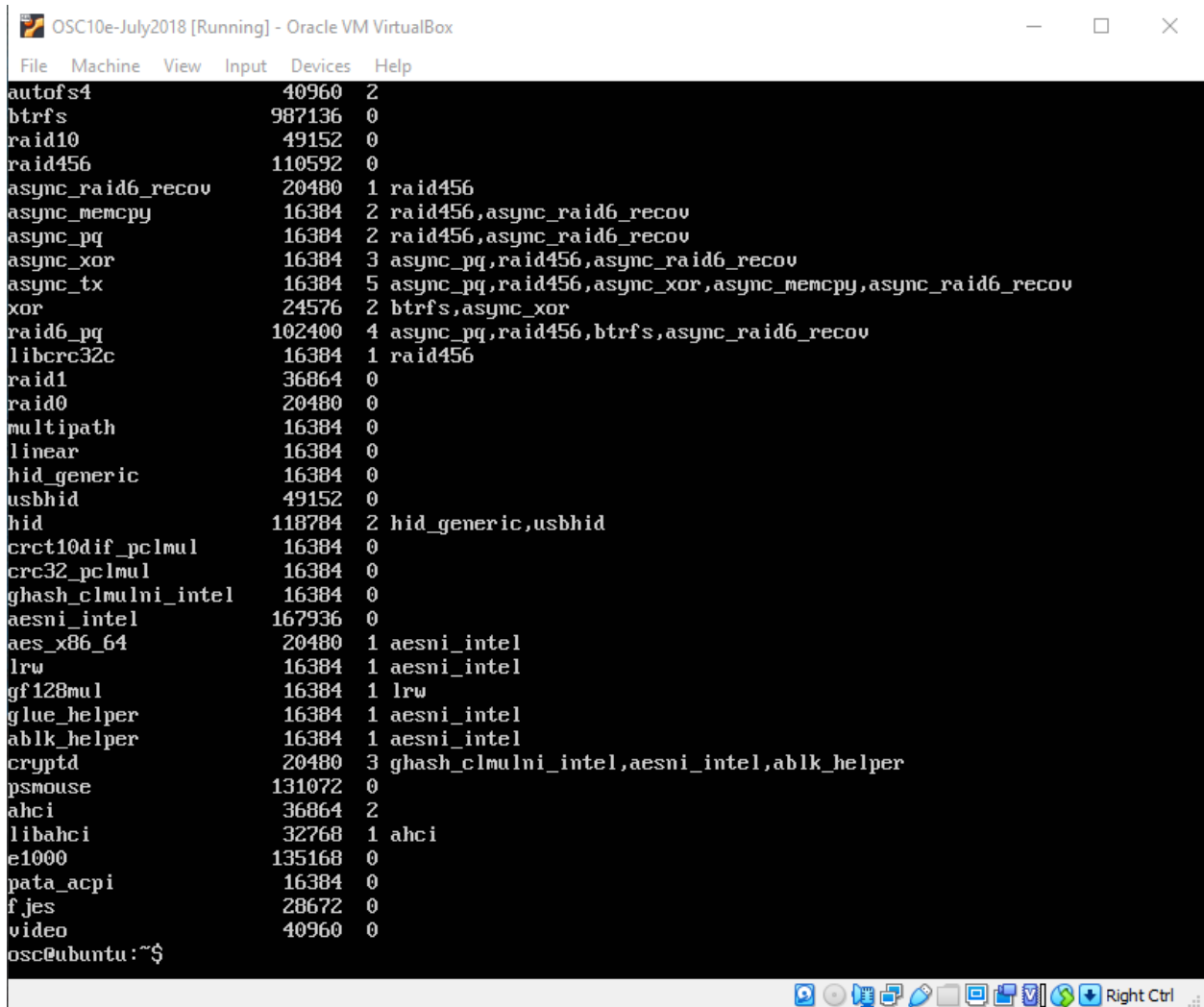## OPTION1STEP1

Listing all kernel modules with lsmod:

```
OSC10e-July2018 [Running] - Oracle VM VirtualBox                    —    □    ×

File   Machine   View   Input   Devices   Help
autofs4            40960  2
btrfs             987136  0
raid10             49152  0
raid456           110592  0
async_raid6_recov  20480  1 raid456
async_memcpy       16384  2 raid456,async_raid6_recov
async_pq           16384  2 raid456,async_raid6_recov
async_xor          16384  3 async_pq,raid456,async_raid6_recov
async_tx           16384  5 async_pq,raid456,async_xor,async_memcpy,async_raid6_recov
xor                24576  2 btrfs,async_xor
raid6_pq          102400  4 async_pq,raid456,btrfs,async_raid6_recov
libcrc32c          16384  1 raid456
raid1              36864  0
raid0              20480  0
multipath          16384  0
linear             16384  0
hid_generic        16384  0
usbhid             49152  0
hid               118784  2 hid_generic,usbhid
crct10dif_pclmul   16384  0
crc32_pclmul       16384  0
ghash_clmulni_intel 16384 0
aesni_intel       167936  0
aes_x86_64         20480  1 aesni_intel
lrw                16384  1 aesni_intel
gf128mul           16384  1 lrw
glue_helper        16384  1 aesni_intel
ablk_helper        16384  1 aesni_intel
cryptd             20480  3 ghash_clmulni_intel,aesni_intel,ablk_helper
psmouse           131072  0
ahci               36864  2
libahci            32768  1 ahci
e1000             135168  0
pata_acpi          16384  0
fjes               28672  0
video              40960  0
osc@ubuntu:~$
```

First dmesg before module is loaded:


```
profile="unconfined" name="/sbin/dhclient" pid=559 comm="apparmor_parser"
[    8.656199] audit: type=1400 audit(1670976500.292:7): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="/usr/lib/NetworkManager/nm-dhcp-client.action" pid=559 comm="apparmor_par
ser"
[    8.656203] audit: type=1400 audit(1670976500.292:8): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="/usr/lib/NetworkManager/nm-dhcp-helper" pid=559 comm="apparmor_parser"
[    8.656209] audit: type=1400 audit(1670976500.292:9): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="/usr/lib/connman/scripts/dhclient-script" pid=559 comm="apparmor_parser"
[    8.662388] audit: type=1400 audit(1670976500.300:10): apparmor="STATUS" operation="profile_load"
 profile="unconfined" name="/usr/bin/lxc-start" pid=560 comm="apparmor_parser"
[    8.669558] audit: type=1400 audit(1670976500.308:11): apparmor="STATUS" operation="profile_load"
 profile="unconfined" name="/usr/lib/lxd/lxd-bridge-proxy" pid=561 comm="apparmor_parser"
[    9.093210] piix4_smbus 0000:00:07.0: SMBus Host Controller at 0x4100, revision 0
[    9.116662] vgdrvHeartbeatInit: Setting up heartbeat to trigger every 2000 milliseconds
[    9.132689] input: Unspecified device as /devices/pci0000:00/0000:00:04.0/input/input7
[    9.150177] vboxguest: misc device minor 55, IRQ 20, I/O port d020, MMIO at 00000000f0400000 (siz
e 0x400000)
[    9.150180] vboxguest: Successfully loaded version 5.0.18_Ubuntu (interface 0x00010004)
[    9.380268] [drm] Initialized drm 1.1.0 20060810
[    9.504844] IPv6: ADDRCONF(NETDEV_UP): enp0s3: link is not ready
[    9.505570] e1000: enp0s3 NIC Link is Up 1000 Mbps Full Duplex, Flow Control: RX
[    9.509034] IPv6: ADDRCONF(NETDEV_CHANGE): enp0s3: link becomes ready
[    9.539676] snd_intel8x0 0000:00:05.0: disable (unknown or VT-d) VM optimization
[    9.813433] snd_intel8x0 0000:00:05.0: white list rate for 1028:0177 is 48000
[    9.831497] [drm] VRAM 01000000
[    9.834046] [TTM] Zone  kernel: Available graphics memory: 379024 kiB
[    9.834047] [TTM] Initializing pool allocator
[    9.834053] [TTM] Initializing DMA pool allocator
[   10.016956] fbcon: vboxdrmfb (fb0) is primary device
[   10.098743] Console: switching to colour frame buffer device 100x37
[   10.100590] vboxvideo 0000:00:02.0: fb0: vboxdrmfb frame buffer device
[   10.102568] [drm] Initialized vboxvideo 1.0.0 20130823 for 0000:00:02.0 on minor 0
[   10.216418] ppdev: user-space parallel port driver
[   10.364928] Adding 784380k swap on /dev/sda5.  Priority:-1 extents:1 across:784380k FS
[   10.693562] cgroup: new mount options do not match the existing superblock, will be ignored
[   12.001185] floppy0: no floppy controllers found
osc@ubuntu:~$
```

After module is loaded:

Module is removed

OSC10e-July2018 [Running] - Oracle VM VirtualBox

File Machine View Input Devices Help

```
[    8.656203] audit: type=1400 audit(1670976500.292:8): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="/usr/lib/NetworkManager/nm-dhcp-helper" pid=559 comm="apparmor_parser"
[    8.656209] audit: type=1400 audit(1670976500.292:9): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="/usr/lib/connman/scripts/dhclient-script" pid=559 comm="apparmor_parser"
[    8.662388] audit: type=1400 audit(1670976500.300:10): apparmor="STATUS" operation="profile_load"
 profile="unconfined" name="/usr/bin/lxc-start" pid=560 comm="apparmor_parser"
[    8.669558] audit: type=1400 audit(1670976500.308:11): apparmor="STATUS" operation="profile_load"
 profile="unconfined" name="/usr/lib/lxd/lxd-bridge-proxy" pid=561 comm="apparmor_parser"
[    9.093210] piix4_smbus 0000:00:07.0: SMBus Host Controller at 0x4100, revision 0
[    9.116662] vgdrvHeartbeatInit: Setting up heartbeat to trigger every 2000 milliseconds
[    9.132689] input: Unspecified device as /devices/pci0000:00/0000:00:04.0/input/input7
[    9.150177] vboxguest: misc device minor 55, IRQ 20, I/O port d020, MMIO at 00000000f0400000 (siz
e 0x400000)
[    9.150180] vboxguest: Successfully loaded version 5.0.18_Ubuntu (interface 0x00010004)
[    9.380268] [drm] Initialized drm 1.1.0 20060810
[    9.504844] IPv6: ADDRCONF(NETDEV_UP): enp0s3: link is not ready
[    9.505570] e1000 enp0s3 NIC Link is Up 1000 Mbps Full Duplex, Flow Control: RX
[    9.509034] IPv6: ADDRCONF(NETDEV_CHANGE): enp0s3: link becomes ready
[    9.539676] snd_intel8x0 0000:00:05.0: disable (unknown or VT-d) VM optimization
[    9.813433] snd_intel8x0 0000:00:05.0: white list rate for 1028:0177 is 48000
[    9.831497] [drm] VRAM 01000000
[    9.834046] [TTM] Zone  kernel: Available graphics memory: 379024 kiB
[    9.834047] [TTM] Initializing pool allocator
[    9.834053] [TTM] Initializing DMA pool allocator
[   10.016956] fbcon: vboxdrmfb (fb0) is primary device
[   10.098743] Console: switching to colour frame buffer device 100x37
[   10.100590] vboxvideo 0000:00:02.0: fb0: vboxdrmfb frame buffer device
[   10.102568] [drm] Initialized vboxvideo 1.0.0 20130823 for 0000:00:02.0 on minor 0
[   10.216418] ppdev: user-space parallel port driver
[   10.364928] Adding 784380k swap on /dev/sda5.  Priority:-1 extents:1 across:784380k FS
[   10.693562] cgroup: new mount options do not match the existing superblock, will be ignored
[   12.001185] floppy0: no floppy controllers found
[  969.863995] simple: module verification failed: signature and/or required key missing - tainting
kernel
[  969.864733] Loading Module
[ 1241.210100] Removing Module
osc@ubuntu:~/Project2/Option1Step1$
```

Right Ctrl

Value of Jiffies and HZ printed out:


```
OSC10e-July2018 [Running] - Oracle VM VirtualBox                    —    □    ✕

File   Machine   View   Input   Devices   Help

[    7.107914] audit: type=1400 audit(1670978701.628:3): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="lxc-container-default-cgns" pid=640 comm="apparmor_parser"
[    7.107916] audit: type=1400 audit(1670978701.628:4): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="lxc-container-default-with-mounting" pid=640 comm="apparmor_parser"
[    7.107919] audit: type=1400 audit(1670978701.628:5): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="lxc-container-default-with-nesting" pid=640 comm="apparmor_parser"
[    7.113142] audit: type=1400 audit(1670978701.632:6): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="/sbin/dhclient" pid=643 comm="apparmor_parser"
[    7.113147] audit: type=1400 audit(1670978701.632:7): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="/usr/lib/NetworkManager/nm-dhcp-client.action" pid=643 comm="apparmor_par
ser"
[    7.113149] audit: type=1400 audit(1670978701.632:8): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="/usr/lib/NetworkManager/nm-dhcp-helper" pid=643 comm="apparmor_parser"
[    7.113151] audit: type=1400 audit(1670978701.632:9): apparmor="STATUS" operation="profile_load"
profile="unconfined" name="/usr/lib/connman/scripts/dhclient-script" pid=643 comm="apparmor_parser"
[    7.114394] audit: type=1400 audit(1670978701.636:10): apparmor="STATUS" operation="profile_load"
 profile="unconfined" name="/usr/bin/lxc-start" pid=646 comm="apparmor_parser"
[    7.117741] fbcon: vboxdrmfb (fb0) is primary device
[    7.122678] audit: type=1400 audit(1670978701.644:11): apparmor="STATUS" operation="profile_load"
 profile="unconfined" name="/usr/lib/lxd/lxd-bridge-proxy" pid=647 comm="apparmor_parser"
[    7.145211] Console: switching to colour frame buffer device 100x37
[    7.148583] vboxvideo 0000:00:02.0: fb0: vboxdrmfb frame buffer device
[    7.172282] [drm] Initialized vboxvideo 1.0.0 20130823 for 0000:00:02.0 on minor 0
[    7.197020] IPv6: ADDRCONF(NETDEV_UP): enp0s3: link is not ready
[    7.198549] e1000: enp0s3 NIC Link is Up 1000 Mbps Full Duplex, Flow Control: RX
[    7.198908] IPv6: ADDRCONF(NETDEV_CHANGE): enp0s3: link becomes ready
[    7.248431] ppdev: user-space parallel port driver
[    7.319606] Adding 784380k swap on /dev/sda5.  Priority:-1 extents:1 across:784380k FS
[    7.456197] cgroup: new mount options do not match the existing superblock, will be ignored
[    9.794163] floppy0: no floppy controllers found
[  122.766872] simple: module verification failed: signature and/or required key missing - tainting
kernel
[  122.767737] Loading Module
[  122.767739] 11400862456688148481
[  122.767740] Value of  jiffies is 4294922935
[  122.767740] Value of  Hz is 250
osc@ubuntu:~/Project2/Option1Step1$ _

Right Ctrl
```

OPTION1STEP2

"ps -el" command listing all the tasks


```
4 S     0   350     1  0  80    0 -   7006 -        ?        00:00:00 systemd-journal
1 S     0   355     2  0  80    0 -      0 -        ?        00:00:00 kworker/0:4
1 S     0   381     2  0  80    0 -      0 -        ?        00:00:00 kauditd
1 S     0   387     2  0  60 -20 -      0 -        ?        00:00:00 iscsi_eh
1 S     0   397     2  0  60 -20 -      0 -        ?        00:00:00 ib_addr
1 S     0   398     2  0  60 -20 -      0 -        ?        00:00:00 ib_mcast
1 S     0   399     2  0  60 -20 -      0 -        ?        00:00:00 ib_nl_sa_wq
4 S     0   400     1  0  80    0 - 23692 -        ?        00:00:00 lvmetad
1 S     0   403     2  0  60 -20 -      0 -        ?        00:00:00 ib_cm
1 S     0   409     2  0  60 -20 -      0 -        ?        00:00:00 iw_cm_wq
1 S     0   413     2  0  60 -20 -      0 -        ?        00:00:00 rdma_cm
4 S     0   426     1  0  80    0 - 11084 -        ?        00:00:00 systemd-udevd
1 S     0   453     2  0  80    0 -      0 -        ?        00:00:00 kworker/0:5
1 S     0   481     2  0  60 -20 -      0 -        ?        00:00:00 iprt-VBoxWQueue
4 S   100   516     1  0  80    0 - 25080 -        ?        00:00:00 systemd-timesyn
1 S     0   678     2  0  60 -20 -      0 -        ?        00:00:00 ttm_swap
4 S     0   760     1  0  80    0 - 68963 -        ?        00:00:00 accounts-daemon
0 S     0   763     1  0  80    0 -   1098 -        ?        00:00:00 acpid
4 S     0   770     1  0  80    0 -   7155 -        ?        00:00:00 systemd-logind
4 S     0   773     1  0  80    0 - 37185 -        ?        00:00:00 snapd
4 S   104   775     1  0  80    0 - 64097 -        ?        00:00:00 rsyslogd
4 S     1   778     1  0  80    0 -   6510 -        ?        00:00:00 atd
4 S     0   786     1  0  80    0 -   7251 -        ?        00:00:00 cron
4 S     0   789     1  0  80    0 - 23841 -        ?        00:00:00 lxcfs
4 S   107   792     1  0  80    0 - 10724 -        ?        00:00:00 dbus-daemon
1 S     0   814     1  0  80    0 -   3342 -        ?        00:00:00 mdadm
4 S     0   816     1  0  80    0 - 69271 -        ?        00:00:00 polkitd
1 S     0   875     1  0  80    0 -   4029 -        ?        00:00:00 dhclient
1 S     0  1015     1  0  80    0 -   1304 -        ?        00:00:00 iscsid
5 S     0  1016     1  0  70 -10 -   1429 -        ?        00:00:00 iscsid
4 S     0  1026     1  0  80    0 - 16376 -        ?        00:00:00 sshd
4 S     0  1085     1  0  80    0 - 16457 -        tty1     00:00:00 login
4 S  1000  1145     1  0  80    0 - 11318 ep_pol  ?        00:00:00 systemd
5 S  1000  1147  1145  0  80    0 - 15293 -        ?        00:00:00 (sd-pam)
4 S  1000  1153  1085  0  80    0 -   5651 wait    tty1     00:00:00 bash
0 R  1000  1540  1153  0  80    0 -   7228 -        tty1     00:00:00 ps
osc@ubuntu:~/ThomasDeMasse-P2/Option1Step2$ _
```

dmesg command listing all the tasks after the module has been loaded

File   Machine   View   Input   Devices   Help

```
[ 2087.320904] Name: ib_addr            State: 1      Process ID: 397
[ 2087.320905] Name: ib_mcast           State: 1      Process ID: 398
[ 2087.320906] Name: ib_nl_sa_wq        State: 1      Process ID: 399
[ 2087.320907] Name: lvmetad            State: 1      Process ID: 400
[ 2087.320908] Name: ib_cm              State: 1      Process ID: 403
[ 2087.320909] Name: iw_cm_wq           State: 1      Process ID: 409
[ 2087.320910] Name: rdma_cm            State: 1      Process ID: 413
[ 2087.320910] Name: systemd-udevd      State: 1      Process ID: 426
[ 2087.320911] Name: iprt-VBoxWQueue    State: 1      Process ID: 481
[ 2087.320913] Name: systemd-timesyn    State: 1      Process ID: 516
[ 2087.320913] Name: ttm_swap           State: 1      Process ID: 678
[ 2087.320914] Name: accounts-daemon    State: 1      Process ID: 760
[ 2087.320915] Name: acpid              State: 1      Process ID: 763
[ 2087.320916] Name: systemd-logind     State: 1      Process ID: 770
[ 2087.320917] Name: snapd              State: 1      Process ID: 773
[ 2087.320918] Name: rsyslogd           State: 1      Process ID: 775
[ 2087.320919] Name: atd                State: 1      Process ID: 778
[ 2087.320920] Name: cron               State: 1      Process ID: 786
[ 2087.320921] Name: lxcfs              State: 1      Process ID: 789
[ 2087.320922] Name: dbus-daemon        State: 1      Process ID: 792
[ 2087.320923] Name: mdadm              State: 1      Process ID: 814
[ 2087.320924] Name: polkitd            State: 1      Process ID: 816
[ 2087.320925] Name: dhclient           State: 1      Process ID: 875
[ 2087.320926] Name: iscsid             State: 1      Process ID: 1015
[ 2087.320927] Name: iscsid             State: 1      Process ID: 1016
[ 2087.320928] Name: sshd               State: 1      Process ID: 1026
[ 2087.320929] Name: login              State: 1      Process ID: 1085
[ 2087.320930] Name: systemd            State: 1      Process ID: 1145
[ 2087.320930] Name: (sd-pam)           State: 1      Process ID: 1147
[ 2087.320931] Name: bash               State: 1      Process ID: 1153
[ 2087.320932] Name: kworker/u2:0       State: 1      Process ID: 2175
[ 2087.320933] Name: kworker/0:0        State: 1      Process ID: 2179
[ 2087.320934] Name: kworker/u2:1       State: 1      Process ID: 2184
[ 2087.320935] Name: sudo               State: 1      Process ID: 2830
[ 2087.320935] Name: insmod             State: 0      Process ID: 2831
[ 2087.320936] Stopped listing tasks
osc@ubuntu:~/ThomasDeMasse-P2/Option1Step2$ dmesg_
```