# **Lab 4 : Daemons and processes**

# Exercise 1. Exploring running processes

1.1. Find out the total number of processes that are currently running and identify the 10 most CPU-intensive processes.

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root	1499 1506	0.0	0.4			016		Ss S-	12:05		/usr/sbin/sshd
root 31	1517	0.0	$0.2 \\ 0.3$			608 808		Ss	12:05 12:05		/usr/sbin/acpid/ /usr/bin/dbus-d
root	1520	$0.0 \\ 0.0$	1.6			596		Ss Ss 1	12:05		/usr/sbin/conso
.00 t 32	1589	0.0	2.6			020		Ssl	12:05		/usr/sbin/hald
oot	1644	0.0	1.6			644		351 S1	12:05		/usr/libexec/p
oot	1662	0.0	0.4			200		S	12:05		hald-runner
oot	1694	0.0	0.4			028		S	12:05		hald-addon-inp
oot	1706	0.0	0.4			024		S	12:05		hald-addon-sto:
32	1708	0.0	0.4			144		S	12:05		hald-addon-acp
oot	1727	0.0	0.2			660		Ss	12:05		/usr/sbin/cron
aemon	1729	0.0	0.1			320		Ss	12:05		/usr/sbin/atd
oot	1741	0.0	0.4			064		S<	12:05		/sbin/udevd
root	1754	0.0	0.1			376		Ss	12:05		/usr/sbin/gpm
ob	1756	0.0	0.7				tty1	Ss	12:05		-bash
oot	1757	0.0	0.2				tty2	Ss+	12:05		/sbin/agetty 3
oot	1758	0.0	0.2				tty3	Ss+	12:05	0:00	/sbin/agetty 3
oot	1759	$\Theta.\Theta$	$\Theta.2$				ttý4	Ss+	12:05		∕sbin/agettý 3
oot	1760	$\Theta.\Theta$	0.2				ttý5	Ss+			∕sbin/agettý 3
oot	1761	0.0	0.2				ttý6	Ss+	12:05		∕sbin/agettý 3
oot	1788	$\Theta.\Theta$	$\Theta.\Theta$	9	0	Θ		S	12:25	0:00	[flush-8:01
ob	1803	0.0	0.3	3 27	32	960	tty1	R+	12:28	0:00	ps aux
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91 <b>S</b> abobar	.021 : ./baw	a zh al	ı d								
nobusru	յ021:∕hom	e/boi	DŞ _								
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0 0 0							are [Runn	ing]			
o o o	92 tota			ınning	, 91	sle	eping,	ing] 0 st	opped,	0 zor	nbie
Tasks:	92 tota : 0.0%us	, 0	.3%s <u>u</u>	j, 0.	, 91 0%ni,	sle 99.	eping, 7%id,	ing] 0 sto 0.0%wa	opped, , 0.0%hi	0 zor	nbie .0%si, 0.0%st
asks: pu(s)	92 tota : 0.0%us 243708k	, O tota	.3%sy al,	j, 0.	, 91 0%ni, 20k u	sle 99. sed,	eping, 7%id, 782	ing] 0 st: 0.0%wa 288k fr:	opped, , 0.0%hi ee, 32	0 zor , 0 :728k	nbie .0%si, 0.0%st buffers
Casks: Cpu(s):	92 tota : 0.0%us	, O tota	.3%sy al,	j, 0.	, 91 0%ni,	sle 99. sed,	eping, 7%id, 782	ing] 0 sto 0.0%wa	opped, , 0.0%hi ee, 32	0 zor , 0 :728k	nbie .0%si, 0.0%st
(asks: Cpu(s):	92 tota : 0.0%us 243708k 2815388k	tota tota PR	.3%sy al,	), 0°. 1654 Virt	, 91 0%ni, 20k u 0k u RES	sle 99. sed, sed,	eping, 7%id, 782 28153 S %CPI	ing] 0 sto 0.0%wa 288k fro 388k fro	opped, , 0.0%hi ee, 32 ee, 105	0 zor , 0 728k 420k	nbie .0%si, 0.0%st buffers cached MAND
'asks: 'pu(s): lem: wap: PID U	92 tota : 0.0%us 243708k 2815388k USER	tota tota PR 20	.3%s <u>u</u> al, al, NI 0	J, 0. 1654 UIRT 2628	, 91 0%ni, 20k u 0k u RES 1056	sle 99. sed, sed, SHR 820	eping, 7%id, 782 28153 S %CPU R 0.	ing] 0 sto 0.0%wa 288k fro 388k fro J :/MEM 7 0.4	opped, , 0.0%hi ee, 32 ee, 105 TIME+ 0:00.02	0 zor , 0 728k 420k COM	mbie .0%si, 0.0%st buffers cached 1AND
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The number is provided by the command ps aux | wc -l

See last page for a description for those 10 processes.

### Exercise 2. Exploring network processes

### 2.1. Execute the command nmap localhost. Write down the processes returned.

The command **nmap** (network mapper) is an utility that uses raw IP packets to determine what hosts are available on the network, what services those hosts are offering, what OS they are running, etc. It was designed to rapidly scan large networks, but works fine against single hosts. Many sysadmins also find it useful for tasks such as network inventory, managing service upgrade, etc. For example to see the services our machine is offering (three processes):

**37/tcp time** - server included in a set called "tcp small services". It's deprecated so it is going to be commented in /etc/inetd.conf (exercise 4).

**113/tcp auth** - server to identify the user behind a particular TCP connection.

22/tcp ssh - server to enable secured remote access (sshd is the server daemon)

# Exercise 3. Exploring UNIX signals

The kill command sends signals to running processes in order to request their termination:

```
Slackware [Running]
 oot@Bry021:
 1) SIGHUP
                   2) SIGINT
7) SIGBUS
                                      3) SIGQUIT
                                                         4) SIGILL
                                                                           5) SIGTRAP
6) SIGABRT
                                      8) SIGFPE
                                                         9) SIGKILL
                                                                           10) SIGUSR1
                                                        14) SIGALRM
11) SIGSEGV
                  12) SIGUSR2
                                     13) SIGPIPE
                                                                           15) SIGTERM
16) SIGSTKFLT
                  17) SIGCHLD
                                                        19) SIGSTOP
                                                                           20) SIGTSTP
                                     18) SIGCONT
                                     23) SIGURG
                  22) SIGTTOU
                                                        24) SIGXCPU
                                                                           25) SIGXFSZ
21) SIGTTIN
26) SIGUTALRM
                                                        29) SIGIO
                  27) SIGPROF
                                     28) SIGWINCH
                                                                           30) SIGPWR
                  34) SIGRTMIN
39) SIGRTMIN+5
                                                        36) SIGRTMIN+2
41) SIGRTMIN+7
                                                                          37) SIGRTMIN+3
42) SIGRTMIN+8
31) SIGSYS
                                     35) SIGRTMIN+1
38) SIGRTMIN+4
                                     40) SIGRTMIN+6
43) SIGRTMIN+9
                  44) SIGRTMIN+10 45) SIGRTMIN+11
                                                       46) SIGRTMIN+12 47) SIGRTMIN+13
48) SIGRTMIN+14 49) SIGRTMIN+15 50) SIGRTMAX-14 51) SIGRTMAX-13 52) SIGRTMAX-12
53) SIGRTMAX-11 54) SIGRTMAX-10 55) SIGRTMAX-9 56) SIGRTMAX-8 57) SIGRTMAX-7
58) SIGRTMAX-6
                  59) SIGRTMAX-5
                                     60) SIGRTMAX-4
                                                        61) SIGRTMAX-3
                                                                          62) SIGRTMAX-2
                  64) SIGRTMAX
63) SIGRTMAX-1
root@Bry021:~# _
```

Signal	No	Descritpion
SIGHUP	1	Hangup detected on controlling terminal (restart)
SIGINT	2	Interrupt from the keyboard
SIGQUIT	3	Quit from keyboard
SIGILL	4	Illegal instruction
SIGTRAP	5	Trap
SIGABRT	6	Abort signal
SIGBUS	7	Bus
SIGFP	8	Float point exception
SIGKILL	9	The process must quit immediately and will not perform any clean-up operations.
SIGUSR1	10	User defined signal
SIGALRM	14	Alarm clock (timers)
SIGTERM	15	Software termination signal (sent by default)
SIGSTOP	17,19,23	Stop process
SIGCONT	19,18,25	Continue if stopped

# Exercise 4. Processes and networking

### 4.1. Edit /etc/inetd.conf to enable telnet and ftp

The daemon **inetd** provides Internet services. For each configured service, it listens for requests from connecting clients. Requests are served by spawning a process which runs the appropriate executable, but simple services such as *echo* are served by inetd itself.

Let's first remove the service in port 37. We are going to edit the file /etc/inetd.conf. Once it has been updated, the inetd service is restarted running this:

#### #./etc/rc.d/rc.inetd restart

Note that all processes listed in the /etc/rc.d/ directory start with the prefix "rc" (rc.inetd).

```
Slackware [Running]
root@Bry021:~
                 # telnet localhost
Trying 127.0.0.1...
Connected to localhost.
Escape character is '^l'.
Bry021 login: bob
Password:
Linux 2.6.37.6-smp.
Last login: Thu Oct 12 13:17:42 +0100 2017 on /dev/pts/0 from localhost.
No mail.
When you are about to do an objective and scientific piece of investigation of a topic, it is well to gave the answer firmly in hand, so that you can proceed forthrightly, without being deflected or swayed, directly to the
goal.
                      -- Amrom Katz
bob@Bry021:~$ w
18:05:28 up
USER TTY
                   1:33, Z users, FROM
                                          load average: 0.00, 0.01, 0.03
USER
                                                 LOGINO
                                                             IDLE
                                                                       JCPU
                                                                                 PCPU WHAT
            tty1
                                                16:33
                                                            0.00s
                                                                      0.15s
                                                                               0.00s telnet localhos
root
            pts/0
                        localhost
                                                18:04
                                                            0.00s
bob
                                                                      0.00s
                                                                               0.00s w
bob@Bry021:~$
                                                                   👂 🧿 🚅 🤌 🗀 🖳 🚰 🔘 🚫 🛂 Left ೫
```

Therefore bob can login by using telnet. The command "w" shows that there are two users logged in the machine: root at tty1 (running telnet) and bob at pts/0 (running w).

The main reason of using the SSH protocol instead is because telnet sends data in plain text. SSH uses a public key for authentication.

Now let's enable ftp (port 21). We are going to use the **vsftpd** daemon. Its configuration files is located at /**etc/vsftp.conf**. There are two changes:

- Change anonymous\_enable=YES to NO to disable Anonymous FTP.
- Uncomment local\_enable=YES and write\_enable=YES to allow you to make changes to the FTP server.

```
Slackware [Running]
root@Bry021:~# nmap localhost

Starting Nmap 5.51 ( http://nmap.org ) at 2017-10-13 18:24 BST

Nmap scan report for localhost (127.0.0.1)
Host is up (0.0000020s latency).

Not shown: 296 closed ports
PORT STATE SERVICE
21/tcp open ftp
22/tcp open ssh
23/tcp open telnet
113/tcp open auth

Nmap done: 1 IP address (1 host up) scanned in 0.05 seconds
root@Bry021:~# ______
```

```
root@Bry021:~# ftp localhost
Connected to localhost.
220 (vsFTPd 2.3.4)
Name (localhost:root):
331 Please specify the password.
Password:
230 Login successful.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> ls
200 PORT command successful. Consider using PASV.
150 Here comes the directory listing.
              2 0
2 0
drwxr-xr-x
                          0
                                        4096 Mar 02
                                                     2012 Desktop
drwxr-xr-x
                          Θ
                                        4096 Mar 02
                                                     2012 Documents
drwxr-xr-x
              2 0
                          0
                                        4096 Mar 02
                                                     2012 Downloads
drwxr-xr-x
              2 0
                                        4096 Mar 02
                                                     2012 Music
                          Θ
              2 0
2 0
drwxr-xr-x
                          0
                                        4096 Mar 02
                                                     2012 Pictures
                                        4096 Mar 02
                                                     2012 Public
                          0
drwxr-xr-x
                                                     2012 Templates
drwxr-xr-x
              2 0
                          0
                                        4096 Mar 02
                                                     2012 Videos
                                        4096 Mar 02
drwxr-xr-x
              2 0
                          Θ
                                        1280 Oct 07 15:04 dead.letter
-rw----
              1 0
                          0
                                          5 Oct 07 12:05 hello
rw-r--r--
              1 0
                          0
rwxr--r--
              1 0
                          0
                                          37 Oct 05 11:32 test.sh
226 Directory send OK.
ftp>
```

Command	FTP operation
put	copy one file from the local machine to the remote machine
get	copy one file from the remote machine to the local machine
ls, mkdir, rmdir, cd	remote file-folder management
lcd	same as cd in local

More FTP commands can be found at <a href="https://www.cs.colostate.edu/helpdocs/ftp.html">https://www.cs.colostate.edu/helpdocs/ftp.html</a>.

# 4.2. Edit /etc/inetd.conf again to disable ftp.

Once the line is commented in the config file, the process should be restarted:

# # ./etc/rc.d/rc.inetd restart

Now the connection is refused (ftp localhost).

### Exercise 5 (optional).

# 5.1. How could you combine pidof with kill -HUP in order to restart inetd in one command?

We can combine those commands in one line using a mini bash script (variable):

# # kill -HUP \$(pidof inetd)

The command in between brackets is evaluated first.

```
Slackware [Running]

rooteBry021:/etc# cat inetd.conf i grep telnet

#telnet stream tcp nowait root /usr/sbin/tcpd

in.telnetd

# Try "telnet localhost systat" and "telnet localhost netstat" to see that

rooteBry021:/etc# kill -HUP $(pidof inetd)

rooteBry021:/etc#

rooteBry021:/etc#

rooteBry021:/etc# nmap localhost

Starting Nmap 5.31 ( http://nmap.org ) at 2017-10-14 09:13 BST

Nmap scan report for localhost (127.0.0.1)

Host is up (0.0000020s latency).

Not shown: 999 closed ports

PORT STATE SERVICE

22/tcp open ssh

Nmap done: 1 IP address (1 host up) scanned in 0.04 seconds

rooteBry021:/etc# __
```

# 5.2. Can you ftp as root? Is a good idea?

Looking at the exercise 3, the root user is able to login in the FTP server but it's not a good idea. In this forum there are some clues:

https://askubuntu.com/questions/16178/why-is-it-bad-to-log-in-as-root

Basically it's like arming a little kid with an AK47, while he can happily play with his paintball gun.

# 5.3. From you host machine, telnet to your Slackware VM?

There are several options in the VirtualBox for networking (table 6.1)

	VM — Host	VM1 — VM2	VM -> Internet	VM <- Internet
Host Only	Yes	Yes	-	-
Bridged(*)	Yes	Yes	Yes	Port forwarding
NAT	-	-	Yes	Port forwarding
NAT Network	-	Yes	Yes	Port forwarding

The default VirtualBox adapter is a NAT type (Network Address Translation) but a Bridged one is more convenient as our DHCP server (real router) will assign a real IP address to the VM.

Now let's make telnet and ftp servers accessible from any device in the network with port forwarding (still networking tab on VirtualBox):

Service	Host IP	Host Port	Guest IP	Guest Port
Telnet	-	23	-	23
FTP	-	21	-	21
Apache	-	80	-	80

```
•
              🏫 juanmanuelgagobenitez — telnet 192.168.0.16 — 80×24
[juan$ telnet 192.168.0.16
Trying 192.168.0.16...
Connected to 192.168.0.16.
Escape character is '^]'.
[Password:
Login incorrect
Bry021 login: bob
[Password:
Linux 2.6.37.6-smp.
Last login: Sun Oct 15 14:37:35 +0100 2017 on /dev/pts/0 from 192.168.0.4.
No mail.
I'd never cry if I did find
        A blue whale in my soup...
Nor would I mind a porcupine
        Inside a chicken coop.
Yes life is fine when things combine,
        Like ham in beef chow mein...
But lord, this time I think I mind,
        They've put acid in my rain.
                      --- Milo Bloom
bob@Bry021:~$ ☐
```

More info at <a href="https://www.howtogeek.com/122641/how-to-forward-ports-to-a-virtual-machine-and-use-it-as-a-server/">https://www.howtogeek.com/122641/how-to-forward-ports-to-a-virtual-machine-and-use-it-as-a-server/</a>

#### Answer 1.1:

- 1. **init** (short for *initialization*) is the first process started during booting of the computer system. Init is a daemon process that continues running until the system is shut down.
- 2. **kthreadd** is a thread that kernel uses to spawn newer threads if required.
- 3. **ksoftirqd** is a per-cpu kernel thread that runs when the machine is under heavy soft-interrupt load.
- 4. **kworker/0:0** is placeholder for kernel worker threads, which perform most of the processing for the kernel, especially in cases where there are interrupts, timers, IO, etc.
- 5. **migration/0** distributes workload across CPU cores. You should have one migration process per processor core.
- 6. **cpuset** confines process to the processor and memory node subset. It is mounted in / dev/cpuset
- 7. **khelper:** module used to make calls to userspace implementations of what would be kernel modules.
- 8. **netns**: network namespace management is logically another copy of the network stack, with its own routes, firewall rules, and network devices.
- 9. sync\_supers : Apache service (user "nobody")
- 10. **bdi-default:** breakpoint debugger interface.