

**Vanier College**  
**Faculty of Careers and Technical Programs**  
**Department of Computer Science Technology**

# **Advanced UNIX**

**Lab #9**

**Title: Managing Linux Processes**

**Student Names: Marissa Gonçalves**  
**Amy Yip**  
**Yulia Bakaleinik**

**Submitted to Florin Pilat**

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### **Review Questions (p.415-418):**

1. D) ps
2. A) If /etc/at.allow exists, only users listed in it can use the at command.  
B) If /etc/cron.allow exists, only users listed in it can use the cron command.  
C) If /etc/cron.deny exists and /etc/cron.allow does not exist, any user not listed in /etc/cron.deny can use the cron command.
3. D) /var/spool/cron/(the user's login name)
4. C) init
5. B) forking
6. True
7. C) renice -12
8. D) You can use the Ctrl+z key combination and the bg command.
9. C) schedule processes to run at a single instance in the future
10. A) crontab
11. D) parent process ID
12. D) all instances of a process with the same name
13. D) -20 and 19
14. D) daemon process
15. False
16. B) 9
17. D) is a rogue process
18. B) There is a question mark in the TTY column.
19. C) top
20. B) jobs

### **Project 9.1 (p.418-419):**

- 1.

```
Fedora 26 (Workstation Edition)
Kernel 4.16.11-100.fc26.x86_64 on an x86_64 (tty2)

server13 login: root
Password:
Last login: Thu Nov 12 14:50:24 on tty2
[root@server13 ~]# _
```

2.

```
[root@server13 ~]# ps -ef | less_
```

```
UID      PID  PPID  C  STIME TTY          TIME CMD
root      1    0  0  16:13 ?        00:00:03 /usr/lib/systemd/systemd --switched-root --system --
deserialize 24
root      2    0  0  16:13 ?        00:00:00 [kthreadd]
root      4    2  0  16:13 ?        00:00:00 [kworker/0:0H]
root      6    2  0  16:13 ?        00:00:00 [mm_percpu_wq]
root      7    2  0  16:13 ?        00:00:00 [ksoftirqd/0]
root      8    2  0  16:13 ?        00:00:00 [rcu_sched]
root      9    2  0  16:13 ?        00:00:00 [rcu_bh]
root     10    2  0  16:13 ?        00:00:00 [migration/0]
root     11    2  0  16:13 ?        00:00:00 [watchdog/0]
root     12    2  0  16:13 ?        00:00:00 [cpuhp/0]
root     13    2  0  16:13 ?        00:00:00 [kdevtmpfs]
root     14    2  0  16:13 ?        00:00:00 [netns]
root     15    2  0  16:13 ?        00:00:00 [rcu_tasks_kthre]
root     16    2  0  16:13 ?        00:00:00 [kauditd]
root     17    2  0  16:13 ?        00:00:00 [oom_reaper]
root     18    2  0  16:13 ?        00:00:00 [writeback]
root     19    2  0  16:13 ?        00:00:00 [kcompactd0]
root     20    2  0  16:13 ?        00:00:00 [ksmd]
root     21    2  0  16:13 ?        00:00:00 [khugepaged]
root     22    2  0  16:13 ?        00:00:00 [crypto]
root     23    2  0  16:13 ?        00:00:00 [kintegrityd]
root     24    2  0  16:13 ?        00:00:00 [kblockd]
root     25    2  0  16:13 ?        00:00:00 [ata_sff]
root     26    2  0  16:13 ?        00:00:00 [md]
root     27    2  0  16:13 ?        00:00:00 [edac-poller]
root     28    2  0  16:13 ?        00:00:00 [devfreq_wq]
root     29    2  0  16:13 ?        00:00:00 [watchdogd]
root     32    2  0  16:13 ?        00:00:00 [kswapd0]
root     82    2  0  16:13 ?        00:00:00 [kthrotld]
root     83    2  0  16:13 ?        00:00:00 [acpi_thermal_pm]
root     84    2  0  16:13 ?        00:00:00 [scsi_eh_0]
root     85    2  0  16:13 ?        00:00:00 [scsi_tmf_0]
root     86    2  0  16:13 ?        00:00:00 [scsi_eh_1]
root     87    2  0  16:13 ?        00:00:00 [scsi_tmf_1]
:
```

```

root      1091      1  0 16:15 ?      00:00:00 /usr/sbin/wpa_supplicant -c /etc/wpa_supplicant/wpa_
supplifant.conf -u -s
root      1092      1  0 16:15 ?      00:00:00 /usr/libexec/packagekitd
gdm       1095     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-sound
gdm       1097     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-wacom
gdm       1098     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-xsettings
gdm       1103     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-a11y-keyboard
gdm       1104     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-a11y-settings
gdm       1105     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-clipboard
gdm       1106     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-color
gdm       1107     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-datetime
gdm       1108     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-housekeeping
gdm       1109     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-keyboard
gdm       1110     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-media-keys
gdm       1111     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-mouse
gdm       1112     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-orientation
gdm       1119     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-power
gdm       1120     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-print-notifications
gdm       1121     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-rfkill
gdm       1122     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-screensaver-proxy
gdm       1123     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-sharing
gdm       1132     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-smartcard
gdm       1133     880  0 16:15 tty1    00:00:00 /usr/libexec/gsd-xrandr
colord    1170      1  0 16:15 ?      00:00:00 /usr/libexec/colord
gdm       1217    1067  0 16:15 tty1    00:00:00 /usr/libexec/ibus-engine-simple
root      1272      2  0 16:30 ?      00:00:00 [kworker/0:0]
root      1275      2  0 16:35 ?      00:00:01 [kworker/0:1]
root      1276      1  0 16:36 ?      00:00:00 login -- root
root      1283      2  0 16:37 ?      00:00:00 [kworker/0:2]
root      1284      2  0 16:39 ?      00:00:00 [kworker/u2:0]
root      1291      1  0 16:39 ?      00:00:00 /usr/lib/systemd/systemd --user
root      1298    1291  0 16:39 ?      00:00:00 (sd-pam)
root      1305    1276  0 16:39 tty2    00:00:00 -bash
root      1312      2  0 16:39 ?      00:00:00 [kworker/u2:1]
root      1342    1305  0 16:42 tty2    00:00:00 ps -ef
root      1343    1305  0 16:42 tty2    00:00:00 less
[root@server13 ~]#

```

3. a) It is the /usr/lib/systemd/systemd --switched-root --system --deserialize 24 process that has a Process ID of 1.
- b) Most processes have the question mark (?) character in the terminal column.
- c) The question mark (?) character indicates that the process doesn't run on a terminal.
- d) The root user started the most processes.
- e) The kthreadd process (2) is the parent to most processes.

4.

```
[root@server13 ~]# ps -el | less
```

```

F S      UID      PID  PPID  C  PRI  NI ADDR  SZ  WCHAN  TTY      TIME CMD
4 S      0         1      0  0  80   0 - 39711 Sys_ep  ?        00:00:03 systemd
1 S      0         2      0  0  80   0 -      0 -      ?        00:00:00 kthreadd
1 I      0         4      2  0  60 -20 -      0 -      ?        00:00:00 kworker/0:0H
1 I      0         6      2  0  60 -20 -      0 -      ?        00:00:00 mm_percpu_wq
1 S      0         7      2  0  80   0 -      0 -      ?        00:00:00 ksoftirqd/0
1 I      0         8      2  0  80   0 -      0 -      ?        00:00:00 rcu_sched
1 I      0         9      2  0  80   0 -      0 -      ?        00:00:00 rcu_bh
1 S      0        10      2  0 -40   - -      0 -      ?        00:00:00 migration/0
5 S      0        11      2  0 -40   - -      0 -      ?        00:00:00 watchdog/0
1 S      0        12      2  0  80   0 -      0 -      ?        00:00:00 cpuhp/0
5 S      0        13      2  0  80   0 -      0 -      ?        00:00:00 kdevtmpfs
1 I      0        14      2  0  60 -20 -      0 -      ?        00:00:00 netns
1 S      0        15      2  0  80   0 -      0 -      ?        00:00:00 rcu_tasks_kthre
1 S      0        16      2  0  80   0 -      0 -      ?        00:00:00 kauditd
1 S      0        17      2  0  80   0 -      0 -      ?        00:00:00 oom_reaper
1 I      0        18      2  0  60 -20 -      0 -      ?        00:00:00 writeback
1 S      0        19      2  0  80   0 -      0 -      ?        00:00:00 kcompactd0
1 S      0        20      2  0  85   5 -      0 -      ?        00:00:00 ksmd
1 S      0        21      2  0  99  19 -      0 -      ?        00:00:00 khugepaged
1 I      0        22      2  0  60 -20 -      0 -      ?        00:00:00 crypto
1 I      0        23      2  0  60 -20 -      0 -      ?        00:00:00 kintegrityd
1 I      0        24      2  0  60 -20 -      0 -      ?        00:00:00 kblockd
1 I      0        25      2  0  60 -20 -      0 -      ?        00:00:00 ata_sff
1 I      0        26      2  0  60 -20 -      0 -      ?        00:00:00 md
1 I      0        27      2  0  60 -20 -      0 -      ?        00:00:00 edac-poller
1 I      0        28      2  0  60 -20 -      0 -      ?        00:00:00 devfreq_wq
1 S      0        29      2  0 -40   - -      0 -      ?        00:00:00 watchdogd
1 S      0        32      2  0  80   0 -      0 -      ?        00:00:00 kswapd0
1 I      0        82      2  0  60 -20 -      0 -      ?        00:00:00 kthrotld
1 I      0        83      2  0  60 -20 -      0 -      ?        00:00:00 acpi_thermal_pm
1 S      0        84      2  0  80   0 -      0 -      ?        00:00:00 scsi_eh_0
1 I      0        85      2  0  60 -20 -      0 -      ?        00:00:00 scsi_tmf_0
1 S      0        86      2  0  80   0 -      0 -      ?        00:00:00 scsi_eh_1
1 I      0        87      2  0  60 -20 -      0 -      ?        00:00:00 scsi_tmf_1
1 S      0        88      2  0  80   0 -      0 -      ?        00:00:00 scsi_eh_2
:
_

```

```

0 S    42 1072    1 0 80 0 - 140936 Sys_po tty1 00:00:00 ibus-x11
0 S    42 1076   811 0 80 0 - 96212 Sys_po ? 00:00:00 ibus-portal
4 S     0 1091    1 0 80 0 - 13107 core_s ? 00:00:00 wpa_supplicant
4 S     0 1092    1 0 80 0 - 138523 Sys_po ? 00:00:00 packagekitd
0 S    42 1095   880 0 80 0 - 138327 Sys_po tty1 00:00:00 gsd-sound
0 S    42 1097   880 0 80 0 - 117474 Sys_po tty1 00:00:00 gsd-wacom
0 S    42 1098   880 0 80 0 - 172546 Sys_po tty1 00:00:00 gsd-xsettings
0 S    42 1103   880 0 80 0 - 137000 Sys_po tty1 00:00:00 gsd-a11y-keyboa
0 S    42 1104   880 0 80 0 - 127739 Sys_po tty1 00:00:00 gsd-a11y-settin
0 S    42 1105   880 0 80 0 - 115817 Sys_po tty1 00:00:00 gsd-clipboard
0 S    42 1106   880 0 80 0 - 177129 Sys_po tty1 00:00:00 gsd-color
0 S    42 1107   880 0 80 0 - 117826 Sys_po tty1 00:00:00 gsd-datetime
0 S    42 1108   880 0 80 0 - 136416 Sys_po tty1 00:00:00 gsd-housekeepin
0 S    42 1109   880 0 80 0 - 154895 Sys_po tty1 00:00:00 gsd-keyboard
0 S    42 1110   880 0 80 0 - 250748 Sys_po tty1 00:00:00 gsd-media-keys
0 S    42 1111   880 0 80 0 - 108733 Sys_po tty1 00:00:00 gsd-mouse
0 S    42 1112   880 0 80 0 - 148222 Sys_po tty1 00:00:00 gsd-orientation
0 S    42 1119   880 0 80 0 - 159110 Sys_po tty1 00:00:00 gsd-power
0 S    42 1120   880 0 80 0 - 126964 Sys_po tty1 00:00:00 gsd-print-notif
0 S    42 1121   880 0 80 0 - 108738 Sys_po tty1 00:00:00 gsd-rfkill
0 S    42 1122   880 0 80 0 - 127167 Sys_po tty1 00:00:00 gsd-screensaver
0 S    42 1123   880 0 80 0 - 103448 Sys_po tty1 00:00:00 gsd-sharing
0 S    42 1132   880 0 80 0 - 153404 Sys_po tty1 00:00:00 gsd-smartcard
0 S    42 1133   880 0 80 0 - 155484 Sys_po tty1 00:00:00 gsd-xrandr
4 S   993 1170    1 0 80 0 - 106426 Sys_po ? 00:00:00 colord
0 S    42 1217  1067 0 80 0 - 77762 Sys_po tty1 00:00:00 ibus-engine-sim
1 I     0 1275    2 0 80 0 - 0 - ? 00:00:04 kworker/0:1
4 S     0 1276    1 0 80 0 - 41041 - ? 00:00:00 login
4 S     0 1291    1 0 80 0 - 18148 Sys_ep ? 00:00:00 systemd
5 S     0 1298  1291 0 80 0 - 53853 - ? 00:00:00 (sd-pam)
4 S     0 1305  1276 0 80 0 - 33441 - tty2 00:00:00 bash
1 I     0 1312    2 0 80 0 - 0 - ? 00:00:00 kworker/u2:1
1 I     0 1353    2 0 80 0 - 0 - ? 00:00:00 kworker/0:0
1 I     0 1362    2 0 80 0 - 0 - ? 00:00:00 kworker/0:2
0 R     0 1364  1305 0 80 0 - 36273 - tty2 00:00:00 ps
0 S     0 1365  1305 0 80 0 - 29251 - tty2 00:00:00 less
[root@server13 ~]#

```

5. a) The uppercase S character exists for most processes and this character indicates that the process is currently sleeping.
- b) The range of numbers goes from -20 to +19.
- c) The processes below have the number of 4 and it indicates particular features of the process.

```

4 S     0    1    0 0 80 0 - 39711 Sys_ep ? 00:00:03 systemd

```

4 S	0	486	1	0	80	0 - 18669	SyS_ep ?	00:00:01	systemd-journal
4 S	0	503	1	0	80	0 - 48873	core_s ?	00:00:00	lvmetad
4 S	0	514	1	0	80	0 - 16581	SyS_ep ?	00:00:00	systemd-udev

4 S	0	595	593	0	72	-8 - 21154	- ?	00:00:00	audispd
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4 S	0	609	595	0	76	-4 - 10210	- ?	00:00:00	sedispatch
4 S	0	618	1	0	80	0 - 103789	SyS_po ?	00:00:00	ModemManager
4 S	70	619	1	0	80	0 - 18104	SyS_po ?	00:00:00	avahi-daemon
4 S	0	620	1	0	80	0 - 116534	SyS_po ?	00:00:00	abrt-d
4 S	172	621	1	0	81	1 - 46525	SyS_po ?	00:00:00	rtkit-daemon
4 S	0	622	1	0	99	19 - 4259	SyS_po ?	00:00:00	alsactl
4 S	0	625	1	0	80	0 - 69543	SyS_po ?	00:00:00	sssd
4 S	81	626	1	0	80	0 - 19948	SyS_ep ?	00:00:01	dbus-daemon

4 S	0	637	625	0	80	0 - 71199	SyS_ep ?	00:00:00	sssd_be
4 S	0	642	1	0	80	0 - 86251	SyS_po ?	00:00:03	firewalld
4 S	0	645	1	0	80	0 - 4359	SyS_pp ?	00:00:00	mcelog
4 S	0	648	1	0	80	0 - 87827	SyS_pp ?	00:00:00	abrt-dump-journ
4 S	0	649	1	0	80	0 - 92419	SyS_pp ?	00:00:00	abrt-dump-journ
4 S	0	650	1	0	80	0 - 89745	SyS_pp ?	00:00:00	abrt-dump-journ
1 S	0	652	1	0	80	0 - 51194	SyS_ep ?	00:00:00	gssproxy
4 S	0	661	625	0	80	0 - 69380	SyS_ep ?	00:00:00	sssd_nss
4 S	0	662	1	0	80	0 - 104375	SyS_po ?	00:00:00	accounts-daemon
4 S	0	663	1	0	80	0 - 18423	SyS_ep ?	00:00:00	systemd-logind
4 S	997	674	1	0	80	0 - 139767	SyS_po ?	00:00:00	polkitd
4 S	0	682	1	0	80	0 - 143494	SyS_po ?	00:00:00	NetworkManager
4 S	0	700	1	0	80	0 - 239972	SyS_po ?	00:00:01	libvirt
4 S	0	711	1	0	80	0 - 35832	hrtime ?	00:00:01	crond
4 S	0	717	1	0	80	0 - 105354	SyS_po ?	00:00:00	gdm
4 S	0	739	717	0	80	0 - 101185	SyS_po ?	00:00:00	gdm-session-wor
4 S	42	811	1	0	80	0 - 20712	SyS_ep ?	00:00:00	systemd

4 S	42	851	739	0	80	0 - 106556	SyS_po tty1	00:00:00	gdm-wayland-ses
-----	----	-----	-----	---	----	------------	-------------	----------	-----------------

4 S	0	886	682	0	80	0 - 19291	core_s ?	00:00:00	dhclient
-----	---	-----	-----	---	----	-----------	----------	----------	----------

4 S	0	1002	1	0	80	0 - 106098	SyS_po ?	00:00:00	upowerd
-----	---	------	---	---	----	------------	----------	----------	---------

4 S	0	1091	1	0	80	0 - 13107	core_s ?	00:00:00	wpa_supplicant
4 S	0	1092	1	0	80	0 - 138523	SyS_po ?	00:00:00	packagekitd

4 S	993	1170	1	0	80	0 - 106426	SyS_po ?	00:00:00	colord
-----	-----	------	---	---	----	------------	----------	----------	--------

```

4 S      0 1276      1 0 80      0 - 41041 -      ?      00:00:00 login
4 S      0 1291      1 0 80      0 - 18148 Sys_ep ?      00:00:00 systemd

```

```

4 S      0 1305 1276 0 80      0 - 33441 -      tty2    00:00:00 bash

```

6. No, there are no zombie processes indicated.

```

[root@server13 ~]# ps -el | grep Z
F S      UID      PID  PPID  C PRI  NI ADDR SZ WCHAN  TTY          TIME CMD
[root@server13 ~]# _

```

- 7.

```

[root@server13 ~]# exit

```

```

Fedora 26 (Workstation Edition)
Kernel 4.16.11-100.fc26.x86_64 on an x86_64 (tty2)

server13 login: _

```

### Discovery Exercise (p.423):

- 5.

```

[root@server13 ~]# crontab -l
15 14 * * 3 /bin/myscript
* */1 * * * /bin/myscript
15 * 1 * * /bin/myscript
0 18 25 2 * /bin/myscript
10 12 1-7 * 1 /bin/myscript
[root@server13 ~]# _

```

```

[root@server13 ~]# cd /var/spool/cron
[root@server13 cron]# ls -l | grep root
-rwxr-xr-x. 1 root root 131 Nov 15 18:32 root

```

```

[root@server13 cron]# vi root

```



```
15 14 * * 3 /bin/myscript
* */1 * * * /bin/myscript
15 * 1 * * /bin/myscript
0 18 25 2 * /bin/myscript
10 12 1-7 * 1 /bin/myscript
```

```
"root" 5L, 131C
```

```
[root@server13 cron]# cd /bin
[root@server13 bin]# ls -l | grep myscript
-rwxr-xr-x.  1 root root      31 Nov 15 18:29 myscript
```

```
[root@server13 bin]# vi myscript
```

```

echo "This script is running."
"myscript" 1L, 31C

```

a) 15 14 \* \* 3 /bin/myscript

b) \* \*/1 \* \* \* /bin/myscript

c) 15 \* 1 \* \* /bin/myscript

Correction: \*/15 \* 1 \* \*

d) 0 18 25 2 \* /bin/myscript

e) 10 12 1-7 \* 1 /bin/myscript