rc2.d
[tytsai@linux5 rc2.d]$ ls
K03rhnsd      K24irda          K50xinetd  K86nfslock    S17keytable  S85gpm
K05atd        K28amd           K65identd  K87portmap    S20random    S90crond
K05saslauthd  K30spamassassin  K73ypbind  K95firstboot  S24pcmcia    S90xfs
K12cWnn       K34yppasswdd     K74nscd    K95kudzu      S26apmd      S95anacron
K12tWnn       K35winbind       K74ntpd    S08iptables   S28autofs    S99local
K20nfs        K44rawdevices    K74ypserv  S09isdn       S55sshd      S99squid
K20rstatd     K50snmpd         K74ypxfrd  S10network    S60lpd
K20rusersd    K50snmptrapd     K75netfs   S12syslog     S80sendmail
[tytsai@linux5 rc2.d]$
```

Startup Scripts – SystemV-style startup scripts (2)

❑ If you write a daemon and want init to start/stop it,

- write a script and put in /etc/init.d
- make suitable symbolic link in rc*n*.d
  - **ln –s /etc/init.d/initiald /etc/rc2.d/S61initiald**
  - **ln –s /etc/init.d/initiald /etc/rc0.d/K33initiald**

Systemd

Service management for modern Linux distributions

Systemd

❑ Evolved from System-V

- Backward compability

❑ Goal: provide a faster booting process

- Less processes
- Parallel launching

❑ Use ‘targets’ replace run-levels

- Easier to use

❑ Tool

- systemctl (1)
- Similar to ‘service’ tool in FreeBSD

Flow of Running a Service with Systemd

Example with Ubuntu 18.04

1. Installation
   - Through packages, or source tarballs
     - apt install apache2
2. Configuration
   - Service specific configuration file(s)
     - /etc/apache2/*
   - systemctl enable apache2
3. Start
   - systemctl start apache2
4. Maintenance
   - Updating、Restarting

How to use systemctl

- ❑ Usage
  - systemctl [OPTIONS…] {COMMAND} …
- ❑ Common commands
  - enable / disable
    - ➢ Enable/disable launch when booting
  - start / stop / reload / restart / status
  - condrestart
    - ➢ Restart only if service is running

Unit files

- ❑ Define services
  - /lib/systemd/system/*
  - Similar to /etc/rc.d/* in FreeBSD
- ❑ systemd.service (5)
- ❑ Example 1: (simple service)
  - Type
    - ➢ Simple: main process keeps running
    - ➢ Forking: main process forks and exits
  - ExecStart
    - ➢ Command to launch the service
  - WantedBy
    - ➢ Run this service at which target

```
[Unit]
Description=Some simple daemon

[Service]
Type=forking
ExecStart=/usr/sbin/my-simple-daemon -d
PIDFile=/var/run/my-daemon.pid

[Install]
WantedBy=multi-user.target
```

Unit files

- ❑ Example 2: (apache2.service)
  - After
    - Dependency. Start service after dependency is fulfilled
  - ExecStop / ExecReload
    - Custom command to stop / reload the service

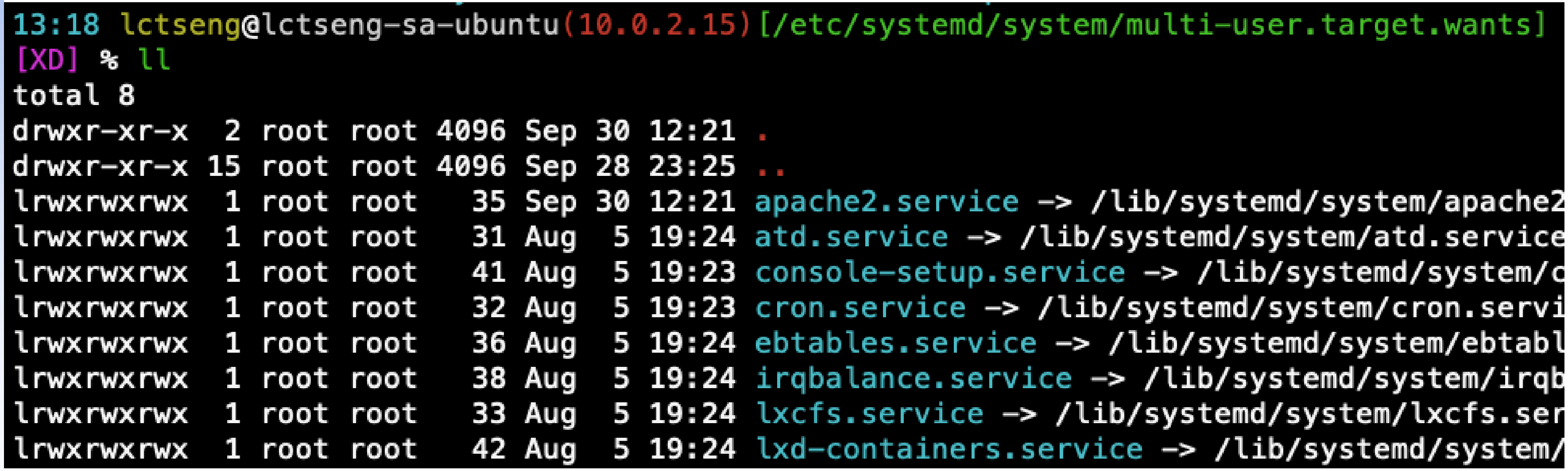
```
[Unit]
Description=The Apache HTTP Server
After=network.target remote-fs.target nss-lookup.target

[Service]
Type=forking
Environment=APACHE_STARTED_BY_SYSTEMD=true
ExecStart=/usr/sbin/apachectl start
ExecStop=/usr/sbin/apachectl stop
ExecReload=/usr/sbin/apachectl graceful
PrivateTmp=true
Restart=on-abort

[Install]
WantedBy=multi-user.target
```

Unit files

- ❑ When enable a service, it will create links from "/lib/systemd/system/*.service" to "/etc/systemd/system/XXX.target.wants/*"
  - /etc/systemd/system/multi-user.target.wants/apache2.service
    -> /lib/systemd/system/apache2.service



```
13:18 lctseng@lctseng-sa-ubuntu(10.0.2.15)[/etc/systemd/system/multi-user.target.wants]
[XD] % ll
total 8
drwxr-xr-x  2 root root 4096 Sep 30 12:21 .
drwxr-xr-x 15 root root 4096 Sep 28 23:25 ..
lrwxrwxrwx  1 root root   35 Sep 30 12:21 apache2.service -> /lib/systemd/system/apache2
lrwxrwxrwx  1 root root   31 Aug  5 19:24 atd.service -> /lib/systemd/system/atd.service
lrwxrwxrwx  1 root root   41 Aug  5 19:23 console-setup.service -> /lib/systemd/system/c
lrwxrwxrwx  1 root root   32 Aug  5 19:23 cron.service -> /lib/systemd/system/cron.servi
lrwxrwxrwx  1 root root   36 Aug  5 19:24 ebtables.service -> /lib/systemd/system/ebtabl
lrwxrwxrwx  1 root root   38 Aug  5 19:24 irqbalance.service -> /lib/systemd/system/irqb
lrwxrwxrwx  1 root root   33 Aug  5 19:24 lxcfs.service -> /lib/systemd/system/lxcfs.ser
lrwxrwxrwx  1 root root   42 Aug  5 19:24 lxd-containers.service -> /lib/systemd/system/
```