

作業系統作業四

題目敘述

觀察下列十個檔案內容，並解釋其各項所代表的意義，並繳交成一份報告 “**Report.pdf**”

- /proc/cpuinfo
- /proc/meminfo
- /proc/mounts
- /proc/devices
- /proc/filesystems
- /proc/modules
- /proc/version
- /proc/cmdline
- /proc/time_stats
- /proc/ioports

答案

1. /proc/cpuinfo

列出該電腦的 cpu 資訊

```
howard@howard-PE70-2QE: ~  
howard@howard-PE70-2QE:~$ cat /proc/cpuinfo  
processor       : 0  
vendor_id      : GenuineIntel  
cpu family     : 6  
model          : 71  
model name     : Intel(R) Core(TM) i7-5700HQ CPU @ 2.70GHz  
stepping       : 1  
microcode      : 0xd  
cpu MHz        : 2700.843  
cache size     : 6144 KB  
physical id    : 0  
siblings       : 8  
core id        : 0  
cpu cores      : 4  
apicid         : 0  
initial apicid : 0  
fpu            : yes  
fpu_exception  : yes  
cpuid level    : 20  
wp             : yes  
flags          : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clfl  
ush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_per  
fmon pebs bts rep_good nopl xtopology nonstop_tsc aperfmperf eagerfpu pni pclmulqdq dtes64 mon  
itor ds cpl vmx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt t  
sc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ept intel_pt tpr_shadow  
vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid rdseed adx sma  
p xsaveopt dtherm ida arat pln pts  
bugs           :  
bogomips       : 5387.89  
clflush size   : 64  
cache_alignme  : 64  
address sizes  : 39 bits physical, 48 bits virtual  
power managem  :  
  
processor       : 1  
vendor_id      : GenuineIntel  
cpu family     : 6  
model          : 71  
model name     : Intel(R) Core(TM) i7-5700HQ CPU @ 2.70GHz  
stepping       : 1  
microcode      : 0xd  
cpu MHz        : 2701.160  
cache size     : 6144 KB  
physical id    : 0  
siblings       : 8  
core id        : 1  
cpu cores      : 4  
apicid         : 2  
initial apicid : 2  
fpu            : yes  
fpu_exception  : yes  
cpuid level    : 20  
wp             : yes  
flags          : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clfl  
ush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_per  
fmon pebs bts rep_good nopl xtopology nonstop_tsc aperfmperf eagerfpu pni pclmulqdq dtes64 mon  
itor ds cpl vmx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt t
```

2. /proc/meminfo

列出該電腦的記憶體使用狀況

```
howard@howard-PE70-2QE:~$ cat /proc/meminfo
MemTotal:      8084280 kB
MemFree:       2290776 kB
MemAvailable:  4737780 kB
Buffers:       493036 kB
Cached:        2494460 kB
SwapCached:    0 kB
Active:        3646092 kB
Inactive:      1593528 kB
Active(anon):  2255464 kB
Inactive(anon): 588000 kB
Active(file):  1390628 kB
Inactive(file): 1005528 kB
Unevictable:   768 kB
Mlocked:       768 kB
SwapTotal:     7905276 kB
SwapFree:      7905276 kB
Dirty:         448 kB
Writeback:     0 kB
AnonPages:     2253120 kB
Mapped:        680336 kB
Shmem:         591348 kB
Slab:          409976 kB
SReclaimable:  358804 kB
SUnreclaim:    51172 kB
KernelStack:   13696 kB
PageTables:    54688 kB
NFS_Unstable:  0 kB
Bounce:        0 kB
WritebackTmp:  0 kB
CommitLimit:   11947416 kB
Committed_AS:  9840424 kB
VmallocTotal:  34359738367 kB
VmallocUsed:   0 kB
VmallocChunk:  0 kB
HardwareCorrupted: 0 kB
AnonHugePages: 794624 kB
CmaTotal:      0 kB
CmaFree:       0 kB
HugePages_Total: 0
HugePages_Free: 0
HugePages_Rsvd: 0
HugePages_Surp: 0
Hugepagesize:  2048 kB
DirectMap4k:   194428 kB
DirectMap2M:   7055360 kB
DirectMap1G:   2097152 kB
howard@howard-PE70-2QE:~$
```

3. /proc/mounts

列出當前系統已掛載的資料

```
howard@howard-PE70-2QE: ~  
howard@howard-PE70-2QE:~$ cat /proc/mounts  
sysfs /sys sysfs rw,nosuid,nodev,noexec,relatime 0 0  
proc /proc proc rw,nosuid,nodev,noexec,relatime 0 0  
udev /dev devtmpfs rw,nosuid,relatime,size=4021880k,nr_inodes=1005470,mode=755 0 0  
devpts /dev/pts devpts rw,nosuid,noexec,relatime,gid=5,mode=620,ptmxmode=000 0 0  
tmpfs /run tmpfs rw,nosuid,noexec,relatime,size=808428k,mode=755 0 0  
/dev/sda1 / ext4 rw,relatime,errors=remount-ro,data=ordered 0 0  
securityfs /sys/kernel/security securityfs rw,nosuid,nodev,noexec,relatime 0 0  
tmpfs /dev/shm tmpfs rw,nosuid,nodev 0 0  
tmpfs /run/lock tmpfs rw,nosuid,nodev,noexec,relatime,size=5120k 0 0  
tmpfs /sys/fs/cgroup tmpfs ro,nosuid,nodev,noexec,mode=755 0 0  
cgroup /sys/fs/cgroup/systemd cgroup rw,nosuid,nodev,noexec,relatime,xattr,release_agent=/lib/  
systemd/systemd-cgroups-agent,name=systemd 0 0  
pstore /sys/fs/pstore pstore rw,nosuid,nodev,noexec,relatime 0 0  
cgroup /sys/fs/cgroup/net_cls,net_prio cgroup rw,nosuid,nodev,noexec,relatime,net_cls,net_prio  
0 0  
cgroup /sys/fs/cgroup/cpu,cpuacct cgroup rw,nosuid,nodev,noexec,relatime,cpu,cpuacct 0 0  
cgroup /sys/fs/cgroup/freezer cgroup rw,nosuid,nodev,noexec,relatime,freezer 0 0  
cgroup /sys/fs/cgroup/blkio cgroup rw,nosuid,nodev,noexec,relatime,blkio 0 0  
cgroup /sys/fs/cgroup/memory cgroup rw,nosuid,nodev,noexec,relatime,memory 0 0  
cgroup /sys/fs/cgroup/hugetlb cgroup rw,nosuid,nodev,noexec,relatime,hugetlb 0 0  
cgroup /sys/fs/cgroup/devices cgroup rw,nosuid,nodev,noexec,relatime,devices 0 0  
cgroup /sys/fs/cgroup/cpuset cgroup rw,nosuid,nodev,noexec,relatime,cpuset 0 0  
cgroup /sys/fs/cgroup/pids cgroup rw,nosuid,nodev,noexec,relatime,pids 0 0  
cgroup /sys/fs/cgroup/perf_event cgroup rw,nosuid,nodev,noexec,relatime,perf_event 0 0  
systemd-1 /proc/sys/fs/binfmt_misc autofs rw,relatime,fd=29,pgrp=1,timeout=0,minproto=5,maxpro  
to=5,direct 0 0  
mqueue /dev/mqueue mqueue rw,relatime 0 0  
debugfs /sys/kernel/debug debugfs rw,relatime 0 0  
hugetlbfs /dev/hugepages hugetlbfs rw,relatime 0 0  
fusectl /sys/fs/fuse/connections fusectl rw,relatime 0 0  
/dev/sdb5 /home ext4 rw,relatime,data=ordered 0 0  
/dev/sdb6 /var ext4 rw,relatime,data=ordered 0 0  
binfmt_misc /proc/sys/fs/binfmt_misc binfmt_misc rw,relatime 0 0  
tmpfs /run/user/1000 tmpfs rw,nosuid,nodev,relatime,size=808428k,mode=700,uid=1000,gid=1000 0  
0  
gvfsd-fuse /run/user/1000/gvfs fuse.gvfsd-fuse rw,nosuid,nodev,relatime,user_id=1000,group_id=  
1000 0 0  
howard@howard-PE70-2QE:~$ |
```


4. /proc/devices

列出各個主要裝置的代號，與 mknod 相關。

```
howard@howard-PE70-2QE: ~  
howard@howard-PE70-2QE:~$ cat /proc/devices  
Character devices:  
1 mem  
4 /dev/vc/0  
4 tty  
4 ttyS  
5 /dev/tty  
5 /dev/console  
5 /dev/ptmx  
5 ttyprintk  
6 lp  
7 vcs  
10 misc  
13 input  
21 sg  
29 fb  
89 i2c  
99 ppdev  
108 ppp  
116 alsa  
128 ptm  
136 pts  
180 usb  
189 usb_device  
216 rfcomm  
226 drm  
245 mei  
246 iio  
247 aux  
248 hidraw  
249 bsg  
250 watchdog  
251 rtc  
252 dimmctl  
253 ndctl  
254 tpm  
  
Block devices:  
259 blkext  
7 loop  
8 sd  
9 md  
11 sr  
65 sd  
66 sd  
67 sd  
68 sd  
69 sd  
70 sd  
71 sd  
128 sd  
129 sd  
130 sd  
131 sd  
132 sd  
133 sd  
134 sd
```

5. /proc/filesystems

列出當前系統載入之檔案

```
howard@howard-PE70-2QE: ~  
howard@howard-PE70-2QE:~$ cat /proc/filesystems  
nodev    sysfs  
nodev    rootfs  
nodev    ramfs  
nodev    bdev  
nodev    proc  
nodev    cpuset  
nodev    cgroup  
nodev    tmpfs  
nodev    devtmpfs  
nodev    debugfs  
nodev    tracefs  
nodev    securityfs  
nodev    sockfs  
nodev    bpf  
nodev    pipefs  
nodev    devpts  
         ext3  
         ext2  
         ext4  
         squashfs  
nodev    hugetlbfs  
         vfat  
nodev    ecryptfs  
         fuseblk  
nodev    fuse  
nodev    fusectl  
nodev    pstore  
nodev    mqueue  
nodev    autofs  
nodev    binfmt_misc  
howard@howard-PE70-2QE:~$
```

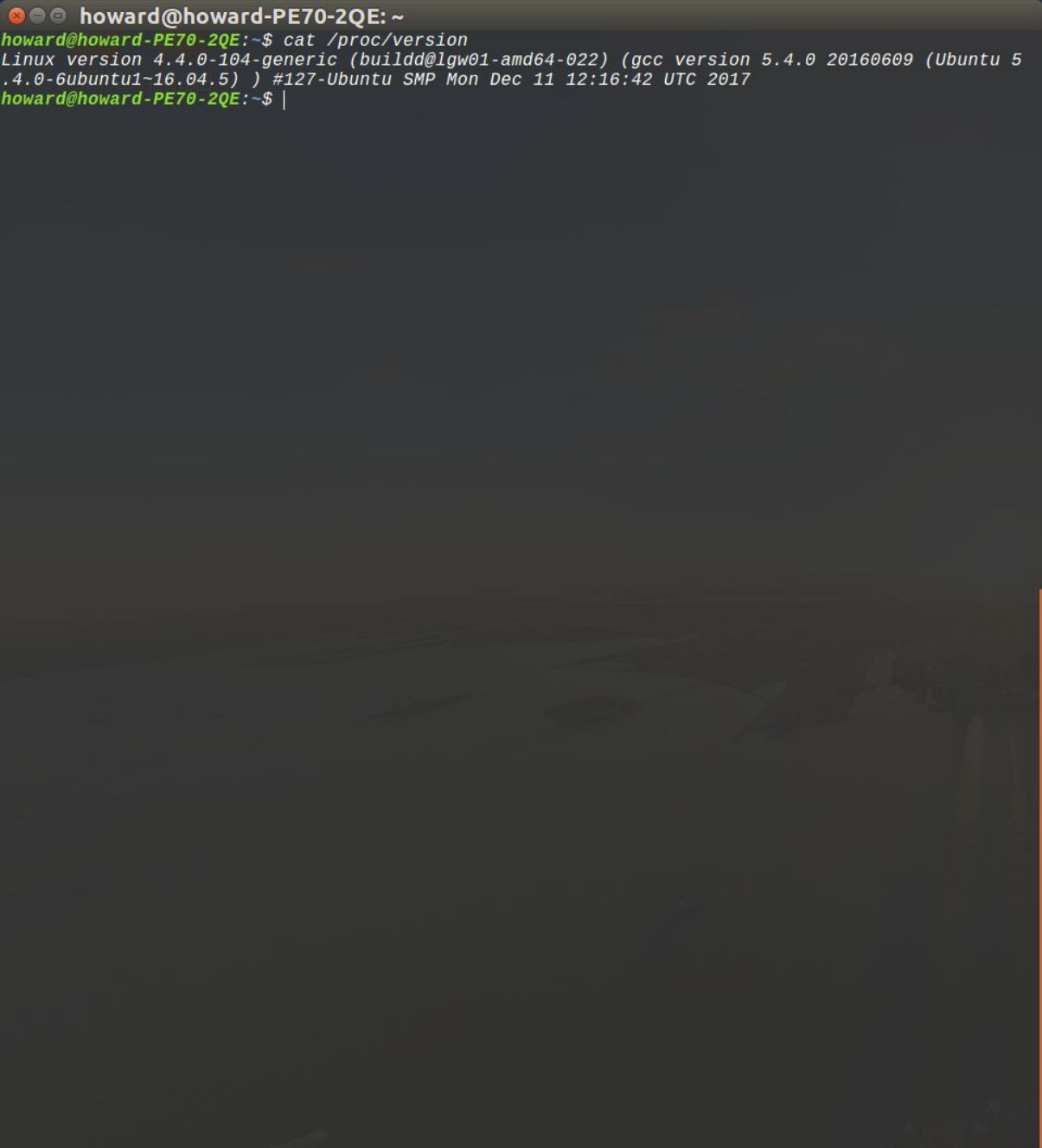
6. /proc/modules

列出當前系統已載入之模組、驅動。

```
howard@howard-PE70-2QE: ~  
howard@howard-PE70-2QE:~$ cat /proc/modules  
pci_stub 16384 1 - Live 0x0000000000000000  
vboxpci 24576 0 - Live 0x0000000000000000 (OE)  
vboxnetadp 28672 0 - Live 0x0000000000000000 (OE)  
vboxnetflt 28672 0 - Live 0x0000000000000000 (OE)  
vboxdrv 454656 3 vboxpci,vboxnetadp,vboxnetflt, Live 0x0000000000000000 (OE)  
rfcomm 69632 2 - Live 0x0000000000000000  
bnep 20480 2 - Live 0x0000000000000000  
rtsx_usb_ms 20480 0 - Live 0x0000000000000000  
memstick 20480 1 rtsx_usb_ms, Live 0x0000000000000000  
binfmt_misc 20480 1 - Live 0x0000000000000000  
arc 16384 2 - Live 0x0000000000000000  
msi_wmi 16384 0 - Live 0x0000000000000000  
sparse_keymap 16384 1 msi_wmi, Live 0x0000000000000000  
intel_rapl 20480 0 - Live 0x0000000000000000  
x86_pkg_temp_thermal 16384 0 - Live 0x0000000000000000  
intel_powerclamp 16384 0 - Live 0x0000000000000000  
coretemp 16384 0 - Live 0x0000000000000000  
kvm_intel 172032 0 - Live 0x0000000000000000  
kvm 544768 1 kvm_intel, Live 0x0000000000000000  
irqbypass 16384 1 kvm, Live 0x0000000000000000  
crc10dif_pclmul 16384 0 - Live 0x0000000000000000  
iwlvm 311296 0 - Live 0x0000000000000000  
btusb 45056 0 - Live 0x0000000000000000  
crc32_pclmul 16384 0 - Live 0x0000000000000000  
btrtl 16384 1 btusb, Live 0x0000000000000000  
ghash_clmulni_intel 16384 0 - Live 0x0000000000000000  
btbcm 16384 1 btusb, Live 0x0000000000000000  
btintel 16384 1 btusb, Live 0x0000000000000000  
mac80211 737280 1 iwlvm, Live 0x0000000000000000  
bluetooth 520192 29 rfcomm,bnep,btusb,btrtl,btbcm,btintel, Live 0x0000000000000000  
aesni_intel 167936 0 - Live 0x0000000000000000  
aes_x86_64 20480 1 aesni_intel, Live 0x0000000000000000  
lrw 16384 1 aesni_intel, Live 0x0000000000000000  
gf128mul 16384 1 lrw, Live 0x0000000000000000  
glue_helper 16384 1 aesni_intel, Live 0x0000000000000000  
ablk_helper 16384 1 aesni_intel, Live 0x0000000000000000  
cryptd 20480 3 ghash_clmulni_intel,aesni_intel,ablk_helper, Live 0x0000000000000000  
input_leds 16384 0 - Live 0x0000000000000000  
joydev 20480 0 - Live 0x0000000000000000  
serio_raw 16384 0 - Live 0x0000000000000000  
iwlwifi 200704 1 iwlvm, Live 0x0000000000000000  
snd_hda_codec_realtek 90112 1 - Live 0x0000000000000000  
snd_hda_codec_hdmi 53248 1 - Live 0x0000000000000000  
snd_hda_codec_generic 77824 1 snd_hda_codec_realtek, Live 0x0000000000000000  
cfg80211 565248 3 iwlvm,mac80211,iwlwifi, Live 0x0000000000000000  
snd_soc_rt5640 114688 0 - Live 0x0000000000000000  
snd_soc_ssm4567 16384 0 - Live 0x0000000000000000  
snd_soc_rl6231 16384 1 snd_soc_rt5640, Live 0x0000000000000000  
snd_hda_intel 40960 5 - Live 0x0000000000000000  
snd_soc_core 212992 2 snd_soc_rt5640,snd_soc_ssm4567, Live 0x0000000000000000  
lpc_ich 24576 0 - Live 0x0000000000000000  
snd_hda_codec 135168 4 snd_hda_codec_realtek,snd_hda_codec_hdmi,snd_hda_codec_generic,snd_hda_intel, Live 0x0000000000000000  
snd_compress 20480 1 snd_soc_core, Live 0x0000000000000000  
mei_me 36864 0 - Live 0x0000000000000000  
snd_hda_core 73728 5 snd_hda_codec_realtek,snd_hda_codec_hdmi,snd_hda_codec_generic,snd_hda_in
```

7. /proc/version

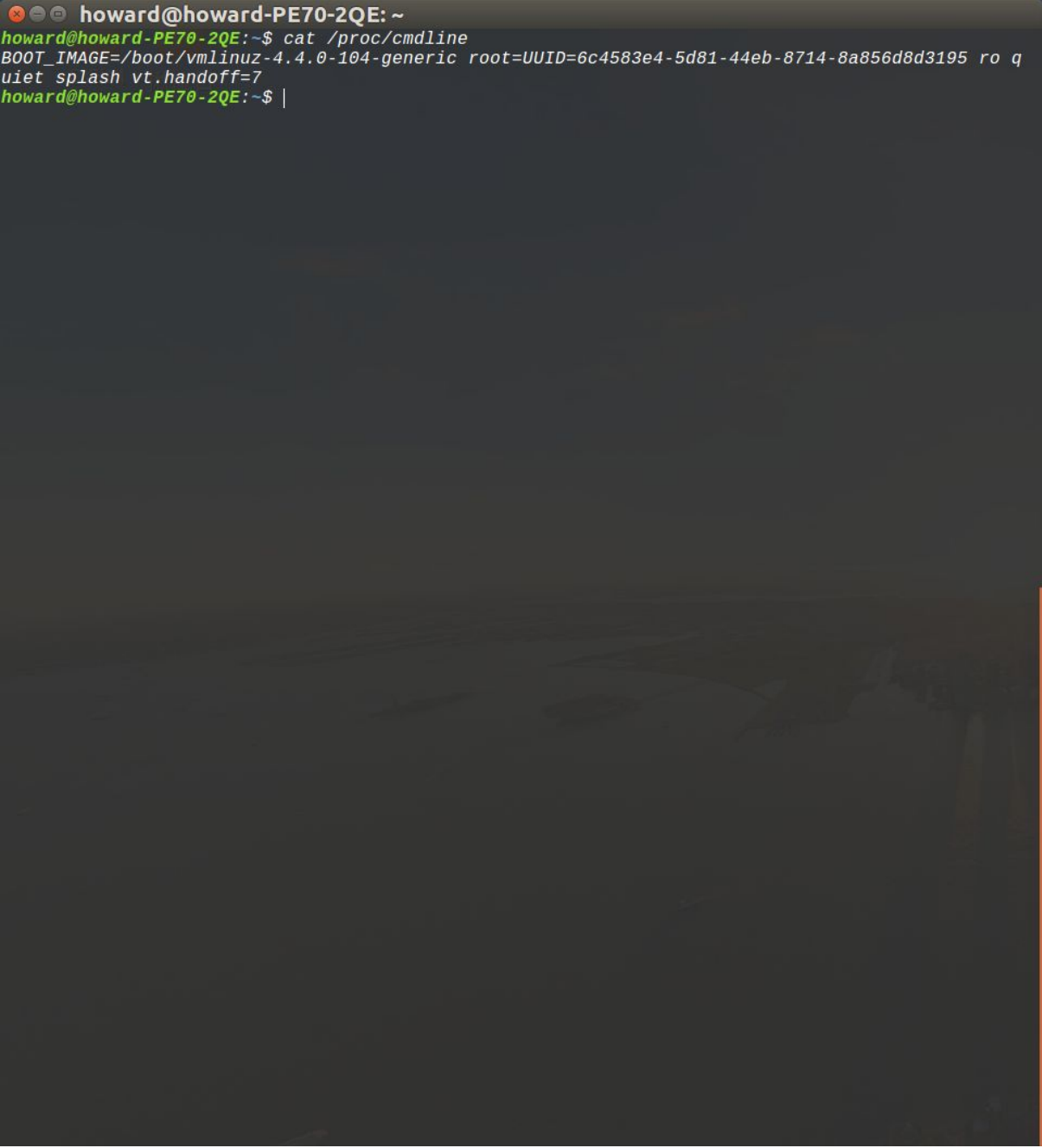
列出作業系統資訊，類似 linux uname 。



```
howard@howard-PE70-2QE: ~  
howard@howard-PE70-2QE:~$ cat /proc/version  
Linux version 4.4.0-104-generic (bulld@lgw01-amd64-022) (gcc version 5.4.0 20160609 (Ubuntu 5.4.0-6ubuntu1~16.04.5) ) #127-Ubuntu SMP Mon Dec 11 12:16:42 UTC 2017  
howard@howard-PE70-2QE:~$ |
```


8. /proc/cmdline

列出載入kernel時所下達的相關參數。



```
howard@howard-PE70-2QE: ~  
howard@howard-PE70-2QE:~$ cat /proc/cmdline  
BOOT_IMAGE=/boot/vmlinuz-4.4.0-104-generic root=UUID=6c4583e4-5d81-44eb-8714-8a856d8d3195 ro q  
uiet splash vt.handoff=7  
howard@howard-PE70-2QE:~$ |
```

9. /proc/timer_stats

列出當前系統中所有正在使用 timer 的統計訊息。

```
howard@howard-PE70-2QE: ~  
howard@howard-PE70-2QE:~$ cat /proc/timer_stats  
Timer Stats Version: v0.3  
Sample period: 0.000 s  
Collection: inactive  
0 total events  
howard@howard-PE70-2QE:~$ |
```

10./proc/ioproports

列出當前系統上各個裝置配置的 IO 位址。

```
howard@howard-PE70-2QE: ~  
howard@howard-PE70-2QE:~$ cat /proc/ioproports  
0000-0000 : PCI Bus 0000:00  
  0000-0000 : dma1  
  0000-0000 : pic1  
  0000-0000 : timer0  
  0000-0000 : timer1  
  0000-0000 : keyboard  
  0000-0000 : PNP0C09:01  
    0000-0000 : EC data  
  0000-0000 : keyboard  
  0000-0000 : PNP0C09:01  
    0000-0000 : EC cmd  
  0000-0000 : rtc0  
  0000-0000 : dma page reg  
  0000-0000 : pic2  
  0000-0000 : dma2  
  0000-0000 : fpu  
    0000-0000 : PNP0C04:00  
  0000-0000 : vesafb  
  0000-0000 : pnp 00:02  
  0000-0000 : pnp 00:03  
0000-0000 : PCI conf1  
0000-0000 : PCI Bus 0000:00  
  0000-0000 : pnp 00:02  
  0000-0000 : ACPI PM1a_EVT_BLK  
  0000-0000 : ACPI PM1a_CNT_BLK  
  0000-0000 : ACPI PM_TMR  
  0000-0000 : ACPI CPU throttle  
  0000-0000 : ACPI GPE0_BLK  
  0000-0000 : iTCO_wdt.2.auto  
  0000-0000 : ACPI PM2_CNT_BLK  
  0000-0000 : pnp 00:05  
  0000-0000 : iTCO_wdt.2.auto  
  0000-0000 : PCI Bus 0000:04  
    0000-0000 : 0000:04:00.0  
  0000-0000 : PCI Bus 0000:01  
    0000-0000 : 0000:01:00.0  
  0000-0000 : 0000:00:02.0  
  0000-0000 : 0000:00:1f.3  
  0000-0000 : 0000:00:1f.2  
    0000-0000 : ahci  
  0000-0000 : 0000:00:1f.2  
    0000-0000 : ahci  
  0000-0000 : 0000:00:1f.2  
    0000-0000 : ahci  
  0000-0000 : 0000:00:1f.2  
    0000-0000 : ahci  
  0000-0000 : 0000:00:1f.2  
    0000-0000 : ahci  
  0000-0000 : pnp 00:02  
    0000-0000 : pnp 00:02  
    0000-0000 : pnp 00:02  
howard@howard-PE70-2QE:~$ |
```