Part 1(linear)：

(一)Code：

```c
C hw2_linear.c > ⊗ process_exit(void)
  1    #include <linux/init.h>
  2    #include <linux/kernel.h>
  3    #include <linux/module.h>
  4    #include <linux/sched/signal.h>
  5    #include <linux/sched.h>
  6
  7    int process_init(void) {
  8        struct task_struct *task;
  9
 10        printk(KERN_INFO "loading module\n");
 11        for_each_process(task) {
 12            printk(KERN_INFO "pid: %d |pname: %s |state: %ld\n", task->pid, task->comm, task->state);
 13        }
 14
 15        return 0;
 16    }
 17
 18    void process_exit(void) {
 19        printk(KERN_INFO "removing module\n");
 20    }
 21
 22    module_init(process_init);
 23    module_exit(process_exit);
 24
 25    MODULE_LICENSE("GPL");
 26    MODULE_DESCRIPTION("SIMPLE MODULE");
 27    MODULE_AUTHOR("廖昱瑋");
```

(二)說明：
使用 linux/sched.h 中的 struct task_struct，先宣告一個 task_struct 指標變數叫做 task，再搭配 linux/sced/signal.h 中的 for_each_process 函式，print 出 task->pid、task->comm、task->state。

（三）dmesg：

```
[  582.672257] loading module
[  582.672261] pid: 1  |pname: systemd |state: 1
[  582.672263] pid: 2  |pname: kthreadd |state: 1
[  582.672265] pid: 4  |pname: kworker/0:0H |state: 1026
[  582.672266] pid: 5  |pname: kworker/u2:0 |state: 1026
[  582.672268] pid: 6  |pname: mm_percpu_wq |state: 1026
[  582.672269] pid: 7  |pname: ksoftirqd/0 |state: 1
[  582.672271] pid: 8  |pname: rcu_sched |state: 1026
[  582.672272] pid: 9  |pname: rcu_bh |state: 1026
[  582.672273] pid: 10 |pname: migration/0 |state: 1
[  582.672275] pid: 11 |pname: watchdog/0 |state: 1
[  582.672276] pid: 12 |pname: cpuhp/0 |state: 1
[  582.672277] pid: 13 |pname: kdevtmpfs |state: 1
[  582.672278] pid: 14 |pname: netns |state: 1026
[  582.672279] pid: 15 |pname: rcu_tasks_kthre |state: 1
[  582.672281] pid: 16 |pname: kauditd |state: 1
[  582.672282] pid: 17 |pname: khungtaskd |state: 1
[  582.672283] pid: 18 |pname: oom_reaper |state: 1
[  582.672284] pid: 19 |pname: writeback |state: 1026
[  582.672285] pid: 20 |pname: kcompactd0 |state: 1
[  582.672287] pid: 21 |pname: ksmd |state: 1
[  582.672288] pid: 22 |pname: khugepaged |state: 1
[  582.672290] pid: 23 |pname: crypto |state: 1026
[  582.672291] pid: 24 |pname: kintegrityd |state: 1026
[  582.672292] pid: 25 |pname: kblockd |state: 1026
[  582.672294] pid: 26 |pname: ata_sff |state: 1026
[  582.672295] pid: 27 |pname: md |state: 1026
[  582.672297] pid: 28 |pname: edac-poller |state: 1026
[  582.672298] pid: 29 |pname: devfreq_wq |state: 1026
[  582.672299] pid: 30 |pname: watchdogd |state: 1026
[  582.672301] pid: 31 |pname: kworker/u2:1 |state: 1026
[  582.672303] pid: 34 |pname: kswapd0 |state: 1
[  582.672304] pid: 35 |pname: kworker/u3:0 |state: 1026
[  582.672305] pid: 36 |pname: ecryptfs-kthrea |state: 1
[  582.672307] pid: 78 |pname: kthrotld |state: 1026
[  582.672308] pid: 79 |pname: acpi_thermal_pm |state: 1026
[  582.672309] pid: 80 |pname: scsi_eh_0 |state: 1
[  582.672310] pid: 81 |pname: scsi_tmf_0 |state: 1026
[  582.672311] pid: 82 |pname: scsi_eh_1 |state: 1
[  582.672313] pid: 83 |pname: scsi_tmf_1 |state: 1026
[  582.672314] pid: 84 |pname: kworker/u2:2 |state: 1026
[  582.672315] pid: 89 |pname: ipv6_addrconf |state: 1026
[  582.672317] pid: 98 |pname: kstrp |state: 1026
[  582.672318] pid: 115 |pname: charger_manager |state: 1026
[  582.672319] pid: 151 |pname: kworker/0:2 |state: 1026
[  582.672321] pid: 165 |pname: scsi_eh_2 |state: 1
[  582.672322] pid: 166 |pname: scsi_tmf_2 |state: 1026
[  582.672323] pid: 167 |pname: ttm_swap |state: 1026
[  582.672324] pid: 168 |pname: irq/18-vmwgfx |state: 1
[  582.672326] pid: 170 |pname: kworker/0:1H |state: 1026
[  582.672327] pid: 192 |pname: jbd2/sda1-8 |state: 1
[  582.672328] pid: 193 |pname: ext4-rsv-conver |state: 1026
```

```
[  582.672328] pid: 193 |pname: ext4-rsv-conver |state: 1026
[  582.672330] pid: 228 |pname: systemd-journal |state: 1
[  582.672330] pid: 245 |pname: systemd-udevd |state: 1
[  582.672331] pid: 249 |pname: kworker/0:5 |state: 1026
[  582.672333] pid: 252 |pname: kworker/u2:4 |state: 1026
[  582.672334] pid: 410 |pname: iprt-VBoxWQueue |state: 1026
[  582.672336] pid: 683 |pname: anacron |state: 1
[  582.672354] pid: 684 |pname: dbus-daemon |state: 1
[  582.672356] pid: 685 |pname: acpid |state: 1
[  582.672357] pid: 691 |pname: cron |state: 1
[  582.672359] pid: 703 |pname: rsyslogd |state: 1
[  582.672360] pid: 707 |pname: accounts-daemon |state: 1
[  582.672361] pid: 708 |pname: systemd-logind |state: 1
[  582.672363] pid: 715 |pname: avahi-daemon |state: 1
[  582.672365] pid: 728 |pname: NetworkManager |state: 1
[  582.672366] pid: 745 |pname: avahi-daemon |state: 1
[  582.672368] pid: 797 |pname: unattended-upgr |state: 1
[  582.672369] pid: 802 |pname: polkitd |state: 1
[  582.672371] pid: 848 |pname: dhclient |state: 1
[  582.672372] pid: 860 |pname: dnsmasq |state: 1
[  582.672374] pid: 1025 |pname: whoopsie |state: 1
[  582.672375] pid: 1052 |pname: ntpd |state: 1
[  582.672377] pid: 1499 |pname: VBoxClient |state: 1
[  582.672378] pid: 1500 |pname: VBoxClient |state: 1
[  582.672380] pid: 1525 |pname: lightdm |state: 1
[  582.672381] pid: 1539 |pname: VBoxService |state: 1
[  582.672383] pid: 1556 |pname: Xorg |state: 1
[  582.672384] pid: 1558 |pname: agetty |state: 1
[  582.672386] pid: 1766 |pname: lightdm |state: 1
[  582.672387] pid: 1861 |pname: rtkit-daemon |state: 1
[  582.672389] pid: 1930 |pname: upowerd |state: 1
[  582.672391] pid: 2001 |pname: colord |state: 1
[  582.672392] pid: 2098 |pname: systemd |state: 1
[  582.672394] pid: 2099 |pname: (sd-pam) |state: 1
[  582.672395] pid: 2163 |pname: gnome-keyring-d |state: 1
[  582.672397] pid: 2174 |pname: upstart |state: 1
[  582.672398] pid: 2206 |pname: VBoxClient |state: 1
[  582.672399] pid: 2207 |pname: VBoxClient |state: 1
[  582.672401] pid: 2213 |pname: VBoxClient |state: 1
[  582.672402] pid: 2214 |pname: VBoxClient |state: 1
[  582.672403] pid: 2224 |pname: VBoxClient |state: 1
[  582.672404] pid: 2225 |pname: VBoxClient |state: 1
[  582.672405] pid: 2346 |pname: upstart-udev-br |state: 1
[  582.672407] pid: 2357 |pname: dbus-daemon |state: 1
[  582.672408] pid: 2369 |pname: window-stack-br |state: 1
[  582.672409] pid: 2414 |pname: bamfdaemon |state: 1
[  582.672410] pid: 2417 |pname: upstart-dbus-br |state: 1
[  582.672412] pid: 2419 |pname: upstart-dbus-br |state: 1
[  582.672413] pid: 2421 |pname: upstart-file-br |state: 1
[  582.672414] pid: 2431 |pname: ibus-daemon |state: 1
[  582.672415] pid: 2434 |pname: at-spi-bus-laun |state: 1
[  582.672416] pid: 2443 |pname: gvfsd |state: 1
[  582.672418] pid: 2447 |pname: dbus-daemon |state: 1
[  582.672419] pid: 2453 |pname: gvfsd-fuse |state: 1
```

Search your computer

(四)ps -el：

```
c6209c6209@c6209c6209-VirtualBox:~/Documents/os_hw_run/homework2$ ps -el
F S   UID   PID  PPID  C PRI  NI ADDR SZ WCHAN  TTY          TIME CMD
4 S     0     1     0  0  80   0 - 29958 -      ?        00:00:04 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 R     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 I     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 khungtaskd
1 S     0    18     2  0  80   0 -     0 -      ?        00:00:00 oom_reaper
1 I     0    19     2  0  60 -20 -     0 -      ?        00:00:00 writeback
1 S     0    20     2  0  80   0 -     0 -      ?        00:00:00 kcompactd0
1 S     0    21     2  0  85   5 -     0 -      ?        00:00:00 ksmd
1 S     0    22     2  0  99  19 -     0 -      ?        00:00:00 khugepaged
1 I     0    23     2  0  60 -20 -     0 -      ?        00:00:00 crypto
1 I     0    24     2  0  60 -20 -     0 -      ?        00:00:00 kintegrityd
1 I     0    25     2  0  60 -20 -     0 -      ?        00:00:00 kblockd
1 I     0    26     2  0  60 -20 -     0 -      ?        00:00:00 ata_sff
1 I     0    27     2  0  60 -20 -     0 -      ?        00:00:00 md
1 I     0    28     2  0  60 -20 -     0 -      ?        00:00:00 edac-poller
1 I     0    29     2  0  60 -20 -     0 -      ?        00:00:00 devfreq_wq
1 I     0    30     2  0  60 -20 -     0 -      ?        00:00:00 watchdogd
1 I     0    31     2  0  80   0 -     0 -      ?        00:00:00 kworker/u2:1
1 S     0    34     2  0  80   0 -     0 -      ?        00:00:00 kswapd0
1 I     0    35     2  0  60 -20 -     0 -      ?        00:00:00 kworker/u3:0
1 S     0    36     2  0  80   0 -     0 -      ?        00:00:00 ecryptfs-kthrea
1 I     0    78     2  0  60 -20 -     0 -      ?        00:00:00 kthrotld
1 I     0    79     2  0  60 -20 -     0 -      ?        00:00:00 acpi_thermal_pm
1 S     0    80     2  0  80   0 -     0 -      ?        00:00:00 scsi_eh_0
1 I     0    81     2  0  60 -20 -     0 -      ?        00:00:00 scsi_tmf_0
1 S     0    82     2  0  80   0 -     0 -      ?        00:00:00 scsi_eh_1
1 I     0    83     2  0  60 -20 -     0 -      ?        00:00:00 scsi_tmf_1
1 I     0    84     2  0  80   0 -     0 -      ?        00:00:00 kworker/u2:2
1 I     0    89     2  0  60 -20 -     0 -      ?        00:00:00 ipv6_addrconf
1 I     0    98     2  0  60 -20 -     0 -      ?        00:00:00 kstrp
1 I     0   115     2  0  60 -20 -     0 -      ?        00:00:00 charger_manager
1 I     0   151     2  0  80   0 -     0 -      ?        00:00:00 kworker/0:2
1 S     0   165     2  0  80   0 -     0 -      ?        00:00:00 scsi_eh_2
1 I     0   166     2  0  60 -20 -     0 -      ?        00:00:00 scsi_tmf_2
1 I     0   167     2  0  60 -20 -     0 -      ?        00:00:00 ttm_swap
1 S     0   168     2  0   9   - -     0 -      ?        00:00:00 irq/18-vmwgfx
1 I     0   170     2  0  60 -20 -     0 -      ?        00:00:00 kworker/0:1H
1 S     0   192     2  0  80   0 -     0 -      ?        00:00:00 jbd2/sda1-8
1 I     0   193     2  0  60 -20 -     0 -      ?        00:00:00 ext4-rsv-conver
4 S     0   228     1  0  80   0 - 7758 -      ?        00:00:00 systemd-journal
```

```
4 S     0   228     1  0  80   0 -  7758 -      ?        00:00:00 systemd-journal
4 S     0   245     1  0  80   0 - 11385 -      ?        00:00:00 systemd-udevd
1 I     0   410     2  0  60 -20 -     0 -      ?        00:00:00 iprt-VBoxWQueue
4 S   106   684     1  0  80   0 - 11102 -      ?        00:00:02 dbus-daemon
0 S     0   685     1  0  80   0 -  1099 -      ?        00:00:00 acpid
4 S     0   691     1  0  80   0 -  9089 -      ?        00:00:00 cron
4 S   104   703     1  0  80   0 - 64098 -      ?        00:00:00 rsyslogd
4 S     0   707     1  0  80   0 - 70808 -      ?        00:00:00 accounts-daemon
4 S     0   708     1  0  80   0 -  7164 -      ?        00:00:00 systemd-logind
4 S   111   715     1  0  80   0 - 11229 -      ?        00:00:00 avahi-daemon
4 S     0   728     1  0  80   0 - 114105 -     ?        00:00:00 NetworkManager
1 S   111   745   715  0  80   0 - 11196 -      ?        00:00:00 avahi-daemon
4 S     0   797     1  0  80   0 - 45493 -      ?        00:00:00 unattended-upgr
4 S     0   802     1  0  80   0 - 72344 -      ?        00:00:00 polkitd
4 S     0   848   728  0  80   0 -  4031 -      ?        00:00:00 dhclient
4 S 65534   860   728  0  80   0 - 15053 -      ?        00:00:00 dnsmasq
4 S   109  1025     1  0  80   0 - 95541 -      ?        00:00:00 whoopsie
5 S   121  1052     1  0  80   0 - 28024 -      ?        00:00:00 ntpd
1 S     0  1499     1  0  80   0 - 32385 -      ?        00:00:00 VBoxClient
5 S     0  1500  1499  0  80   0 - 32425 -      ?        00:00:00 VBoxClient
4 S     0  1525     1  0  80   0 - 87636 -      ?        00:00:00 lightdm
1 S     0  1539     1  0  80   0 - 82177 -      ?        00:00:00 VBoxService
4 S     0  1556  1525  2  80   0 - 124685 -    tty7     00:00:30 Xorg
4 S     0  1558     1  0  80   0 -  5821 -      tty1     00:00:00 agetty
4 S     0  1766  1525  0  80   0 - 57576 -      ?        00:00:00 lightdm
4 S   118  1861     1  0  81   1 - 45886 -      ?        00:00:00 rtkit-daemon
4 S     0  1930     1  0  80   0 - 88623 -      ?        00:00:00 upowerd
4 S   113  2001     1  0  80   0 - 77110 -      ?        00:00:00 colord
4 S  1000  2098     1  0  80   0 - 11325 ep_pol ?        00:00:00 systemd
5 S  1000  2099  2098  0  80   0 - 15862 -      ?        00:00:00 (sd-pam)
1 S  1000  2163     1  0  80   0 - 53139 -      ?        00:00:00 gnome-keyring-d
4 S  1000  2174  1766  0  80   0 - 13456 poll_s ?        00:00:00 upstart
1 S  1000  2206     1  0  80   0 - 14405 wait   ?        00:00:00 VBoxClient
1 S  1000  2207  2206  0  80   0 - 14438 poll_s ?        00:00:00 VBoxClient
1 S  1000  2213     1  0  80   0 - 14405 wait   ?        00:00:00 VBoxClient
1 S  1000  2214  2213  0  80   0 - 47464 rtR0Se ?        00:00:00 VBoxClient
1 S  1000  2224     1  0  80   0 - 14405 wait   ?        00:00:00 VBoxClient
1 S  1000  2225  2224  0  80   0 - 47593 futex_ ?        00:00:02 VBoxClient
1 S  1000  2346  2174  0  80   0 - 10052 poll_s ?        00:00:00 upstart-udev-br
1 S  1000  2357  2174  0  80   0 - 10934 ep_pol ?        00:00:01 dbus-daemon
0 S  1000  2369  2174  0  80   0 - 23424 poll_s ?        00:00:00 window-stack-br
0 S  1000  2414  2174  0  80   0 - 132861 poll_s ?       00:00:00 bamfdaemon
1 S  1000  2417  2174  0  80   0 - 10035 poll_s ?        00:00:00 upstart-dbus-br
1 S  1000  2419  2174  0  80   0 - 10035 poll_s ?        00:00:00 upstart-dbus-br
1 S  1000  2421  2174  0  80   0 - 12158 poll_s ?        00:00:00 upstart-file-br
1 S  1000  2431  2174  0  80   0 - 88081 poll_s ?        00:00:00 ibus-daemon
0 S  1000  2434  2174  0  80   0 - 84494 poll_s ?        00:00:00 at-spi-bus-laun
0 S  1000  2443  2174  0  80   0 - 70472 poll_s ?        00:00:00 gvfsd
```

Part 2(DFS)：

(一)Code：

```c
C hw2_dfs.c > ⊘ process_exit(void)
 1    #include <linux/init.h>
 2    #include <linux/kernel.h>
 3    #include <linux/module.h>
 4    #include <linux/sched.h>
 5    #include <linux/sched/signal.h>
 6
 7    void dfs(struct task_struct *current_task) {
 8        struct task_struct *child;
 9        struct list_head *list;
10
11        printk(KERN_INFO "pid: %d |pname: %s |state: %ld\n"
12        ,current_task->pid, current_task->comm, current_task->state);
13
14        list_for_each(list, &current_task->children) {
15            child = list_entry(list, struct task_struct, sibling);
16            dfs(child);
17        }
18    }
19
20    int process_init(void) {
21        printk(KERN_INFO "loading module\n");
22        dfs(&init_task);
23        return 0;
24    }
25
26    void process_exit(void) {
27        printk(KERN_INFO "removing module\n");
28    }
29
30    module_init(process_init);
31    module_exit(process_exit);
32
33    MODULE_LICENSE("GPL");
34    MODULE_DESCRIPTION("SIMPLE MODULE");
35    MODULE_AUTHOR("廖昱瑋");
```

（二）說明：

宣告一個函數叫 dfs，裡面有一個型態為 task_struct pointer 的 argument，第一次先傳入 &init_task 給 dfs。在 dfs 裡先印出當前 task 的 pid、name 及 state，接著用 list_for_each loop 每個當前 task 的 child，list_for_each 裡面用 list_entry 抓出 child 並且用那個 child 當下一次 recursion dfs 的參數，這樣即可使用 dfs print 出所有的 tasks。

（三）demsg：

```
[18333.512621] loading module
[18333.512625] pid: 0 |pname: swapper/0 |state: 0
[18333.512626] pid: 1 |pname: systemd |state: 1
[18333.512628] pid: 228 |pname: systemd-journal |state: 1
[18333.512629] pid: 245 |pname: systemd-udevd |state: 1
[18333.512631] pid: 684 |pname: dbus-daemon |state: 1
[18333.512633] pid: 685 |pname: acpid |state: 1
[18333.512634] pid: 691 |pname: cron |state: 1
[18333.512636] pid: 703 |pname: rsyslogd |state: 1
[18333.512637] pid: 707 |pname: accounts-daemon |state: 1
[18333.512639] pid: 708 |pname: systemd-logind |state: 1
[18333.512640] pid: 715 |pname: avahi-daemon |state: 1
[18333.512642] pid: 745 |pname: avahi-daemon |state: 1
[18333.512644] pid: 728 |pname: NetworkManager |state: 1
[18333.512645] pid: 848 |pname: dhclient |state: 1
[18333.512646] pid: 860 |pname: dnsmasq |state: 1
[18333.512648] pid: 797 |pname: unattended-upgr |state: 1
[18333.512650] pid: 802 |pname: polkitd |state: 1
[18333.512651] pid: 1025 |pname: whoopsie |state: 1
[18333.512653] pid: 1052 |pname: ntpd |state: 1
[18333.512654] pid: 1499 |pname: VBoxClient |state: 1
[18333.512656] pid: 1500 |pname: VBoxClient |state: 1
[18333.512657] pid: 1525 |pname: lightdm |state: 1
[18333.512658] pid: 1556 |pname: Xorg |state: 0
[18333.512659] pid: 1766 |pname: lightdm |state: 1
[18333.512661] pid: 2174 |pname: upstart |state: 1
[18333.512662] pid: 2346 |pname: upstart-udev-br |state: 1
[18333.512664] pid: 2357 |pname: dbus-daemon |state: 1
[18333.512665] pid: 2369 |pname: window-stack-br |state: 1
[18333.512667] pid: 2414 |pname: bamfdaemon |state: 1
[18333.512668] pid: 2417 |pname: upstart-dbus-br |state: 1
[18333.512669] pid: 2419 |pname: upstart-dbus-br |state: 1
[18333.512671] pid: 2421 |pname: upstart-file-br |state: 1
[18333.512672] pid: 2431 |pname: ibus-daemon |state: 1
[18333.512673] pid: 2457 |pname: ibus-dconf |state: 1
[18333.512674] pid: 2458 |pname: ibus-ui-gtk3 |state: 1
[18333.512676] pid: 2493 |pname: ibus-engine-sim |state: 1
[18333.512677] pid: 2434 |pname: at-spi-bus-laun |state: 1
[18333.512678] pid: 2447 |pname: dbus-daemon |state: 1
[18333.512679] pid: 2443 |pname: gvfsd |state: 1
[18333.512681] pid: 2453 |pname: gvfsd-fuse |state: 1
[18333.512682] pid: 2467 |pname: ibus-x11 |state: 1
[18333.512683] pid: 2455 |pname: at-spi2-registr |state: 1
[18333.512685] pid: 2525 |pname: gpg-agent |state: 1
[18333.512686] pid: 2541 |pname: hud-service |state: 1
[18333.512688] pid: 2543 |pname: unity-settings- |state: 1
[18333.512689] pid: 2551 |pname: gnome-session-b |state: 1
[18333.512691] pid: 2729 |pname: gnome-software |state: 1
[18333.512692] pid: 2735 |pname: nautilus |state: 1
[18333.512693] pid: 2738 |pname: polkit-gnome-au |state: 1
[18333.512695] pid: 2746 |pname: nm-applet |state: 1
[18333.512696] pid: 2747 |pname: unity-fallback- |state: 1
[18333.512697] pid: 2979 |pname: zeitgeist-datah |state: 1

[18333.512697] pid: 2979 |pname: zeitgeist-datah |state: 1
[18333.512699] pid: 3140 |pname: update-notifier |state: 1
[18333.512701] pid: 3412 |pname: deja-dup-monito |state: 1
[18333.512702] pid: 2561 |pname: unity-panel-ser |state: 1
[18333.512703] pid: 2597 |pname: dconf-service |state: 1
[18333.512705] pid: 2607 |pname: indicator-messa |state: 1
[18333.512706] pid: 2610 |pname: indicator-bluet |state: 1
[18333.512707] pid: 2615 |pname: indicator-power |state: 1
[18333.512709] pid: 2619 |pname: indicator-datet |state: 1
[18333.512710] pid: 2620 |pname: indicator-keybo |state: 1
[18333.512711] pid: 2621 |pname: indicator-sound |state: 1
[18333.512713] pid: 2624 |pname: indicator-print |state: 1
[18333.512714] pid: 2627 |pname: indicator-sessi |state: 1
[18333.512715] pid: 2649 |pname: compiz |state: 0
[18333.512717] pid: 2666 |pname: indicator-appli |state: 1
[18333.512718] pid: 2665 |pname: pulseaudio |state: 1
[18333.512720] pid: 2655 |pname: evolution-sourc |state: 1
[18333.512721] pid: 2711 |pname: evolution-calen |state: 1
[18333.512722] pid: 2757 |pname: evolution-calen |state: 1
[18333.512724] pid: 2793 |pname: evolution-calen |state: 1
[18333.512725] pid: 2776 |pname: gvfs-udisks2-vo |state: 1
[18333.512727] pid: 2806 |pname: gvfs-mtp-volume |state: 1
[18333.512728] pid: 2820 |pname: gvfs-afc-volume |state: 1
[18333.512729] pid: 2837 |pname: gvfs-gphoto2-vo |state: 1
[18333.512731] pid: 2852 |pname: gvfs-goa-volume |state: 1
[18333.512732] pid: 2801 |pname: evolution-addre |state: 1
[18333.512734] pid: 2884 |pname: evolution-addre |state: 1
[18333.512735] pid: 2921 |pname: gvfsd-trash |state: 1
[18333.512737] pid: 2986 |pname: sh |state: 1
[18333.512739] pid: 2993 |pname: zeitgeist-daemo |state: 1
[18333.512740] pid: 3001 |pname: zeitgeist-fts |state: 1
[18333.512741] pid: 3233 |pname: gvfsd-network |state: 1
[18333.512742] pid: 3263 |pname: gvfsd-dnssd |state: 1
[18333.512743] pid: 3300 |pname: gvfsd-metadata |state: 1
[18333.512745] pid: 3943 |pname: unity-scope-hom |state: 1
[18333.512746] pid: 3956 |pname: unity-files-dae |state: 1
[18333.512747] pid: 3954 |pname: unity-scope-loa |state: 1
[18333.512749] pid: 7004 |pname: gnome-terminal- |state: 1
[18333.512750] pid: 7011 |pname: bash |state: 1
[18333.512751] pid: 8226 |pname: bash |state: 1
[18333.512752] pid: 9616 |pname: bash |state: 1
[18333.512754] pid: 11294 |pname: bash |state: 1
[18333.512755] pid: 11829 |pname: bash |state: 1
[18333.512756] pid: 13451 |pname: bash |state: 1
[18333.512758] pid: 13542 |pname: bash |state: 1
[18333.512759] pid: 13654 |pname: bash |state: 1
[18333.512760] pid: 13747 |pname: bash |state: 1
[18333.512762] pid: 14230 |pname: bash |state: 1
[18333.512763] pid: 14814 |pname: bash |state: 1
[18333.512764] pid: 14975 |pname: bash |state: 1
[18333.512765] pid: 15855 |pname: sudo |state: 1
```

（四）ps -el：

```
c6209c6209@c6209c6209-VirtualBox:~/Documents/os_hw_run/homework2$ ps -el
F S   UID   PID  PPID  C PRI  NI ADDR SZ WCHAN  TTY          TIME CMD
4 S     0     1     0  0  80   0 - 29958 -      ?        00:00:04 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 -      ?        00:00:04 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 khungtaskd
1 S     0    18     2  0  80   0 -     0 -      ?        00:00:00 oom_reaper
1 I     0    19     2  0  60 -20 -     0 -      ?        00:00:00 writeback
1 S     0    20     2  0  80   0 -     0 -      ?        00:00:00 kcompactd0
1 S     0    21     2  0  85   5 -     0 -      ?        00:00:00 ksmd
1 S     0    22     2  0  99  19 -     0 -      ?        00:00:00 khugepaged
1 I     0    23     2  0  60 -20 -     0 -      ?        00:00:00 crypto
1 I     0    24     2  0  60 -20 -     0 -      ?        00:00:00 kintegrityd
1 I     0    25     2  0  60 -20 -     0 -      ?        00:00:00 kblockd
1 I     0    26     2  0  60 -20 -     0 -      ?        00:00:00 ata_sff
1 I     0    27     2  0  60 -20 -     0 -      ?        00:00:00 md
1 I     0    28     2  0  60 -20 -     0 -      ?        00:00:00 edac-poller
1 I     0    29     2  0  60 -20 -     0 -      ?        00:00:00 devfreq_wq
1 I     0    30     2  0  60 -20 -     0 -      ?        00:00:00 watchdogd
1 S     0    34     2  0  80   0 -     0 -      ?        00:00:00 kswapd0
1 I     0    35     2  0  60 -20 -     0 -      ?        00:00:00 kworker/u3:0
1 S     0    36     2  0  80   0 -     0 -      ?        00:00:00 ecryptfs-kthrea
1 I     0    78     2  0  60 -20 -     0 -      ?        00:00:00 kthrotld
1 I     0    79     2  0  60 -20 -     0 -      ?        00:00:00 acpi_thermal_pm
1 S     0    80     2  0  80   0 -     0 -      ?        00:00:00 scsi_eh_0
1 I     0    81     2  0  60 -20 -     0 -      ?        00:00:00 scsi_tmf_0
1 S     0    82     2  0  80   0 -     0 -      ?        00:00:00 scsi_eh_1
1 I     0    83     2  0  60 -20 -     0 -      ?        00:00:00 scsi_tmf_1
1 I     0    89     2  0  60 -20 -     0 -      ?        00:00:00 ipv6_addrconf
1 I     0    98     2  0  60 -20 -     0 -      ?        00:00:00 kstrp
1 I     0   115     2  0  60 -20 -     0 -      ?        00:00:00 charger_manager
1 S     0   165     2  0  80   0 -     0 -      ?        00:00:00 scsi_eh_2
1 I     0   166     2  0  60 -20 -     0 -      ?        00:00:00 scsi_tmf_2
1 I     0   167     2  0  60 -20 -     0 -      ?        00:00:00 ttm_swap
1 S     0   168     2  0   9   - -     0 -      ?        00:00:00 irq/18-vmwgfx
1 I     0   170     2  0  60 -20 -     0 -      ?        00:00:00 kworker/0:1H
1 S     0   192     2  0  80   0 -     0 -      ?        00:00:00 jbd2/sda1-8
1 I     0   193     2  0  60 -20 -     0 -      ?        00:00:00 ext4-rsv-conver
4 S     0   228     1  0  80   0 -  7758 -      ?        00:00:00 systemd-journal
4 S     0   245     1  0  80   0 - 11385 -      ?        00:00:00 systemd-udevd
1 I     0   410     2  0  60 -20 -     0 -      ?        00:00:00 iprt-VBoxWQueue
```

```
1 I     0   410     2  0  60 -20 -     0 -      ?        00:00:00 iprt-VBoxWQueue
4 S   106   684     1  0  80   0 - 11102 -      ?        00:00:04 dbus-daemon
0 S     0   685     1  0  80   0 -  1099 -      ?        00:00:00 acpid
4 S     0   691     1  0  80   0 -  9089 -      ?        00:00:00 cron
4 S   104   703     1  0  80   0 - 64098 -      ?        00:00:00 rsyslogd
4 S     0   707     1  0  80   0 - 70808 -      ?        00:00:00 accounts-daemon
4 S     0   708     1  0  80   0 -  7164 -      ?        00:00:00 systemd-logind
4 S   111   715     1  0  80   0 - 11229 -      ?        00:00:00 avahi-daemon
4 S     0   728     1  0  80   0 - 114105 -     ?        00:00:00 NetworkManager
1 S   111   745   715  0  80   0 - 11196 -      ?        00:00:00 avahi-daemon
4 S     0   797     1  0  80   0 - 45493 -      ?        00:00:00 unattended-upgr
4 S     0   802     1  0  80   0 - 72344 -      ?        00:00:00 polkitd
4 S     0   848   728  0  80   0 -  4031 -      ?        00:00:00 dhclient
4 S 65534   860   728  0  80   0 - 15053 -      ?        00:00:00 dnsmasq
4 S   109  1025     1  0  80   0 - 95541 -      ?        00:00:00 whoopsie
5 S   121  1052     1  0  80   0 - 28024 -      ?        00:00:01 ntpd
1 S     0  1499     1  0  80   0 - 32385 -      ?        00:00:00 VBoxClient
5 S     0  1500  1499  0  80   0 - 32425 -      ?        00:00:00 VBoxClient
4 S     0  1525     1  0  80   0 - 87636 -      ?        00:00:00 lightdm
1 S     0  1539     1  0  80   0 - 82177 -      ?        00:00:03 VBoxService
4 R     0  1556  1525  1  80   0 - 138823 -    tty7     00:05:27 Xorg
4 S     0  1558     1  0  80   0 -  5821 -      tty1     00:00:00 agetty
4 S     0  1766  1525  0  80   0 - 57576 -      ?        00:00:00 lightdm
4 S   118  1861     1  0  81   1 - 45886 -      ?        00:00:00 rtkit-daemon
4 S     0  1930     1  0  80   0 - 88623 -      ?        00:00:00 upowerd
4 S   113  2001     1  0  80   0 - 77110 -      ?        00:00:00 colord
4 S  1000  2098     1  0  80   0 - 11325 ep_pol ?        00:00:00 systemd
5 S  1000  2099  2098  0  80   0 - 15862 -      ?        00:00:00 (sd-pam)
1 S  1000  2163     1  0  80   0 - 53139 -      ?        00:00:00 gnome-keyring-d
4 S  1000  2174  1766  0  80   0 - 13456 poll_s ?        00:00:00 upstart
1 S  1000  2206     1  0  80   0 - 14405 wait   ?        00:00:00 VBoxClient
1 S  1000  2207  2206  0  80   0 - 14438 poll_s ?        00:00:00 VBoxClient
1 S  1000  2213     1  0  80   0 - 14405 wait   ?        00:00:00 VBoxClient
1 S  1000  2214  2213  0  80   0 - 47464 rtR0Se ?        00:00:00 VBoxClient
1 S  1000  2224     1  0  80   0 - 14405 wait   ?        00:00:00 VBoxClient
1 S  1000  2225  2224  0  80   0 - 47593 futex_ ?        00:00:40 VBoxClient
1 S  1000  2346  2174  0  80   0 - 10052 poll_s ?        00:00:00 upstart-udev-br
1 S  1000  2357  2174  0  80   0 - 10959 ep_pol ?        00:00:03 dbus-daemon
0 S  1000  2369  2174  0  80   0 - 23424 poll_s ?        00:00:00 window-stack-br
0 S  1000  2414  2174  0  80   0 - 132957 poll_s ?       00:00:02 bamfdaemon
1 S  1000  2417  2174  0  80   0 - 10035 poll_s ?        00:00:00 upstart-dbus-br
1 S  1000  2419  2174  0  80   0 - 10035 poll_s ?        00:00:00 upstart-dbus-br
1 S  1000  2421  2174  0  80   0 - 12158 poll_s ?        00:00:00 upstart-file-br
1 S  1000  2431  2174  0  80   0 - 88213 poll_s ?        00:00:02 ibus-daemon
0 S  1000  2434  2174  0  80   0 - 84494 poll_s ?        00:00:00 at-spi-bus-laun
0 S  1000  2443  2174  0  80   0 - 70472 poll_s ?        00:00:00 gvfsd
0 S  1000  2447  2434  0  80   0 - 10724 ep_pol ?        00:00:00 dbus-daemon
0 S  1000  2453  2174  0  80   0 - 101716 futex_ ?       00:00:00 gvfsd-fuse
0 S  1000  2455  2174  0  80   0 - 51743 poll_s ?        00:00:00 at-spi2-registr
0 S  1000  2457  2431  0  80   0 - 67902 poll_s ?        00:00:00 ibus-dconf
0 S  1000  2458  2431  0  80   0 - 121215 poll_s ?       00:00:00 ibus-ui-gtk3
0 S  1000  2467  2174  0  80   0 - 108807 poll_s ?       00:00:00 ibus-x11
```

```
0 S  1000  2467  2174   0  80   0 - 108807 poll_s ?        00:00:00 ibus-x11
0 S  1000  2493  2431   0  80   0 -  48967 poll_s ?        00:00:00 ibus-engine-sim
1 S  1000  2525  2174   0  80   0 -  43471 -      ?        00:00:00 gpg-agent
0 S  1000  2541  2174   0  80   0 - 167530 poll_s ?        00:00:08 hud-service
0 S  1000  2543  2174   0  80   0 - 217352 poll_s ?        00:00:01 unity-settings-
0 S  1000  2551  2174   0  80   0 - 178581 poll_s ?        00:00:00 gnome-session-b
0 S  1000  2561  2174   0  80   0 - 144528 poll_s ?        00:00:06 unity-panel-ser
0 S  1000  2597  2174   0  80   0 -  44690 poll_s ?        00:00:00 dconf-service
0 S  1000  2607  2174   0  80   0 -  90440 poll_s ?        00:00:00 indicator-messa
0 S  1000  2610  2174   0  80   0 -  87231 poll_s ?        00:00:00 indicator-bluet
0 S  1000  2615  2174   0  80   0 - 127788 poll_s ?        00:00:00 indicator-power
0 S  1000  2619  2174   0  80   0 - 195412 poll_s ?        00:00:00 indicator-datet
0 S  1000  2620  2174   0  80   0 - 164119 poll_s ?        00:00:00 indicator-keybo
0 S  1000  2621  2174   0  80   0 - 186082 poll_s ?        00:00:00 indicator-sound
0 S  1000  2624  2174   0  80   0 - 157118 poll_s ?        00:00:00 indicator-print
0 S  1000  2627  2174   0  80   0 - 158135 poll_s ?        00:00:00 indicator-sessi
0 R  1000  2649  2174  28  80   0 - 362796 -      ?        01:27:37 compiz
0 S  1000  2655  2174   0  80   0 - 181488 poll_s ?        00:00:00 evolution-sourc
1 S  1000  2665  2174   0  69 -11 - 110570 poll_s ?        00:00:00 pulseaudio
0 S  1000  2666  2174   0  80   0 - 119220 poll_s ?        00:00:00 indicator-appli
0 S  1000  2711  2174   0  80   0 - 217564 poll_s ?        00:00:00 evolution-calen
0 S  1000  2729  2551   0  80   0 - 262549 poll_s ?        00:00:06 gnome-software
0 S  1000  2735  2551   0  80   0 - 256947 poll_s ?        00:00:35 nautilus
0 S  1000  2738  2551   0  80   0 - 109179 poll_s ?        00:00:00 polkit-gnome-au
0 S  1000  2746  2551   0  80   0 - 167601 poll_s ?        00:00:00 nm-applet
0 S  1000  2747  2551   0  80   0 - 146027 poll_s ?        00:00:00 unity-fallback-
0 S  1000  2757  2711   0  80   0 - 203784 poll_s ?        00:00:00 evolution-calen
0 S  1000  2776  2174   0  80   0 -  91633 poll_s ?        00:00:00 gvfs-udisks2-vo
4 S     0  2783     1   0  80   0 - 108082 -      ?        00:00:00 udisksd
0 S  1000  2793  2711   0  80   0 - 201894 poll_s ?        00:00:00 evolution-calen
0 S  1000  2801  2174   0  80   0 - 174479 poll_s ?        00:00:00 evolution-addre
0 S  1000  2806  2174   0  80   0 -  66718 poll_s ?        00:00:00 gvfs-mtp-volume
0 S  1000  2820  2174   0  80   0 - 102738 poll_s ?        00:00:00 gvfs-afc-volume
0 S  1000  2837  2174   0  80   0 -  69767 poll_s ?        00:00:00 gvfs-gphoto2-vo
0 S  1000  2852  2174   0  80   0 -  66221 poll_s ?        00:00:00 gvfs-goa-volume
4 S     0  2877     1   0  80   0 - 128572 -      ?        00:00:02 fwupd
0 S  1000  2884  2801   0  80   0 - 195404 poll_s ?        00:00:00 evolution-addre
0 S  1000  2921  2174   0  80   0 -  89474 poll_s ?        00:00:00 gvfsd-trash
0 S  1000  2979  2551   0  80   0 - 104989 poll_s ?        00:00:00 zeitgeist-datah
0 S  1000  2986  2174   0  80   0 -   1126 wait   ?        00:00:00 sh
0 S  1000  2993  2986   0  80   0 - 102601 poll_s ?        00:00:00 zeitgeist-daemo
0 S  1000  3001  2174   0  80   0 -  79294 poll_s ?        00:00:00 zeitgeist-fts
0 S  1000  3140  2551   0  80   0 - 132836 poll_s ?        00:00:00 update-notifier
0 S  1000  3233  2174   0  80   0 - 108504 poll_s ?        00:00:00 gvfsd-network
0 S  1000  3263  2174   0  80   0 -  92266 poll_s ?        00:00:00 gvfsd-dnssd
0 S  1000  3300  2174   0  80   0 -  48331 poll_s ?        00:00:00 gvfsd-metadata
0 S  1000  3412  2551   0  80   0 - 129157 poll_s ?        00:00:00 deja-dup-monito
0 S  1000  3943  2174   0  80   0 - 163009 poll_s ?        00:00:00 unity-scope-hom
0 S  1000  3954  2174   0  80   0 - 145607 poll_s ?        00:00:00 unity-scope-loa
0 S  1000  3956  2174   0  80   0 - 141052 poll_s ?        00:00:00 unity-files-dae
4 S     0  6681     1   0  80   0 -  25146 -      ?        00:00:00 cupsd
4 S     0  6682     1   0  80   0 -  68704 -      ?        00:00:00 cups-browsed
```