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Gestion du Matériel et les Ressources

Fichiers Spéciaux

Dans l'ordinateur les périphériques sont reliés à un **contrôleur** qui communique avec le processeur à l'aide d'un **bus**. Le contrôleur ainsi que les périphériques nécessitent des pilotes. Sous Linux, les pilotes sont généralement fournis sous la forme d'un **module**. Chaque périphérique est représenté par un **fichier spécial** dans le répertoire **/dev** et c'est dans ce fichier que le système trouve les informations nécessaires pour s'adresser au pilote.



Important : Les périphériques qui nécessitent à ce que l'ordinateur soit éteint afin des les brancher/débrancher sont appelés communément **Cold Plug Devices**. Les périphériques qui peuvent être brancher/débrancher à chaud sont appelés des **Hot Plug Devices**.

Consultez le contenu du répertoire **/dev** :

```
[root@centos7 ~]# ls -l /dev | more
total 0
crw-----. 1 root    root      10, 235 Oct 28 09:40 autofs
drwxr-xr-x. 2 root    root        140 Oct 28 09:40 block
drwxr-xr-x. 2 root    root         80 Oct 28 09:40 bsg
crw-----. 1 root    root     10, 234 Oct 28 09:40 btrfs-control
drwxr-xr-x. 3 root    root         60 Oct 28 09:40 bus
lrwxrwxrwx. 1 root    root          3 Oct 28 09:40 cdrom -> sr0
drwxr-xr-x. 2 root    root     2800 Oct 28 09:41 char
crw-----. 1 root    root        5,   1 Oct 28 09:40 console
lrwxrwxrwx. 1 root    root        11 Oct 28 09:40 core -> /proc/kcore
```

```

drwxr-xr-x. 3 root    root      80 Oct 28 09:40 cpu
crw-----. 1 root    root    10, 61 Oct 28 09:40 cpu_dma_latency
crw-----. 1 root    root    10, 62 Oct 28 09:40 crash
drwxr-xr-x. 5 root    root    100 Oct 28 09:40 disk
drwxr-xr-x. 2 root    root      60 Oct 28 09:40 dri
lrwxrwxrwx. 1 root    root      13 Oct 28 09:40 fd -> /proc/self/fd
crw-rw-rw-. 1 root    root      1,  7 Oct 28 09:40 full
crw-rw-rw-. 1 root    root   10, 229 Oct 28 09:41 fuse
crw-----. 1 root    root   10, 228 Oct 28 09:40 hpet
drwxr-xr-x. 3 root    root      0 Oct 28 09:40 hugepages
prw-----. 1 root    root      0 Oct 28 09:40 initctl
drwxr-xr-x. 3 root    root    240 Oct 28 09:40 input
crw-r--r--. 1 root    root      1, 11 Oct 28 09:40 kmsg
--More--

```

```

root@debian8:~# ls -l /dev | more
total 0
crw----- 1 root    root    10, 235 Nov  1 08:39 autofs
drwxr-xr-x 2 root    root    140 Nov  1 08:39 block
drwxr-xr-x 2 root    root      80 Nov  1 08:39 bsg
crw----- 1 root    root   10, 234 Nov  1 08:39 btrfs-control
drwxr-xr-x 3 root    root      60 Nov  1 08:39 bus
lrwxrwxrwx 1 root    root      3 Nov  1 08:39 cdrom -> sr0
drwxr-xr-x 2 root    root   2780 Nov  1 13:35 char
crw----- 1 root    root      5,  1 Nov  1 08:39 console
lrwxrwxrwx 1 root    root     11 Nov  1 08:39 core -> /proc/kcore
drwxr-xr-x 2 root    root      60 Nov  1 08:39 cpu
crw----- 1 root    root   10,  62 Nov  1 08:39 cpu_dma_latency
crw-rw-rw- 1 root    root   10, 203 Nov  1 08:39 cuse
drwxr-xr-x 4 root    root      80 Nov  1 08:39 disk
drwxr-xr-x 2 root    root      60 Nov  1 08:39 dri
lrwxrwxrwx 1 root    root      3 Nov  1 08:39 dvd -> sr0
lrwxrwxrwx 1 root    root     13 Nov  1 08:39 fd -> /proc/self/fd
crw-rw-rw- 1 root    root      1,  7 Nov  1 08:39 full

```

```

crw-rw-rw-  1 root    root      10, 229 Nov  1 08:39 fuse
crw-----  1 root    root     251,   0 Nov  1 13:35 hidraw0
crw-----  1 root    root      10, 228 Nov  1 08:39 hpet
drwxr-xr-x  2 root    root         0 Nov  1 08:39 hugepages
lrwxrwxrwx  1 root    root        25 Nov  1 08:39 initctl -> /run/systemd/initctl/fifo
drwxr-xr-x  4 root    root     340 Nov  1 13:35 input
crw-r--r--  1 root    root        1,  11 Nov  1 08:39 kmsg
lrwxrwxrwx  1 root    root        28 Nov  1 08:39 log -> /run/systemd/journal/dev-log
crw-rw----  1 root    disk     10, 237 Nov  1 08:39 loop-control
drwxr-xr-x  2 root    root         60 Nov  1 08:39 mapper
crw-----  1 root    root     10, 227 Nov  1 08:39 mcelog
crw-r----- 1 root    kmem        1,   1 Nov  1 08:39 mem
drwxrwxrwt  2 root    root         40 Nov  1 08:39 mqueue
--More--

```

On peut noter dans la sortie de la commande que certains fichiers sont de type **bloc (b)**, tandis que d'autre sont de type **caractère (c)**.

```

...
brw-rw----  1 root    disk        8,   1 Nov  1 08:39 sda1
...
crw-rw-rw-  1 root    tty         5,   0 Nov  1 08:39 tty
...

```

La différence entre les deux repose sur le type de communication entre le système et le module. Dans le premier cas le système accède au périphérique par des coordonnées du bloc de données sur le support tandis que dans le deuxième cas la communication d'échange de données se fait octet par octet sans utiliser des tampons.

Les deux informations clefs du fichier spécial sont situées à la place de la taille d'un fichier normal et se nomment le **majeur** et le **mineur** :

- le **majeur** identifie le pilote du périphérique et donc son contrôleur,
- le **mineur** identifie le périphérique ou une particularité du périphérique telle une partition d'un disque.

Commandes

La Commande lspci

Cette commande vous renseigne sur les adaptateurs reliés aux bus PCI, AGP et PCI express :

```
[root@centos7 ~]# lspci
00:00.0 Host bridge: Intel Corporation 440FX - 82441FX PMC [Natoma] (rev 02)
00:01.0 ISA bridge: Intel Corporation 82371SB PIIX3 ISA [Natoma/Triton II]
00:01.1 IDE interface: Intel Corporation 82371AB/EB/MB PIIX4 IDE (rev 01)
00:02.0 VGA compatible controller: InnoTek Systemberatung GmbH VirtualBox Graphics Adapter
00:03.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
00:04.0 System peripheral: InnoTek Systemberatung GmbH VirtualBox Guest Service
00:05.0 Multimedia audio controller: Intel Corporation 82801AA AC'97 Audio Controller (rev 01)
00:06.0 USB controller: Apple Inc. KeyLargo/Intrepid USB
00:07.0 Bridge: Intel Corporation 82371AB/EB/MB PIIX4 ACPI (rev 08)
00:0b.0 USB controller: Intel Corporation 82801FB/FBM/FR/FW/FRW (ICH6 Family) USB2 EHCI Controller
00:0d.0 SATA controller: Intel Corporation 82801HM/HEM (ICH8M/ICH8M-E) SATA Controller [AHCI mode] (rev 02)
```

```
root@debian8:~# lspci
00:00.0 Host bridge: Intel Corporation 440FX - 82441FX PMC [Natoma] (rev 02)
00:01.0 ISA bridge: Intel Corporation 82371SB PIIX3 ISA [Natoma/Triton II]
00:01.1 IDE interface: Intel Corporation 82371AB/EB/MB PIIX4 IDE (rev 01)
00:02.0 VGA compatible controller: InnoTek Systemberatung GmbH VirtualBox Graphics Adapter
00:03.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
00:04.0 System peripheral: InnoTek Systemberatung GmbH VirtualBox Guest Service
00:05.0 Multimedia audio controller: Intel Corporation 82801AA AC'97 Audio Controller (rev 01)
00:06.0 USB controller: Apple Inc. KeyLargo/Intrepid USB
00:07.0 Bridge: Intel Corporation 82371AB/EB/MB PIIX4 ACPI (rev 08)
00:0d.0 SATA controller: Intel Corporation 82801HM/HEM (ICH8M/ICH8M-E) SATA Controller [AHCI mode] (rev 02)
```

Pour obtenir de l'information sur un adaptateur spécifique, il convient d'utiliser la même commande avec l'option **-v** en spécifiant l'identifiant concerné

:

```
[root@centos7 ~]# lspci -v -s 00:03.0
00:03.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
  Subsystem: Intel Corporation PR0/1000 MT Desktop Adapter
  Flags: bus master, 66MHz, medium devsel, latency 64, IRQ 19
  Memory at f0000000 (32-bit, non-prefetchable) [size=128K]
  I/O ports at d010 [size=8]
  Capabilities: [dc] Power Management version 2
  Capabilities: [e4] PCI-X non-bridge device
  Kernel driver in use: e1000
```

```
root@debian8:~# lspci -v -s 00:03.0
00:03.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
  Subsystem: Intel Corporation PR0/1000 MT Desktop Adapter
  Flags: bus master, 66MHz, medium devsel, latency 64, IRQ 10
  Memory at f0000000 (32-bit, non-prefetchable) [size=128K]
  I/O ports at d010 [size=8]
  Capabilities: [dc] Power Management version 2
  Capabilities: [e4] PCI-X non-bridge device
  Kernel driver in use: e1000
```

ou :

```
[root@centos7 ~]# lspci -vv -s 00:03.0
00:03.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
  Subsystem: Intel Corporation PR0/1000 MT Desktop Adapter
  Control: I/O+ Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop- ParErr- Stepping- SERR- FastB2B- DisINTx-
  Status: Cap+ 66MHz+ UDF- FastB2B- ParErr- DEVSEL=medium >TAbort- <TAbort- <MAbort- >SERR- <PERR- INTx-
  Latency: 64 (63750ns min)
  Interrupt: pin A routed to IRQ 19
  Region 0: Memory at f0000000 (32-bit, non-prefetchable) [size=128K]
  Region 2: I/O ports at d010 [size=8]
  Capabilities: [dc] Power Management version 2
```

```
Flags: PMEClk- DSI+ D1- D2- AuxCurrent=0mA PME(D0-,D1-,D2-,D3hot-,D3cold-)
Status: D0 NoSoftRst- PME-Enable- DSel=0 DScale=0 PME-
Capabilities: [e4] PCI-X non-bridge device
Command: DPERE- ER0+ RBC=512 OST=1
Status: Dev=ff:1f.0 64bit- 133MHz- SCD- USC- DC=simple DMMRBC=2048 DMOST=1 DMCRS=8 RSCEM- 266MHz- 533MHz-
Kernel driver in use: e1000
```

```
root@debian8:~# lspci -vv -s 00:03.0
00:03.0 Ethernet controller: Intel Corporation 82540EM Gigabit Ethernet Controller (rev 02)
Subsystem: Intel Corporation PR0/1000 MT Desktop Adapter
Control: I/O+ Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop- ParErr- Stepping- SERR- FastB2B- DisINTx-
Status: Cap+ 66MHz+ UDF- FastB2B- ParErr- DEVSEL=medium >TAbort- <TAbort- <MAbort- >SERR- <PERR- INTx-
Latency: 64 (63750ns min)
Interrupt: pin A routed to IRQ 10
Region 0: Memory at f0000000 (32-bit, non-prefetchable) [size=128K]
Region 2: I/O ports at d010 [size=8]
Capabilities: [dc] Power Management version 2
Flags: PMEClk- DSI+ D1- D2- AuxCurrent=0mA PME(D0-,D1-,D2-,D3hot-,D3cold-)
Status: D0 NoSoftRst- PME-Enable- DSel=0 DScale=0 PME-
Capabilities: [e4] PCI-X non-bridge device
Command: DPERE- ER0+ RBC=512 OST=1
Status: Dev=ff:1f.0 64bit- 133MHz- SCD- USC- DC=simple DMMRBC=2048 DMOST=1 DMCRS=8 RSCEM- 266MHz- 533MHz-
Kernel driver in use: e1000
```

Options de la commande

Les options de cette commande sont :

```
[root@centos7 ~]# lspci --help
lspci: invalid option -- '-'
Usage: lspci [<switches>]
```

Basic display modes:

-mm Produce machine-readable output (single -m for an obsolete format)
-t Show bus tree

Display options:

-v Be verbose (-vv for very verbose)
-k Show kernel drivers handling each device
-x Show hex-dump of the standard part of the config space
-xxx Show hex-dump of the whole config space (dangerous; root only)
-xxxx Show hex-dump of the 4096-byte extended config space (root only)
-b Bus-centric view (addresses and IRQ's as seen by the bus)
-D Always show domain numbers

Resolving of device ID's to names:

-n Show numeric ID's
-nn Show both textual and numeric ID's (names & numbers)
-q Query the PCI ID database for unknown ID's via DNS
-qq As above, but re-query locally cached entries
-Q Query the PCI ID database for all ID's via DNS

Selection of devices:

-s [[:<domain>]:]<bus>[:<slot>][.<func>] Show only devices in selected slots
-d [<vendor>]:<device> Show only devices with specified ID's

Other options:

-i <file> Use specified ID database instead of /usr/share/hwdata/pci.ids
-p <file> Look up kernel modules in a given file instead of default modules.pci.map
-M Enable 'bus mapping' mode (dangerous; root only)

PCI access options:

-A <method> Use the specified PCI access method (see '-A help' for a list)
-O <par>=<val> Set PCI access parameter (see '-O help' for a list)
-G Enable PCI access debugging
-H <mode> Use direct hardware access (<mode> = 1 or 2)
-F <file> Read PCI configuration dump from a given file

```
root@debian8:~# lspci --help
lspci: invalid option -- '-'
Usage: lspci [<switches>]
```

Basic display modes:

```
-mm      Produce machine-readable output (single -m for an obsolete format)
-t       Show bus tree
```

Display options:

```
-v       Be verbose (-vv for very verbose)
-k       Show kernel drivers handling each device
-x       Show hex-dump of the standard part of the config space
-xxx     Show hex-dump of the whole config space (dangerous; root only)
-xxxx    Show hex-dump of the 4096-byte extended config space (root only)
-b       Bus-centric view (addresses and IRQ's as seen by the bus)
-D       Always show domain numbers
```

Resolving of device ID's to names:

```
-n       Show numeric ID's
-nn      Show both textual and numeric ID's (names & numbers)
-q       Query the PCI ID database for unknown ID's via DNS
-qq      As above, but re-query locally cached entries
-Q       Query the PCI ID database for all ID's via DNS
```

Selection of devices:

```
-s [[:<domain>]:]<bus>[:<slot>][.[:<func>]]  Show only devices in selected slots
-d [<vendor>]:<device>                      Show only devices with specified ID's
```

Other options:

```
-i <file> Use specified ID database instead of /usr/share/misc/pci.ids.gz
-p <file> Look up kernel modules in a given file instead of default modules.pcimap
-M       Enable 'bus mapping' mode (dangerous; root only)
```

PCI access options:


```
-A <method>   Use the specified PCI access method (see '-A help' for a list)
-O <par>=<val> Set PCI access parameter (see '-O help' for a list)
-G           Enable PCI access debugging
-H <mode>     Use direct hardware access (<mode> = 1 or 2)
-F <file>    Read PCI configuration dump from a given file
```

La Commande lsusb

Cette commande vous renseigne sur les adaptateurs reliés au bus usb :

```
[root@centos7 ~]# lsusb
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 002 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub

[root@centos7 ~]# lsusb -vt
/: Bus 02.Port 1: Dev 1, Class=root_hub, Driver=ohci-pci/8p, 12M
/: Bus 01.Port 1: Dev 1, Class=root_hub, Driver=ehci-pci/8p, 480M
```

```
root@debian8:~# lsusb
Bus 001 Device 004: ID 80ee:0021 VirtualBox USB Tablet
Bus 001 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub

root@debian8:~# lsusb -vt
/: Bus 01.Port 1: Dev 1, Class=root_hub, Driver=ohci-pci/8p, 12M
   |__ Port 1: Dev 4, If 0, Class=Human Interface Device, Driver=usbhid, 12M
```

Options de la commande

Les options de cette commande sont :

```
[root@centos7 ~]# lsusb --help
```

```
Usage: lsusb [options]...
List USB devices
-v, --verbose
    Increase verbosity (show descriptors)
-s [[bus]:][devnum]
    Show only devices with specified device and/or
    bus numbers (in decimal)
-d vendor:[product]
    Show only devices with the specified vendor and
    product ID numbers (in hexadecimal)
-D device
    Selects which device lsusb will examine
-t, --tree
    Dump the physical USB device hierarchy as a tree
-V, --version
    Show version of program
-h, --help
    Show usage and help
```

```
root@debian8:~# lsusb --help
Usage: lsusb [options]...
List USB devices
-v, --verbose
    Increase verbosity (show descriptors)
-s [[bus]:][devnum]
    Show only devices with specified device and/or
    bus numbers (in decimal)
-d vendor:[product]
    Show only devices with the specified vendor and
    product ID numbers (in hexadecimal)
-D device
    Selects which device lsusb will examine
-t, --tree
    Dump the physical USB device hierarchy as a tree
```

```
-V, --version
    Show version of program
-h, --help
    Show usage and help
```

La Commande dmidecode

La commande **dmidecode** lit la table **DMI** (*Desktop Management Interface*) aussi appelée **SMBIOS** (*System Management BIOS*) et fourni les informations sur :

- l'état du matériel actuel,
- les extensions possibles.

```
[root@centos7 ~]# dmidecode
# dmidecode 2.12
SMBIOS 2.5 present.
10 structures occupying 450 bytes.
Table at 0x000E1000.

Handle 0x0000, DMI type 0, 20 bytes
BIOS Information
    Vendor: innotek GmbH
    Version: VirtualBox
    Release Date: 12/01/2006
    Address: 0xE0000
    Runtime Size: 128 kB
    ROM Size: 128 kB
    Characteristics:
        ISA is supported
        PCI is supported
        Boot from CD is supported
        Selectable boot is supported
        8042 keyboard services are supported (int 9h)
```

CGA/mono video services are supported (int 10h)
ACPI is supported

Handle 0x0001, DMI type 1, 27 bytes

System Information

Manufacturer: innotek GmbH
Product Name: VirtualBox
Version: 1.2
Serial Number: 0
UUID: DDEE345C-66F8-4250-B5A2-85CEF2C1C54D
Wake-up Type: Power Switch
SKU Number: Not Specified
Family: Virtual Machine

Handle 0x0008, DMI type 2, 15 bytes

Base Board Information

Manufacturer: Oracle Corporation
Product Name: VirtualBox
Version: 1.2
Serial Number: 0
Asset Tag: Not Specified
Features:
 Board is a hosting board
Location In Chassis: Not Specified
Chassis Handle: 0x0003
Type: Motherboard
Contained Object Handles: 0

Handle 0x0003, DMI type 3, 13 bytes

Chassis Information

Manufacturer: Oracle Corporation
Type: Other
Lock: Not Present
Version: Not Specified

```
Serial Number: Not Specified
Asset Tag: Not Specified
Boot-up State: Safe
Power Supply State: Safe
Thermal State: Safe
Security Status: None
```

```
Handle 0x0007, DMI type 126, 42 bytes
Inactive
```

```
Handle 0x0005, DMI type 126, 15 bytes
Inactive
```

```
Handle 0x0006, DMI type 126, 28 bytes
Inactive
```

```
Handle 0x0002, DMI type 11, 7 bytes
OEM Strings
  String 1: vboxVer_4.3.28
  String 2: vboxRev_100309
```

```
Handle 0x0008, DMI type 128, 8 bytes
OEM-specific Type
  Header and Data:
    80 08 08 00 01 15 21 00
```

```
Handle 0xFEFF, DMI type 127, 4 bytes
End Of Table
```

```
root@debian8:~# dmidecode
# dmidecode 2.12
SMBIOS 2.5 present.
10 structures occupying 450 bytes.
Table at 0x000E1000.
```

Handle 0x0000, DMI type 0, 20 bytes

BIOS Information

Vendor: innotek GmbH

Version: VirtualBox

Release Date: 12/01/2006

Address: 0xE0000

Runtime Size: 128 kB

ROM Size: 128 kB

Characteristics:

ISA is supported

PCI is supported

Boot from CD is supported

Selectable boot is supported

8042 keyboard services are supported (int 9h)

CGA/mono video services are supported (int 10h)

ACPI is supported

Handle 0x0001, DMI type 1, 27 bytes

System Information

Manufacturer: innotek GmbH

Product Name: VirtualBox

Version: 1.2

Serial Number: 0

UUID: 3AEF2B0F-3420-4DF3-A98F-211C945D7CCA

Wake-up Type: Power Switch

SKU Number: Not Specified

Family: Virtual Machine

Handle 0x0008, DMI type 2, 15 bytes

Base Board Information

Manufacturer: Oracle Corporation

Product Name: VirtualBox

Version: 1.2

Serial Number: 0

Asset Tag: Not Specified

Features:

Board is a hosting board

Location In Chassis: Not Specified

Chassis Handle: 0x0003

Type: Motherboard

Contained Object Handles: 0

Handle 0x0003, DMI type 3, 13 bytes

Chassis Information

Manufacturer: Oracle Corporation

Type: Other

Lock: Not Present

Version: Not Specified

Serial Number: Not Specified

Asset Tag: Not Specified

Boot-up State: Safe

Power Supply State: Safe

Thermal State: Safe

Security Status: None

Handle 0x0007, DMI type 126, 42 bytes

Inactive

Handle 0x0005, DMI type 126, 15 bytes

Inactive

Handle 0x0006, DMI type 126, 28 bytes

Inactive

Handle 0x0002, DMI type 11, 7 bytes

OEM Strings

String 1: vboxVer_4.3.28

String 2: vboxRev_100309

```
Handle 0x0008, DMI type 128, 8 bytes
OEM-specific Type
  Header and Data:
    80 08 08 00 F2 13 21 00

Handle 0xFEFF, DMI type 127, 4 bytes
End Of Table
```

Options de la commande

Les options de cette commande sont :

```
[root@centos7 ~]# dmidecode --help
Usage: dmidecode [OPTIONS]
Options are:
  -d, --dev-mem FILE      Read memory from device FILE (default: /dev/mem)
  -h, --help              Display this help text and exit
  -q, --quiet             Less verbose output
  -s, --string KEYWORD    Only display the value of the given DMI string
  -t, --type TYPE         Only display the entries of given type
  -u, --dump              Do not decode the entries
  --dump-bin FILE         Dump the DMI data to a binary file
  --from-dump FILE        Read the DMI data from a binary file
  -V, --version           Display the version and exit
```

```
root@debian8:~# dmidecode --help
Usage: dmidecode [OPTIONS]
Options are:
  -d, --dev-mem FILE      Read memory from device FILE (default: /dev/mem)
  -h, --help              Display this help text and exit
  -q, --quiet             Less verbose output
  -s, --string KEYWORD    Only display the value of the given DMI string
  -t, --type TYPE         Only display the entries of given type
```



```
-u, --dump          Do not decode the entries
--dump-bin FILE     Dump the DMI data to a binary file
--from-dump FILE     Read the DMI data from a binary file
-V, --version       Display the version and exit
```

Répertoire /proc

Le répertoire /proc contient des fichiers et des répertoires virtuels. Le contenu de ces fichiers est créé dynamiquement lors de la consultation. Seul root peut consulter la totalité des informations dans le répertoire /proc.

```
[root@centos7 ~]# ls /proc
1      217    260    2833   3085   465    5898      fb      sched_debug
10     22619   2605   2879   3091   478    5933      filesystems  scsi
11     22650   2606   2883   3104   482    5940      fs        self
12     228     261    2884   3108   484    60        interrupts  slabinfo
1215   229     262    29     3124   485    604       iomem     softirqs
1217   22908   263    2901   3172   488    698       ioports   stat
1227   230     264    2906   3185   490    7         irq       swaps
1228   232     265    2910   3304   492    7110      kallsyms  sys
1230   233     2671   2913   3496   494    8         kcore     sysrq-trigger
1264   23387   2676   2924   3543   495    83        keys      sysvipc
13     235     27     2926   363    5      9         key-users timer_list
1372   23580   2749   2931   370    502     acpi      kmsg      timer_stats
14     23916   2752   2937   372    503     asound    kpagecount tty
15     23998   2759   2948   38     508     buddyinfo kpageflags uptime
16     24      2762   2955   381    509     bus       loadavg   version
17     24013   2764   2967   40     519     cgroups   locks     vmallocinfo
1732   2427   2765   2971   41     521     cmdline   mdstat    vmstat
1744   248     2767   2973   414    525     consoles  meminfo   zoneinfo
17788  2486    2768   2983   431    530     cpuinfo   misc
18     25      2782   2985   432    536     crypto    modules
19     2586    2798   2988   433    549     devices   mounts
```

2	259	28	2998	434	586	diskstats	mtrr
20	2595	2802	3	436	587	dma	net
20638	2597	2806	3058	454	5894	driver	pagetypeinfo
21	26	2818	3084	458	5897	execdomains	partitions

```
root@debian8:~# ls /proc
```

1	1103	1238	170	30	68	957	execdomains	net
10	1104	124	18	31	69	959	fb	pagetypeinfo
1013	1106	1240	19	32	7	963	filesystems	partitions
1014	1108	125	2 33	71	966		fs	sched_debug
1023	1117	1251	20	424	72	975	interrupts	self
1024	1120	1277	21	434	73	979	iomem	slabinfo
1028	1127	1288	2180	439	74	980	ioports	softirqs
1029	1131	1294	2284	441	772	984	irq	stat
1032	1135	13	23	448	778	986	kallsyms	swaps
1033	1139	14	2305	450	781	acpi	kcore	sys
1040	1140	1409	2306	452	793	asound	keys	sysrq-trigger
1043	1142	15	232	457	798	buddyinfo	key-users	sysvipc
1045	1156	1572	236	460	8	bus	kmsg	timer_list
1049	1163	158	24	461	80	cgroups	kpagecount	timer_stats
1053	1165	16	2599	464	807	cmdline	kpageflags	tty
1056	1166	163	263	471	821	consoles	loadavg	uptime
1065	1171	1682	2635	472	838	cpuinfo	locks	version
1080	1177	1685	2737	497	843	crypto	meminfo	vmallocinfo
1081	12	1687	2772	498	9	devices	misc	vmstat
1084	1216	1693	2811	5	948	diskstats	modules	zoneinfo
1092	1228	1694	2834	66	949	dma	mounts	
11	1230	17	3	67	956	driver	mtrr	

Répertoires

ide/scsi

Ce répertoire contient des répertoires dans lesquels se trouvent des informations sur la capacité, le type et la géométrie des disques.

acpi

Ce répertoire contient des informations sur la gestion de l'énergie, les températures, les vitesses de ventilateurs, la charge des batteries.

bus

Ce répertoire contient un sous-répertoire par bus.

net

Ce répertoire contient des informations sur le réseau.

sys

Ce répertoire contient des paramètres du noyau. Certains des fichiers dans ce répertoire sont accessibles en écriture par root en temps réel. Par exemple pour éviter des attaques réseau **DoS** utilisant la commande **ping**, saisissez la commande suivante :

```
# echo 1 > /proc/sys/net/ipv4/icmp_echo_ignore_all [Entrée]
```

Cette commande a pour résultat d'ignorer les requêtes ping.

La commande sysctl

Les fichiers dans le répertoire **/proc/sys** peuvent être administrés par la commande **sysctl** en temps réel.

La commande **sysctl** applique les règles consignés dans le fichier **/etc/sysctl.conf** au démarrage de la machine.

Saisissez la commande :

```
[root@centos7 ~]# cat /etc/sysctl.conf
# System default settings live in /usr/lib/sysctl.d/00-system.conf.
# To override those settings, enter new settings here, or in an /etc/sysctl.d/<name>.conf file
#
# For more information, see sysctl.conf(5) and sysctl.d(5).

[root@centos7 ~]# cat /usr/lib/sysctl.d/00-system.conf
# Kernel sysctl configuration file
#
# For binary values, 0 is disabled, 1 is enabled.  See sysctl(8) and
# sysctl.conf(5) for more details.

# Disable netfilter on bridges.
net.bridge.bridge-nf-call-ip6tables = 0
net.bridge.bridge-nf-call-iptables = 0
net.bridge.bridge-nf-call-arptables = 0

# Controls the maximum shared segment size, in bytes
kernel.shmmax = 4294967295

# Controls the maximum number of shared memory segments, in pages

[root@centos7 ~]# ls -l /etc/sysctl.d/
total 0
lrwxrwxrwx. 1 root root 14 Jun  4 09:54 99-sysctl.conf -> ../sysctl.conf
```

```
[root@centos7 ~]# cat /etc/sysctl.d/99-sysctl.conf
# System default settings live in /usr/lib/sysctl.d/00-system.conf.
# To override those settings, enter new settings here, or in an /etc/sysctl.d/<name>.conf file
#
# For more information, see sysctl.conf(5) and sysctl.d(5).
```

```
root@debian8:~# cat /etc/sysctl.conf
#
# /etc/sysctl.conf - Configuration file for setting system variables
# See /etc/sysctl.d/ for additional system variables.
# See sysctl.conf (5) for information.
#

#kernel.domainname = example.com

# Uncomment the following to stop low-level messages on console
#kernel.printk = 3 4 1 3

#####3
# Functions previously found in netbase
#

# Uncomment the next two lines to enable Spoof protection (reverse-path filter)
# Turn on Source Address Verification in all interfaces to
# prevent some spoofing attacks
#net.ipv4.conf.default.rp_filter=1
#net.ipv4.conf.all.rp_filter=1

# Uncomment the next line to enable TCP/IP SYN cookies
# See http://lwn.net/Articles/277146/
# Note: This may impact IPv6 TCP sessions too
#net.ipv4.tcp_syncookies=1

# Uncomment the next line to enable packet forwarding for IPv4
```

```
#net.ipv4.ip_forward=1

# Uncomment the next line to enable packet forwarding for IPv6
# Enabling this option disables Stateless Address Autoconfiguration
# based on Router Advertisements for this host
#net.ipv6.conf.all.forwarding=1


#####
# Additional settings - these settings can improve the network
# security of the host and prevent against some network attacks
# including spoofing attacks and man in the middle attacks through
# redirection. Some network environments, however, require that these
# settings are disabled so review and enable them as needed.
#
# Do not accept ICMP redirects (prevent MITM attacks)
#net.ipv4.conf.all.accept_redirects = 0
#net.ipv6.conf.all.accept_redirects = 0
# _or_
# Accept ICMP redirects only for gateways listed in our default
# gateway list (enabled by default)
# net.ipv4.conf.all.secure_redirects = 1
#
# Do not send ICMP redirects (we are not a router)
#net.ipv4.conf.all.send_redirects = 0
#
# Do not accept IP source route packets (we are not a router)
#net.ipv4.conf.all.accept_source_route = 0
#net.ipv6.conf.all.accept_source_route = 0
#
# Log Martian Packets
#net.ipv4.conf.all.log_martians = 1
#
```

Options de la commande

Les options de la commande **sysctl** sont :

```
[root@centos7 ~]# sysctl --help
```

Usage:

```
sysctl [options] [variable[=value] ...]
```

Options:

-a, --all	display all variables
-A	alias of -a
-X	alias of -a
--deprecated	include deprecated parameters to listing
-b, --binary	print value without new line
-e, --ignore	ignore unknown variables errors
-N, --names	print variable names without values
-n, --values	print only values of a variables
-p, --load[=<file>]	read values from file
-f	alias of -p
--system	read values from all system directories
-r, --pattern <expression>	select setting that match expression
-q, --quiet	do not echo variable set
-w, --write	enable writing a value to variable
-o	does nothing
-x	does nothing
-d	alias of -h
-h, --help	display this help and exit
-V, --version	output version information and exit

For more details see `sysctl(8)`.

```
root@debian8:~# sysctl --help
```

Usage:

```
sysctl [options] [variable[=value] ...]
```

Options:

-a, --all	display all variables
-A	alias of -a
-X	alias of -a
--deprecated	include deprecated parameters to listing
-b, --binary	print value without new line
-e, --ignore	ignore unknown variables errors
-N, --names	print variable names without values
-n, --values	print only values of a variables
-p, --load[=<file>]	read values from file
-f	alias of -p
--system	read values from all system directories
-r, --pattern <expression>	select setting that match expression
-q, --quiet	do not echo variable set
-w, --write	enable writing a value to variable
-o	does nothing
-x	does nothing
-d	alias of -h
-h, --help	display this help and exit
-V, --version	output version information and exit

For more details see `sysctl(8)`.



Important : Consultez la page de la traduction du manuel de **sysctl** [ici](#) pour comprendre la commande.

Fichiers

Processeur

```
[root@centos7 ~]# cat /proc/cpuinfo
processor      : 0
vendor_id     : GenuineIntel
cpu family    : 6
model         : 55
model name    : Intel(R) Celeron(R) CPU  N2840  @ 2.16GHz
stepping      : 8
microcode     : 0x19
cpu MHz       : 2167.721
cache size    : 6144 KB
physical id   : 0
siblings      : 1
core id       : 0
cpu cores     : 1
apicid        : 0
initial apicid : 0
fpu           : yes
fpu_exception : yes
cpuid level   : 5
wp            : yes
flags         : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2
syscall nx    rdtscp lm constant_tsc rep_good nopl pni monitor ssse3 lahf_lm
bogomips      : 4335.44
clflush size   : 64
cache_alignment : 64
address sizes  : 36 bits physical, 48 bits virtual
power management:
```

```
root@debian8:~# cat /proc/cpuinfo
```

```
processor      : 0
vendor_id     : GenuineIntel
cpu family    : 6
model         : 55
model name    : Intel(R) Celeron(R) CPU  N2840  @ 2.16GHz
stepping      : 8
microcode     : 0x19
cpu MHz       : 2167.709
cache size    : 6144 KB
physical id   : 0
siblings      : 1
core id       : 0
cpu cores     : 1
apicid        : 0
initial apicid : 0
fdiv_bug      : no
f00f_bug      : no
coma_bug      : no
fpu           : yes
fpu_exception : yes
cpuid level   : 5
wp            : yes
flags         : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2
nx rdtscp constant_tsc pni monitor ssse3
bogomips      : 4335.41
clflush size  : 64
cache_alignment : 64
address sizes  : 36 bits physical, 48 bits virtual
power management:
```

Interruptions système

```
[root@centos7 ~]# cat /proc/interrupts
```

```

CPU0
0:      189  IO-APIC-edge    timer
1:     5890  IO-APIC-edge    i8042
8:        0  IO-APIC-edge    rtc0
9:        1  IO-APIC-fasteoi   acpi
12:    22452  IO-APIC-edge    i8042
14:        0  IO-APIC-edge    ata_piix
15:    13891  IO-APIC-edge    ata_piix
19:    25816  IO-APIC-fasteoi   ehci_hcd:usb1, enp0s3
20:   119352  IO-APIC-fasteoi   vboxguest
21:    33754  IO-APIC-fasteoi   ahci, snd_intel8x0
22:        0  IO-APIC-fasteoi   ohci_hcd:usb2
NMI:        0  Non-maskable interrupts
LOC:   1630315  Local timer interrupts
SPU:        0  Spurious interrupts
PMI:        0  Performance monitoring interrupts
IWI:    83206  IRQ work interrupts
RTR:        0  APIC ICR read retries
RES:        0  Rescheduling interrupts
CAL:        0  Function call interrupts
TLB:        0  TLB shootdowns
TRM:        0  Thermal event interrupts
THR:        0  Threshold APIC interrupts
MCE:        0  Machine check exceptions
MCP:        48  Machine check polls
ERR:        0
MIS:        0

```

```
root@debian8:~# cat /proc/interrupts
```

```

CPU0
0:      43  XT-PIC-XT-PIC    timer
1:   15159  XT-PIC-XT-PIC    i8042
2:        0  XT-PIC-XT-PIC    cascade
8:        0  XT-PIC-XT-PIC    rtc0

```

9:	83729	XT-PIC-XT-PIC	acpi, vboxguest
10:	20664	XT-PIC-XT-PIC	eth0
11:	27534	XT-PIC-XT-PIC	ohci_hcd:usb1, ahci, snd_intel8x0
12:	16216	XT-PIC-XT-PIC	i8042
14:	0	XT-PIC-XT-PIC	ata_piix
15:	7427	XT-PIC-XT-PIC	ata_piix
NMI:	0	Non-maskable interrupts	
LOC:	969554	Local timer interrupts	
SPU:	0	Spurious interrupts	
PMI:	0	Performance monitoring interrupts	
IWI:	0	IRQ work interrupts	
RTR:	0	APIC ICR read retries	
RES:	0	Rescheduling interrupts	
CAL:	0	Function call interrupts	
TLB:	0	TLB shootdowns	
TRM:	0	Thermal event interrupts	
THR:	0	Threshold APIC interrupts	
MCE:	0	Machine check exceptions	
MCP:	25	Machine check polls	
HYP:	0	Hypervisor callback interrupts	
ERR:	0		
MIS:	0		



Important : Un pilote de périphérique demande au processeur de fournir un service en utilisant un IRQ. Quand la demande est faite, le processeur interrompt ses activités et passe le contrôle au pilote identifié par l'IRQ. Techniquement l'attribution d'un IRQ à un périphérique doit être exclusive. Dans le cas où deux périphériques demandent un service en même temps, c'est le périphérique ayant l'IRQ le plus bas qui est prioritaire.

Canaux DMA

```
[root@centos7 ~]# cat /proc/dma
4: cascade
```

```
root@debian8:~# cat /proc/dma
4: cascade
```

Plages d'entrée/sortie

```
[root@centos7 ~]# cat /proc/ioports | more
0000-001f : dma1
0020-0021 : pic1
0040-0043 : timer0
0050-0053 : timer1
0060-0060 : keyboard
0064-0064 : keyboard
0070-0071 : rtc_cmos
    0070-0071 : rtc0
0080-008f : dma page reg
00a0-00a1 : pic2
00c0-00df : dma2
00f0-00ff : fpu
0170-0177 : 0000:00:01.1
    0170-0177 : ata_piix
01f0-01f7 : 0000:00:01.1
    01f0-01f7 : ata_piix
0376-0376 : 0000:00:01.1
    0376-0376 : ata_piix
03c0-03df : vga+
03f6-03f6 : 0000:00:01.1
    03f6-03f6 : ata_piix
```

```
0cf8-0cff : PCI conf1
4000-4003 : ACPI PM1a_EVT_BLK
--More--
```

```
root@debian8:~# cat /proc/ioports | more
0000-001f : dma1
0020-0021 : pic1
0040-0043 : timer0
0050-0053 : timer1
0060-0060 : keyboard
0064-0064 : keyboard
0070-0071 : rtc_cmos
    0070-0071 : rtc0
0080-008f : dma page reg
00a0-00a1 : pic2
00c0-00df : dma2
00f0-00ff : fpu
0170-0177 : 0000:00:01.1
    0170-0177 : ata_piix
01f0-01f7 : 0000:00:01.1
    01f0-01f7 : ata_piix
0376-0376 : 0000:00:01.1
    0376-0376 : ata_piix
03c0-03df : vga+
03f6-03f6 : 0000:00:01.1
    03f6-03f6 : ata_piix
0cf8-0cff : PCI conf1
4000-4003 : ACPI PM1a_EVT_BLK
--More--
```



Si deux périphériques ont le même port, les **deux** périphériques seront inutilisables.

Périphériques

```
[root@centos7 ~]# cat /proc/devices
```

Character devices:

```
1 mem
4 /dev/vc/0
4 tty
4 ttyS
5 /dev/tty
5 /dev/console
5 /dev/ptmx
6 lp
7 vcs
10 misc
13 input
14 sound
29 fb
99 ppdev
116 alsa
128 ptm
136 pts
162 raw
180 usb
188 ttyUSB
189 usb_device
202 cpu/msr
203 cpu/cpuid
226 drm
250 hidraw
251 usbmon
252 bsg
253 watchdog
254 rtc
```

Block devices:

259 blkext

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

135 sd

253 device-mapper

254 mdp

root@debian8:~# cat /proc/devices

Character devices:

1 mem

4 /dev/vc/0

4 tty

4 ttyS

5 /dev/tty

5 /dev/console

5 /dev/ptmx

6 lp

7 vcs


```
10 misc
13 input
21 sg
29 fb
99 ppdev
116 alsa
128 ptm
136 pts
180 usb
189 usb_device
226 drm
251 hidraw
252 bsg
253 watchdog
254 rtc
```

Block devices:

```
259 blkext
 8 sd
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
```

135 sd

Modules

```
[root@centos7 ~]# cat /proc/modules | more
tcp_lp 12663 0 - Live 0xfffffffffa059d000
lp 17759 0 - Live 0xfffffffffa0593000
nls_utf8 12557 1 - Live 0xfffffffffa0527000
isofs 39844 1 - Live 0xfffffffffa0588000
bnep 19704 2 - Live 0xfffffffffa0516000
bluetooth 372662 7 bnep, Live 0xfffffffffa052c000
rfkill 26536 3 bluetooth, Live 0xfffffffffa051f000
fuse 87741 3 - Live 0xfffffffffa04ff000
ip6t_rpfilter 12546 1 - Live 0xfffffffffa04fa000
ip6t_REJECT 12939 2 - Live 0xfffffffffa04f5000
ipt_REJECT 12541 2 - Live 0xfffffffffa04f0000
xt_conntrack 12760 7 - Live 0xfffffffffa04e6000
ebtable_nat 12807 0 - Live 0xfffffffffa04e1000
ebtable_broute 12731 0 - Live 0xfffffffffa04eb000
bridge 115385 1 ebtable_broute, Live 0xfffffffffa04c3000
stp 12976 1 bridge, Live 0xfffffffffa04be000
llc 14552 2 bridge,stp, Live 0xfffffffffa04b5000
ebtable_filter 12827 0 - Live 0xfffffffffa04b0000
ebtables 30913 3 ebtable_nat,ebtable_broute,ebtable_filter, Live 0xfffffffffa04a3000
ip6table_nat 12864 1 - Live 0xfffffffffa049e000
nf_conntrack_ipv6 18738 5 - Live 0xfffffffffa0498000
nf_defrag_ipv6 34651 1 nf_conntrack_ipv6, Live 0xfffffffffa048a000
--More--
```

```
root@debian8:~# cat /proc/modules | more
cfg80211 350041 0 - Live 0xf9426000
rfkill 18387 1 cfg80211, Live 0xf92ae000
```

```
vboxsf 36590 0 - Live 0xf81f1000 (0)
nfsd 236959 2 - Live 0xf9360000
auth_rpcgss 45765 1 nfsd, Live 0xf81e4000
oid_registry 12387 1 auth_rpcgss, Live 0xf8064000
nfs_acl 12463 1 nfsd, Live 0xf7ff7000
nfs 168022 0 - Live 0xf9335000
lockd 73443 2 nfsd,nfs, Live 0xf8137000
fscache 44782 1 nfs, Live 0xf8096000
sunrpc 211341 6 nfsd,auth_rpcgss,nfs_acl,nfs,lockd, Live 0xf9300000
joydev 16847 0 - Live 0xf8193000
snd_intel8x0 30521 2 - Live 0xf812e000
snd_ac97_codec 96151 1 snd_intel8x0, Live 0xf8150000
snd_pcm 78128 2 snd_intel8x0,snd_ac97_codec, Live 0xf816e000
snd_timer 22010 1 snd_pcm, Live 0xf808f000
snd 55101 8 snd_intel8x0,snd_ac97_codec,snd_pcm,snd_timer, Live 0xf80a5000
soundcore 12890 1 snd, Live 0xf8069000
ac97_bus 12462 1 snd_ac97_codec, Live 0xf805f000
vboxvideo 12405 1 - Live 0xf8055000 (0)
pcspkr 12531 0 - Live 0xf7e1b000
drm 203555 3 vboxvideo, Live 0xf9202000
psmouse 93505 0 - Live 0xf8077000
--More--
```

Statistiques de l'utilisation des disques

```
[root@centos7 ~]# cat /proc/diskstats
```

```
11      0 sr0 21 0 132 157 0 0 0 0 0 157 157
 8      0 sda 19700 638 2178341 386424 13324 1605 547086 356748 0 164849 740706
 8      1 sda1 2129 0 9438 2181 2057 0 4122 392 0 2527 2569
 8      2 sda2 17213 598 2165719 382957 11202 1605 542964 356316 0 164048 736814
 8      3 sda3 170 31 1608 775 0 0 0 0 0 775 775
```

```
root@debian8:~# cat /proc/diskstats
```

```

 8      0 sda 18987 11031 1082886 269752 13611 11447 380664 169532 0 123708 438044
 8      1 sda1 18763 10780 1079098 268224 13480 11316 379544 168960 0 123396 435948
 8      2 sda2 2 0 4 120 0 0 0 0 0 120 120
 8      5 sda5 99 141 1920 1212 9 131 1120 136 0 1316 1348
11      0 sr0 0 0 0 0 0 0 0 0 0 0 0

```

Partitions

```

[root@centos7 ~]# cat /proc/partitions
major minor #blocks name

```

```

11      0      56876 sr0
 8      0 20971520 sda
 8      1    204800 sda1
 8      2 7168000 sda2
 8      3 3072000 sda3

```

```

root@debian8:~# cat /proc/partitions
major minor #blocks name

```

```

 8      0 20971520 sda
 8      1 9764864 sda1
 8      2          1 sda2
 8      5 1951744 sda5
11      0 1048575 sr0

```

Espaces de pagination

```

[root@centos7 ~]# cat /proc/swaps

```

Filename	Type	Size	Used	Priority
----------	------	------	------	----------

```
/dev/sda3                partition    3071996    0    -1

root@debian8:~# cat /proc/swaps
Filename                Type      Size      Used      Priority
/dev/sda5                partition 1951740    500      -1
```

Statistiques d'utilisation du processeur

```
[root@centos7 ~]# cat /proc/loadavg
1.82 1.07 0.81 3/379 25349
```

```
root@debian8:~# cat /proc/loadavg
0.77 0.80 0.76 2/290 2984
```

Statistiques d'utilisation de la mémoire

```
[root@centos7 ~]# cat /proc/meminfo
MemTotal:        1791624 kB
MemFree:          72272 kB
MemAvailable:    769436 kB
Buffers:           404 kB
Cached:          790132 kB
SwapCached:         0 kB
Active:          1002556 kB
Inactive:         529520 kB
Active(anon):     620404 kB
Inactive(anon):   131808 kB
Active(file):     382152 kB
Inactive(file):   397712 kB
Unevictable:         0 kB
Mlocked:          0 kB
```

```
SwapTotal:      3071996 kB
SwapFree:       3071992 kB
Dirty:          35168 kB
Writeback:       0 kB
AnonPages:      741568 kB
Mapped:         138756 kB
Shmem:          10664 kB
Slab:           98304 kB
SReclaimable:   59848 kB
SUnreclaim:     38456 kB
KernelStack:    5808 kB
PageTables:     24140 kB
NFS_Unstable:   0 kB
Bounce:         0 kB
WritebackTmp:   0 kB
CommitLimit:    3967808 kB
Committed_AS:   3006392 kB
VmallocTotal:   34359738367 kB
VmallocUsed:     28612 kB
VmallocChunk:   34359706684 kB
HardwareCorrupted: 0 kB
AnonHugePages:  256000 kB
HugePages_Total: 0
HugePages_Free:  0
HugePages_Rsvd:  0
HugePages_Surp:  0
Hugepagesize:    2048 kB
DirectMap4k:     75712 kB
DirectMap2M:     1759232 kB
```

```
root@debian8:~# cat /proc/meminfo
MemTotal:        1031864 kB
MemFree:          79924 kB
MemAvailable:     404848 kB
```

```
Buffers:          74112 kB
Cached:           362824 kB
SwapCached:        208 kB
Active:            613740 kB
Inactive:          284400 kB
Active(anon):      397624 kB
Inactive(anon):    74292 kB
Active(file):      216116 kB
Inactive(file):    210108 kB
Unevictable:       32 kB
Mlocked:           32 kB
HighTotal:         141256 kB
HighFree:          10240 kB
LowTotal:          890608 kB
LowFree:           69684 kB
SwapTotal:         1951740 kB
SwapFree:          1951240 kB
Dirty:             0 kB
Writeback:         0 kB
AnonPages:         461060 kB
Mapped:            182132 kB
Shmem:             10716 kB
Slab:              36092 kB
SReclaimable:      26548 kB
SUnreclaim:        9544 kB
KernelStack:       2312 kB
PageTables:        5880 kB
NFS_Unstable:      0 kB
Bounce:            0 kB
WritebackTmp:      0 kB
CommitLimit:       2467672 kB
Committed_AS:      2087760 kB
VmallocTotal:      122880 kB
VmallocUsed:        21900 kB
```

```
VmallocChunk:      99844 kB
HardwareCorrupted:    0 kB
AnonHugePages:       0 kB
HugePages_Total:      0
HugePages_Free:       0
HugePages_Rsvd:       0
HugePages_Surp:       0
Hugepagesize:        2048 kB
DirectMap4k:         34808 kB
DirectMap2M:         872448 kB
```

Version du noyau

```
[root@centos7 ~]# cat /proc/version
Linux version 3.10.0-229.4.2.el7.x86_64 (builder@kbuilder.dev.centos.org) (gcc version 4.8.2 20140120 (Red Hat 4.8.2-16) (GCC) ) #1 SMP Wed May 13 10:06:09 UTC 2015
```

```
root@debian8:~# cat /proc/version
Linux version 3.16.0-4-686-pae (debian-kernel@lists.debian.org) (gcc version 4.8.4 (Debian 4.8.4-1) ) #1 SMP
Debian 3.16.7-ckt11-1+deb8u5 (2015-10-09)
```

Interprétation des informations dans /proc

Les informations brutes stockées dans /proc peuvent être interprétées grâce à l'utilisation des commandes dites de *gestion des performances* :

- free,
- uptime et w,
- iostat,
- vmstat,
- mpstat,
- sar.

Commandes

free

La commande **free** permet de donner l'état de la mémoire totale, libre, partagée, swap et bufferisée. Saisissez donc la commande suivante :

```
[root@centos7 ~]# free -m
```

	total	used	free	shared	buff/cache	available
Mem:	1749	859	76	6	813	707
Swap:	2999	3	2996			

```
root@debian8:~# free -m
```

	total	used	free	shared	buffers	cached
Mem:	1007	930	76	10	72	354
-/+ buffers/cache:		503	503			
Swap:	1905	0	1905			

Dans le cas de ce dernier exemple, nous pouvons constater que l'affichage montre :

- 1007 Mo de mémoire physique totale,
- 930 Mo de mémoire physique utilisée et 76 Mo de mémoire physique libre,
- 1999 Mo de mémoire swap totale et 0 Mo de swap utilisé

La ligne **-/+ buffers/cache:** indique que les applications utilisent 503 Mo et qu'elles disposent de 503 (502) Mo de mémoire libre (72+354+76).

Les options de cette commande sont :

```
[root@centos7 ~]# free --help
```

```
Usage:
  free [options]
```

```
Options:
```

```
-b, --bytes      show output in bytes
-k, --kilo       show output in kilobytes
-m, --mega       show output in megabytes
-g, --giga       show output in gigabytes
    --tera       show output in terabytes
-h, --human      show human-readable output
    --si         use powers of 1000 not 1024
-l, --lohi       show detailed low and high memory statistics
-t, --total      show total for RAM + swap
-s N, --seconds N repeat printing every N seconds
-c N, --count N  repeat printing N times, then exit
-w, --wide       wide output

    --help       display this help and exit
-V, --version    output version information and exit
```

For more details see `free(1)`.

```
root@debian8:~# free --help
```

Usage:

```
free [options]
```

Options:

```
-b, --bytes      show output in bytes
-k, --kilo       show output in kilobytes
-m, --mega       show output in megabytes
-g, --giga       show output in gigabytes
    --tera       show output in terabytes
-h, --human      show human-readable output
    --si         use powers of 1000 not 1024
-l, --lohi       show detailed low and high memory statistics
-o, --old        use old format (without -/+buffers/cache line)
-t, --total      show total for RAM + swap
```

```
-s N, --seconds N    repeat printing every N seconds
-c N, --count N      repeat printing N times, then exit
```

```
--help      display this help and exit
-V, --version output version information and exit
```

For more details see `free(1)`.

uptime ou w

Chacune des ces commandes indique la charge moyenne du ou des processeurs depuis 1 minute, 5 minutes et 15 minutes :

```
[root@centos7 ~]# uptime
14:43:46 up 4:05, 2 users, load average: 0.92, 1.23, 0.95
```

```
[root@centos7 ~]# w
14:43:49 up 4:05, 2 users, load average: 0.92, 1.23, 0.95
USER      TTY      FROM          LOGIN@  IDLE   JCPU   PCPU WHAT
trainee   :0        :0            Wed09   ?xdm?  40:01  0.74s gdm-session-worker [pam/gdm-password]
trainee   pts/0     :0            Wed10   5.00s  0.65s 26.90s /usr/libexec/gnome-terminal-server
```

```
root@debian8:~# uptime
09:37:06 up 2:31, 3 users, load average: 0.67, 0.34, 0.45
```

```
root@debian8:~# w
09:37:08 up 2:31, 3 users, load average: 0.67, 0.34, 0.45
USER      TTY      FROM          LOGIN@  IDLE   JCPU   PCPU WHAT
trainee   :0        :0            Sun08   ?xdm?  44:35  1.13s x-session-manager
trainee   pts/0     :0            Sun08   3.00s  0.56s 44.83s /usr/lib/gnome-terminal/gnome-terminal-server
trainee   pts/1     :0            Sun09   24.00s 0.40s 44.83s /usr/lib/gnome-terminal/gnome-terminal-server
```

Les valeurs **load average** ou *charge moyenne* indiquent le nombre moyen de processus en cours de traitement ou en attente pour la période

concernée.

Par exemple si les valeurs sur un système muni d'un seul processeur étaient **3,48 4,00 3,85** ceci indiquerait que le processeur a du mal à traiter les processus mettant en moyenne :

- 2,48 processus en attente dans la dernière minute,
- 3,00 processus en attente dans les dernières 5 minutes,
- 2,85 processus en attente dans les dernières 15 minutes.

Les options de ces commandes sont :

```
[root@centos7 ~]# uptime --help
```

Usage:

uptime [options]

Options:

-p, --pretty show uptime in pretty format
-h, --help display this help and exit
-s, --since system up since
-V, --version output version information and exit

For more details see uptime(1).

```
[root@centos7 ~]# w --help
```

Usage:

w [options]

Options:

-h, --no-header do not print header
-u, --no-current ignore current process username
-s, --short short format
-f, --from show remote hostname field

```
-o, --old-style      old style output
-i, --ip-addr        display IP address instead of hostname (if possible)

--help              display this help and exit
-V, --version        output version information and exit
```

For more details see `w(1)`.

```
root@debian8:~# uptime --help
```

Usage:

```
uptime [options]
```

Options:

```
-p, --pretty      show uptime in pretty format
-h, --help        display this help and exit
-s, --since       system up since
-V, --version     output version information and exit
```

For more details see `uptime(1)`.

```
root@debian8:~# w --help
```

Usage:

```
w [options]
```

Options:

```
-h, --no-header      do not print header
-u, --no-current     ignore current process username
-s, --short          short format
-f, --from           show remote hostname field
-o, --old-style      old style output
-i, --ip-addr        display IP address instead of hostname (if possible)
```

```
--help      display this help and exit
-V, --version  output version information and exit
```

For more details see w(1).

iostat

La commande **iostat** affiche des statistiques sur l'utilisation des disques, des terminaux et des lecteurs de cartouche :

```
[root@centos7 ~]# iostat
Linux 3.10.0-229.4.2.el7.x86_64 (centos7.fenestros.loc)      11/02/2015      _x86_64_      (1 CPU)

avg-cpu:  %user   %nice %system %iowait  %steal   %idle
           9.00    0.14   2.67   0.29   0.00   87.90

Device:            tps    kB_read/s    kB_wrtn/s    kB_read    kB_wrtn
sdd0                0.00         0.00         0.00         66         0
sda                 2.56        95.04        37.09      1409026      549881
```

Sous Debian 8 les commandes **iostat**, **mpstat** et **sar** ne sont pas disponibles par défaut. Installez donc le paquet **sysstat** :

```
root@debian8:~# apt-get install sysstat
Reading package lists... Done
Building dependency tree
Reading state information... Done
Suggested packages:
  isag
The following NEW packages will be installed:
  sysstat
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 290 kB of archives.
After this operation, 1,390 kB of additional disk space will be used.
```

```
Get:1 http://ftp.fr.debian.org/debian/ jessie/main sysstat i386 11.0.1-1 [290 kB]
Fetched 290 kB in 5s (53.4 kB/s)
Preconfiguring packages ...
Selecting previously unselected package sysstat.
(Reading database ... 167520 files and directories currently installed.)
Preparing to unpack .../sysstat_11.0.1-1_i386.deb ...
Unpacking sysstat (11.0.1-1) ...
Processing triggers for man-db (2.7.0.2-5) ...
Processing triggers for systemd (215-17+deb8u2) ...
Setting up sysstat (11.0.1-1) ...

Creating config file /etc/default/sysstat with new version
update-alternatives: using /usr/bin/sar.sysstat to provide /usr/bin/sar (sar) in auto mode
Processing triggers for systemd (215-17+deb8u2) ...
```

Exécutez maintenant la commande **iostat** :

```
root@debian8:~# iostat
Linux 3.16.0-4-686-pae (debian8)      11/02/2015      _i686_      (1 CPU)

avg-cpu:  %user   %nice %system %iowait  %steal   %idle
           27.19    0.00    5.79    0.80    0.00   66.22

Device:            tps    kB_read/s    kB_wrtn/s    kB_read    kB_wrtn
sda                 4.58         69.17        29.19      613071      258736
```

Au-dessous de la première ligne indiquant la version du noyau du système et son nom d'hôte ainsi que la date actuelle, iostat affiche une vue d'ensemble de l'utilisation CPU moyenne du système depuis le dernier démarrage. Le rapport d'utilisation du CPU inclut les pourcentages suivants :

- Pourcentage de temps passé en mode utilisateur (exécutant des applications, etc.)
- Pourcentage de temps passé en mode utilisateur (pour les processus qui ont modifié leur priorité de programmation à l'aide de la commande nice)
- Pourcentage de temps passé en mode noyau
- Pourcentage de temps passé en inactivité

Notez la valeur de **%iowait**. Dans le cas où ce pourcentage est trop élevé, ceci indique que le processeur passe son temps à attendre les entrées et les sorties de disque.

Pour surveiller la vitesse des entrées et des sorties du disque, vous pouvez utiliser la commande **hdparm**.

Sous RHEL/CentOS 7, la commande **hdparm** n'est pas disponible par défaut. Installez donc le paquet **hdparm** :

```
[root@centos7 ~]# yum install hdparm
Loaded plugins: fastestmirror, langpacks
Loading mirror speeds from cached hostfile
 * base: mirror.in2p3.fr
 * extras: distrib-coffee.ipsl.jussieu.fr
 * updates: distrib-coffee.ipsl.jussieu.fr
Resolving Dependencies
--> Running transaction check
---> Package hdparm.x86_64 0:9.43-5.el7 will be installed
--> Finished Dependency Resolution
```

Dependencies Resolved

```
=====
Package Arch Version
Repository Size
=====
Installing:
hdparm x86_64 9.43-5.el7
base 83 k
```

Transaction Summary

```
=====
Install 1 Package
```



```
Total download size: 83 k
Installed size: 152 k
Is this ok [y/d/N]: y
Downloading packages:
hdparm-9.43-5.el7.x86_64.rpm
| 83 kB 00:00:00
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Installing : hdparm-9.43-5.el7.x86_64
1/1
  Verifying   : hdparm-9.43-5.el7.x86_64
1/1

Installed:
  hdparm.x86_64 0:9.43-5.el7

Complete!
```

```
[root@centos7 ~]# hdparm -t /dev/sda

/dev/sda:
Timing buffered disk reads: 254 MB in 3.02 seconds = 84.19 MB/sec
```

Sous Debian 8, la commande **hdparm** n'est pas disponible par défaut. Installez donc le paquet **hdparm** :

```
root@debian8:~# apt-get install hdparm
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  powermgmt-base
Suggested packages:
```

```
apmd
The following NEW packages will be installed:
  hdparm powermgmt-base
0 upgraded, 2 newly installed, 0 to remove and 0 not upgraded.
Need to get 118 kB of archives.
After this operation, 263 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://ftp.fr.debian.org/debian/ jessie/main hdparm i386 9.43-2 [109 kB]
Get:2 http://ftp.fr.debian.org/debian/ jessie/main powermgmt-base all 1.31+nmu1 [9,240 B]
Fetched 118 kB in 0s (264 kB/s)
Selecting previously unselected package hdparm.
(Reading database ... 167600 files and directories currently installed.)
Preparing to unpack .../hdparm_9.43-2_i386.deb ...
Unpacking hdparm (9.43-2) ...
Selecting previously unselected package powermgmt-base.
Preparing to unpack .../powermgmt-base_1.31+nmu1_all.deb ...
Unpacking powermgmt-base (1.31+nmu1) ...
Processing triggers for systemd (215-17+deb8u2) ...
Processing triggers for man-db (2.7.0.2-5) ...
Setting up hdparm (9.43-2) ...
update-rc.d: warning: start and stop actions are no longer supported; falling back to defaults
Setting up powermgmt-base (1.31+nmu1) ...
Processing triggers for systemd (215-17+deb8u2) ...
```

Exécutez maintenant la commande **hdparm** :

```
root@debian8:~# hdparm -t /dev/sda

/dev/sda:
Timing buffered disk reads: 228 MB in 3.13 seconds = 72.76 MB/sec
```

Au-dessous du rapport d'utilisation du CPU de la sortie de la commande **iostat** figure le rapport d'utilisation des périphériques. Ce dernier contient une ligne pour chaque périphérique disque du système et inclut les informations suivantes :

- La spécification du périphérique, apparaissant sous la forme dev<major-number>-sequence-number où <major-number> correspond au nombre majeur du périphérique et <sequence-number> correspond à un numéro de séquence commençant par zéro.
- Le nombre de transferts (ou opérations d'E/S) par seconde.
- Le nombre de blocs de 512 octets lus par seconde.
- Le nombre de blocs de 512 octets écrits par seconde.
- Le nombre total de blocs de 512 octets lus par seconde.
- Le nombre total de blocs de 512 octets écrits par seconde.

Les options de cette commande sont :

```
[root@centos7 ~]# iostat --help
Usage: iostat [ options ] [ <interval> [ <count> ] ]
Options are:
[ -c ] [ -d ] [ -h ] [ -k | -m ] [ -N ] [ -t ] [ -V ] [ -x ] [ -y ] [ -z ]
[ -j { ID | LABEL | PATH | UUID | ... } ]
[ [ -T ] -g <group_name> ] [ -p [ <device> [,...] | ALL ] ]
[ <device> [...] | ALL ]
```

```
root@debian8:~# iostat --help
Usage: iostat [ options ] [ <interval> [ <count> ] ]
Options are:
[ -c ] [ -d ] [ -h ] [ -k | -m ] [ -N ] [ -t ] [ -V ] [ -x ] [ -y ] [ -z ]
[ -j { ID | LABEL | PATH | UUID | ... } ]
[ [ -T ] -g <group_name> ] [ -p [ <device> [,...] | ALL ] ]
[ <device> [...] | ALL ]
```

vmstat

La commande **vmstat** affiche des statistiques sur la mémoire, la pagination et la charge ponctuelle du processeur :

```
[root@centos7 ~]# vmstat 1 10
procs -----memory----- ---swap-- -----io----- -system-- -----cpu-----
 r  b   swpd   free   buff  cache   si   so    bi    bo    in   cs us sy id wa st
```

5	0	4600	352560	20	620332	0	0	114	37	157	236	9	3	88	0	0
1	0	4600	352736	20	620368	0	0	0	0	231	310	29	7	63	0	0
0	0	4600	352736	20	620368	0	0	0	0	223	318	32	7	60	0	0
1	0	4600	352776	20	620328	0	0	0	0	250	339	34	9	57	0	0
0	0	4600	352776	20	620328	0	0	0	0	215	285	30	9	61	0	0
0	0	4600	352776	20	620328	0	0	0	0	234	326	31	7	61	0	0
1	0	4600	352776	20	620328	0	0	0	0	219	306	31	8	62	0	0
0	0	4600	352776	20	620328	0	0	0	0	223	298	29	7	63	0	0
0	0	4600	352776	20	620328	0	0	0	0	223	314	32	7	60	0	0
1	0	4600	352776	20	620332	0	0	0	0	238	309	34	7	59	0	0

```
root@debian8:~# vmstat 1 10
```

```
procs -----memory----- ---swap-- -----io----- -system-- -----cpu-----
 r  b    swpd    free    buff    cache    si    so    bi    bo    in    cs  us  sy  id  wa  st
 2  0    4004  255664  19164  229560    0    0   92   33  159  722  27   6  66   1   0
 0  0    4004  261608  19164  229584    0    0    0    0  156  861  51   8  41   0   0
 0  0    4004  261608  19164  229584    0    0    0    0  146 1009  34   7  60   0   0
 1  0    4004  258104  19164  229584    0    0    0    0  141 1021  32   8  59   0   0
 0  0    4004  261608  19164  229584    0    0    0    0  133  724  31   7  62   0   0
 0  0    4004  261616  19164  229584    0    0    0    0  141 1009  29  10  61   0   0
 2  0    4004  258076  19164  229584    0    0    0    0  142 1033  33   7  60   0   0
 0  0    4004  261560  19164  229584    0    0    0   20  139  746  31   6  62   0   0
 0  0    4004  261332  19164  229584    0    0    0    0  140  988  32   9  60   0   0
 1  0    4004  257984  19164  229584    0    0    0    0  136  980  34   5  61   0   0
```

La première ligne subdivise le champ en six catégories à savoir : processus, mémoire, swap, E/S, système et CPU sur lesquelles elle donne des statistiques. La seconde ligne identifie de manière encore plus détaillée chacun des champs, permettant ainsi de parcourir simplement et rapidement l'ensemble des données lors de la recherche de statistiques spécifiques.

Les champs relatifs aux processus sont les suivants :

- r — Le nombre de processus exécutables attendant d'avoir accès au CPU
- b — Le nombre de processus exécutables dans un état de veille qui ne peut être interrompu

Les champs relatifs à la mémoire sont les suivants :

- swpd — La quantité de mémoire virtuelle utilisée
- free — La quantité de mémoire libre
- buff — La quantité de mémoire utilisée par les tampons (ou buffers)
- cache — La quantité de mémoire utilisée comme cache de pages

Les champs relatifs au swap sont les suivants :

- si — La quantité de mémoire chargée depuis le disque
- so — La quantité de mémoire déchargée sur le disque

Les champs relatifs aux Entrées/Sorties (E/S) sont les suivants :

- bi — Blocs envoyés vers un périphérique blocs
- bo — Blocs reçus d'un périphérique blocs

Les champs relatifs au système sont les suivants :

- in — Nombre d'interruptions par seconde
- cs — Nombre de changements de contexte par seconde

Les champs relatifs au CPU sont les suivants :

- us — Le pourcentage de temps pendant lequel le CPU exécute un code de niveau utilisateur
- sy — Le pourcentage de temps pendant lequel le CPU exécute un code de niveau système
- id — Le pourcentage de temps pendant lequel le CPU était inoccupé
- wa — Attente d'E/S

Les options de cette commande sont :

```
[root@centos7 ~]# vmstat --help
```

Usage:

```
vmstat [options] [delay [count]]
```

Options:

```
-a, --active      active/inactive memory
-f, --forks       number of forks since boot
-m, --slabs       slabinfo
-n, --one-header  do not redisplay header
-s, --stats       event counter statistics
-d, --disk        disk statistics
-D, --disk-sum    summarize disk statistics
-p, --partition <dev> partition specific statistics
-S, --unit <char> define display unit
-w, --wide        wide output
-t, --timestamp   show timestamp

-h, --help        display this help and exit
-V, --version     output version information and exit
```

For more details see `vmstat(8)`.

```
root@debian8:~# vmstat --help
```

Usage:

```
vmstat [options] [delay [count]]
```

Options:

```
-a, --active      active/inactive memory
-f, --forks       number of forks since boot
-m, --slabs       slabinfo
-n, --one-header  do not redisplay header
-s, --stats       event counter statistics
-d, --disk        disk statistics
-D, --disk-sum    summarize disk statistics
-p, --partition <dev> partition specific statistics
-S, --unit <char> define display unit
-w, --wide        wide output
```

```
-h, --help      display this help and exit
-V, --version   output version information and exit
```

For more details see `vmstat(8)`.



Important : Par défaut la commande `vmstat` affiche des informations depuis le démarrage du système.

mpstat

La commande **mpstat** affiche des statistiques détaillées sur le CPU :

```
[root@centos7 ~]# mpstat
Linux 3.10.0-229.4.2.el7.x86_64 (centos7.fenestros.loc)      11/02/2015      _x86_64_      (1 CPU)

03:19:32 PM  CPU      %usr   %nice    %sys %iowait    %irq   %soft  %steal  %guest  %gnice   %idle
03:19:32 PM  all       9.38    0.14    2.52   0.31     0.00    0.24   0.00   0.00   0.00   87.42
```

```
root@debian8:~# mpstat
Linux 3.16.0-4-686-pae (debian8)      11/02/2015      _i686_      (1 CPU)

09:54:31 AM  CPU      %usr   %nice    %sys %iowait    %irq   %soft  %steal  %guest  %gnice   %idle
09:54:31 AM  all      27.49    0.00    5.59   0.77     0.00    0.22   0.00   0.00   0.00   65.92
```

Dans le cas où vous avez plusieurs processeurs ou coeurs, vous pouvez visualiser ces mêmes informations par unité de traitement :

```
[root@centos7 ~]# mpstat -P ALL
Linux 3.10.0-229.4.2.el7.x86_64 (centos7.fenestros.loc)      11/02/2015      _x86_64_      (1 CPU)
```

```
03:20:06 PM CPU %usr %nice %sys %iowait %irq %soft %steal %guest %gnice %idle
03:20:06 PM all 9.42 0.14 2.53 0.31 0.00 0.24 0.00 0.00 0.00 87.36
03:20:06 PM 0 9.42 0.14 2.53 0.31 0.00 0.24 0.00 0.00 0.00 87.36
```

```
root@debian8:~# mpstat -P ALL
Linux 3.16.0-4-686-pae (debian8) 11/02/2015 _i686_ (1 CPU)
```

```
09:54:59 AM CPU %usr %nice %sys %iowait %irq %soft %steal %guest %gnice %idle
09:54:59 AM all 27.50 0.00 5.59 0.77 0.00 0.22 0.00 0.00 0.00 65.92
09:54:59 AM 0 27.50 0.00 5.59 0.77 0.00 0.22 0.00 0.00 0.00 65.92
```

Pour afficher 5 jeux de statistiques à des intervalles de 2 secondes pour tous les unités de traitement, il convient d'utiliser la commande suivante :

```
[root@centos7 ~]# mpstat -P ALL 2 5
Linux 3.10.0-229.4.2.el7.x86_64 (centos7.fenestros.loc) 11/02/2015 _x86_64_ (1 CPU)

03:20:43 PM CPU %usr %nice %sys %iowait %irq %soft %steal %guest %gnice %idle
03:20:45 PM all 27.46 0.00 7.04 0.00 0.00 0.00 0.00 0.00 0.00 65.49
03:20:45 PM 0 27.46 0.00 7.04 0.00 0.00 0.00 0.00 0.00 0.00 65.49

03:20:45 PM CPU %usr %nice %sys %iowait %irq %soft %steal %guest %gnice %idle
03:20:47 PM all 24.83 0.00 5.37 0.00 0.00 0.67 0.00 0.00 0.00 69.13
03:20:47 PM 0 24.83 0.00 5.37 0.00 0.00 0.67 0.00 0.00 0.00 69.13

03:20:47 PM CPU %usr %nice %sys %iowait %irq %soft %steal %guest %gnice %idle
03:20:49 PM all 17.95 0.00 4.49 0.00 0.00 0.00 0.00 0.00 0.00 77.56
03:20:49 PM 0 17.95 0.00 4.49 0.00 0.00 0.00 0.00 0.00 0.00 77.56

03:20:49 PM CPU %usr %nice %sys %iowait %irq %soft %steal %guest %gnice %idle
03:20:51 PM all 18.18 0.00 3.90 0.00 0.00 0.00 0.00 0.00 0.00 77.92
03:20:51 PM 0 18.18 0.00 3.90 0.00 0.00 0.00 0.00 0.00 0.00 77.92

03:20:51 PM CPU %usr %nice %sys %iowait %irq %soft %steal %guest %gnice %idle
03:20:53 PM all 24.14 0.00 6.21 0.00 0.00 0.00 0.00 0.00 0.00 69.66
```



```
03:20:53 PM    0   24.14   0.00   6.21   0.00   0.00   0.00   0.00   0.00   0.00   0.00   69.66

Average:      CPU    %usr    %nice    %sys %iowait    %irq    %soft    %steal    %guest    %gnice    %idle
Average:      all   22.39    0.00    5.36    0.00    0.00    0.13    0.00    0.00    0.00    0.00   72.12
Average:       0   22.39    0.00    5.36    0.00    0.00    0.13    0.00    0.00    0.00    0.00   72.12
```

```
root@debian8:~# mpstat -P ALL 2 5
Linux 3.16.0-4-686-pae (debian8)    11/02/2015    _i686_    (1 CPU)
```

```
09:59:58 AM  CPU    %usr    %nice    %sys %iowait    %irq    %soft    %steal    %guest    %gnice    %idle
10:00:00 AM  all   24.10    0.00    6.15    0.00    0.00    0.51    0.00    0.00    0.00    0.00   69.23
10:00:00 AM    0   24.10    0.00    6.15    0.00    0.00    0.51    0.00    0.00    0.00    0.00   69.23

10:00:00 AM  CPU    %usr    %nice    %sys %iowait    %irq    %soft    %steal    %guest    %gnice    %idle
10:00:02 AM  all   87.06    0.00   11.76    0.00    0.00    0.00    0.00    0.00    0.00    0.00    1.18
10:00:02 AM    0   87.06    0.00   11.76    0.00    0.00    0.00    0.00    0.00    0.00    0.00    1.18

10:00:02 AM  CPU    %usr    %nice    %sys %iowait    %irq    %soft    %steal    %guest    %gnice    %idle
10:00:04 AM  all   44.94    0.00    7.30    0.00    0.00    0.00    0.00    0.00    0.00    0.00   47.75
10:00:04 AM    0   44.94    0.00    7.30    0.00    0.00    0.00    0.00    0.00    0.00    0.00   47.75

10:00:04 AM  CPU    %usr    %nice    %sys %iowait    %irq    %soft    %steal    %guest    %gnice    %idle
10:00:06 AM  all   36.32    0.00    6.32    0.00    0.00    0.00    0.00    0.00    0.00    0.00   57.37
10:00:06 AM    0   36.32    0.00    6.32    0.00    0.00    0.00    0.00    0.00    0.00    0.00   57.37

10:00:06 AM  CPU    %usr    %nice    %sys %iowait    %irq    %soft    %steal    %guest    %gnice    %idle
10:00:08 AM  all   53.41    0.00   10.80    0.00    0.00    0.00    0.00    0.00    0.00    0.00   35.80
10:00:08 AM    0   53.41    0.00   10.80    0.00    0.00    0.00    0.00    0.00    0.00    0.00   35.80

Average:      CPU    %usr    %nice    %sys %iowait    %irq    %soft    %steal    %guest    %gnice    %idle
Average:      all   48.18    0.00    8.36    0.00    0.00    0.11    0.00    0.00    0.00    0.00   43.34
Average:       0   48.18    0.00    8.36    0.00    0.00    0.11    0.00    0.00    0.00    0.00   43.34
```

Les options de cette commande sont :

```
[root@centos7 ~]# mpstat --help
Usage: mpstat [ options ] [ <interval> [ <count> ] ]
Options are:
[ -A ] [ -u ] [ -V ] [ -I { SUM | CPU | SCPU | ALL } ]
[ -P { <cpu> [,...] | ON | ALL } ]
```

```
root@debian8:~# mpstat --help
Usage: mpstat [ options ] [ <interval> [ <count> ] ]
Options are:
[ -A ] [ -u ] [ -V ] [ -I { SUM | CPU | SCPU | ALL } ]
[ -P { <cpu> [,...] | ON | ALL } ]
```

sar

La commande **sar** permet de surveiller toutes les ressources du système selon l'option qui est passée en argument à la commande. Quelques options importantes sont :

Option	Description
-u	Pourcentage d'utilisation du CPU
-q	Nombre de processus en attente
-r	Utilisation de la mémoire centrale
-w	Surveillance du swapping
-p	Surveillance de la pagination
-b	Utilisation des tampons
-d	Utilisation des disques

Sous RHEL/CentOS 7 la commande **/usr/lib64/sa/sadc** permet de collecter les informations :

```
[root@centos7 ~]# ls /usr/lib64/sa
sa1  sa2  sadc
```

Sous Debian 8 la commande **/usr/lib/sysstat/sadc** permet de collecter les informations :

```
root@debian8:~# ls /usr/lib/sysstat/  
debian-sa1 sa1 sa2 sadc
```

Les scripts **/usr/lib/sa/sa1** et **/usr/lib/sysstat/sa1** exécutent la commande **sadc**. Sous Debian 8, c'est le script **debian-sa1** qui est appelé à la place de **sa1** afin de rectifier une bogue dans ce dernier (Bug#499461). Ce script, tout comme le script **sa1**, prend deux options :

Option	Description
-t	L'interval entre les collectes
-n	Nombre de collectes

Les scripts **/usr/lib/sa/sa2** et **/usr/lib/sysstat/sa2** exécutent la commande **sar** et consignent les informations dans un fichier au format **/var/log/sa/sar<jj>** ou **/var/log/sysstat/sar<jj>** selon la distribution.

Pour pouvoir fonctionner correctement, ces scripts doivent être appelés par **cron**.

Pour activer la collecte des données sous Debian 8, éditez le fichier **/etc/default/sysstat** ainsi :

```
root@debian8:~# cat /etc/default/sysstat  
#  
# Default settings for /etc/init.d/sysstat, /etc/cron.d/sysstat  
# and /etc/cron.daily/sysstat files  
#  
  
# Should sadc collect system activity informations? Valid values  
# are "true" and "false". Please do not put other values, they  
# will be overwritten by debconf!  
ENABLED="true"
```

Modifiez le fichier **/etc/cron.d/sysstat** ainsi :

```
[root@centos7 ~]# cat /etc/cron.d/sysstat  
# Run system activity accounting tool every 10 minutes  
# */10 * * * * root /usr/lib64/sa/sa1 1 1  
*/2 * * * * root /usr/lib64/sa/sa1 1 1
```

```
# 0 * * * * root /usr/lib64/sa/sa1 600 6 &
# Generate a daily summary of process accounting at 23:53
53 23 * * * * root /usr/lib64/sa/sa2 -A
```

```
root@debian8:~# cat /etc/cron.d/sysstat
# The first element of the path is a directory where the debian-sa1
# script is located
PATH=/usr/lib/sysstat:/usr/sbin:/usr/sbin:/usr/bin:/sbin:/bin

# Activity reports every 10 minutes everyday
#5-55/10 * * * * root command -v debian-sa1 > /dev/null && debian-sa1 1 1
*/2 * * * * root command -v debian-sa1 > /dev/null && debian-sa1 1 1

# Additional run at 23:59 to rotate the statistics file
59 23 * * * * root command -v debian-sa1 > /dev/null && debian-sa1 60 2
```

Attendez deux minutes puis saisissez les commandes suivantes :

```
[root@centos7 ~]# sar
Linux 3.10.0-229.4.2.el7.x86_64 (centos7.fenestros.loc)      11/02/2015      _x86_64_      (1 CPU)

02:20:02 PM      CPU      %user      %nice      %system      %iowait      %steal      %idle
02:30:01 PM      all       12.95        0.01         3.36         0.01         0.00       83.67
02:40:01 PM      all       27.64        0.50         7.84         0.06         0.00       63.96
02:50:01 PM      all       11.56        2.46         4.59         1.18         0.00       80.21
03:00:01 PM      all         0.45        0.01         0.64         0.03         0.00       98.88
03:10:01 PM      all         0.38        0.01         0.61         0.01         0.00       98.98
03:20:01 PM      all       25.80        0.02         6.68         0.85         0.00       66.66
03:28:02 PM      all       21.59        0.06         6.84         0.21         0.00       71.31
03:30:01 PM      all       22.88        0.01         5.76         0.00         0.00       71.35
03:32:01 PM      all       11.34        0.01         2.99         0.11         0.00       85.55
Average:         all       13.21        0.41         4.01         0.30         0.00       82.06
```

```
root@debian8:~# sar
```

```
Linux 3.16.0-4-686-pae (debian8) 11/02/2015 _i686_ (1 CPU)
```

	CPU	%user	%nice	%system	%iowait	%steal	%idle
01:35:01 PM	all	23.84	0.00	4.69	0.11	0.00	71.36
01:40:01 PM	all	23.84	0.00	4.69	0.11	0.00	71.36
Average:	all	23.84	0.00	4.69	0.11	0.00	71.36

```
[root@centos7 ~]# sar -u 5 3
```

```
Linux 3.10.0-229.4.2.el7.x86_64 (centos7.fenestros.loc) 11/02/2015 _x86_64_ (1 CPU)
```

	CPU	%user	%nice	%system	%iowait	%steal	%idle
03:34:01 PM	all	29.73	0.00	14.19	0.00	0.00	56.08
03:34:06 PM	all	17.62	0.00	4.40	0.00	0.00	77.98
03:34:11 PM	all	4.75	0.00	1.30	0.00	0.00	93.95
03:34:16 PM	all	15.55	0.00	5.68	0.00	0.00	78.78
Average:	all	15.55	0.00	5.68	0.00	0.00	78.78

```
root@debian8:~# sar -u 5 3
```

```
Linux 3.16.0-4-686-pae (debian8) 11/02/2015 _i686_ (1 CPU)
```

	CPU	%user	%nice	%system	%iowait	%steal	%idle
01:41:52 PM	all	11.29	0.00	4.31	0.00	0.00	84.39
01:41:57 PM	all	11.02	0.00	4.78	0.00	0.00	84.20
01:42:02 PM	all	6.79	0.00	1.85	2.47	0.00	88.89
01:42:07 PM	all	9.70	0.00	3.65	0.83	0.00	85.83
Average:	all	9.70	0.00	3.65	0.83	0.00	85.83

```
[root@centos7 ~]# sar -r 5 3
```

```
Linux 3.10.0-229.4.2.el7.x86_64 (centos7.fenestros.loc) 11/02/2015 _x86_64_ (1 CPU)
```

	kbmemfree	kbmemused	%memused	kbbuffers	kbcached	kbcommit	%commit	kbactive	kbinact	kbdirty
03:34:48 PM	137708	1653916	92.31	20	561940	2950052	60.66	776232	539396	12
03:34:53 PM	130988	1660636	92.69	20	566552	3000196	61.69	779820	542436	20
03:34:58 PM	131360	1660264	92.67	20	566584	2999016	61.66	779288	542472	48
03:35:03 PM	133352	1658272	92.56	20	565025	2983088	61.33	778447	541435	27
Average:	133352	1658272	92.56	20	565025	2983088	61.33	778447	541435	27

```
root@debian8:~# sar -r 5 3
```

```
Linux 3.16.0-4-686-pae (debian8) 11/02/2015 _i686_ (1 CPU)
```

	01:42:53 PM	kbmemfree	kbmemused	%memused	kbbuffers	kbcached	kbcommit	%commit	kbactive	kbinact	kbdirty
01:42:58 PM	221948	809916	78.49	38732	244904	2126568	71.28	485024	267320	20	
01:43:03 PM	221892	809972	78.50	38740	244904	2126568	71.28	485044	267316	176	
01:43:08 PM	221912	809952	78.49	38748	244904	2126568	71.28	485052	267316	224	
Average:	221917	809947	78.49	38740	244904	2126568	71.28	485040	267317	140	

```
[root@centos7 ~]# sar -w 5 3
```

```
Linux 3.10.0-229.4.2.el7.x86_64 (centos7.fenestros.loc) 11/02/2015 _x86_64_ (1 CPU)
```

	03:35:51 PM	proc/s	cswch/s
03:35:56 PM	0.00	608.04	
03:36:01 PM	1.06	531.75	
03:36:06 PM	25.94	1226.28	
Average:	8.36	767.19	

```
root@debian8:~# sar -w 5 3
```

```
Linux 3.16.0-4-686-pae (debian8) 11/02/2015 _i686_ (1 CPU)
```

	01:43:54 PM	proc/s	cswch/s
01:43:59 PM	0.00	539.92	
01:44:04 PM	1.24	599.18	
01:44:09 PM	0.00	317.45	
Average:	0.41	485.32	

```
[root@centos7 ~]# sar -b 5 3
```

```
Linux 3.10.0-229.4.2.el7.x86_64 (centos7.fenestros.loc) 11/02/2015 _x86_64_ (1 CPU)
```

	03:36:09 PM	tps	rtps	wtps	bread/s	bwrtn/s
03:36:14 PM	0.00	0.00	0.00	0.00	0.00	0.00
03:36:19 PM	0.00	0.00	0.00	0.00	0.00	0.00
03:36:24 PM	2.32	0.00	2.32	0.00	31.79	

Average:	0.89	0.00	0.89	0.00	12.25
----------	------	------	------	------	-------

```
root@debian8:~# sar -b 5 3
Linux 3.16.0-4-686-pae (debian8) 11/02/2015 _i686_ (1 CPU)
```

01:44:36 PM	tps	rtps	wtps	bread/s	bwrtn/s
01:44:41 PM	2.44	0.00	2.44	0.00	30.16
01:44:46 PM	0.00	0.00	0.00	0.00	0.00
01:44:51 PM	0.00	0.00	0.00	0.00	0.00
Average:	0.78	0.00	0.78	0.00	9.64

```
[root@centos7 ~]# sar -d 5 3
Linux 3.10.0-229.4.2.el7.x86_64 (centos7.fenestros.loc) 11/02/2015 _x86_64_ (1 CPU)
```

03:36:46 PM	DEV	tps	rd_sec/s	wr_sec/s	avgrq-sz	avgqu-sz	await	svctm	%util
03:36:51 PM	dev11-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03:36:51 PM	dev8-0	0.31	0.00	2.45	8.00	0.00	0.00	0.00	0.00
03:36:51 PM	DEV	tps	rd_sec/s	wr_sec/s	avgrq-sz	avgqu-sz	await	svctm	%util
03:36:56 PM	dev11-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03:36:56 PM	dev8-0	4.31	0.00	55.38	12.86	0.04	9.36	1.93	0.83
03:36:56 PM	DEV	tps	rd_sec/s	wr_sec/s	avgrq-sz	avgqu-sz	await	svctm	%util
03:37:01 PM	dev11-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
03:37:01 PM	dev8-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average:	DEV	tps	rd_sec/s	wr_sec/s	avgrq-sz	avgqu-sz	await	svctm	%util
Average:	dev11-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average:	dev8-0	1.49	0.00	18.63	12.53	0.01	8.73	1.80	0.27

```
root@debian8:~# sar -d 5 3
Linux 3.16.0-4-686-pae (debian8) 11/02/2015 _i686_ (1 CPU)
```

01:44:48 PM	DEV	tps	rd_sec/s	wr_sec/s	avgrq-sz	avgqu-sz	await	svctm	%util
-------------	-----	-----	----------	----------	----------	----------	-------	-------	-------

01:44:53 PM	dev8-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01:44:53 PM	DEV	tps	rd_sec/s	wr_sec/s	avgrq-sz	avgqu-sz	await	svctm	%util
01:44:58 PM	dev8-0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01:44:58 PM	DEV	tps	rd_sec/s	wr_sec/s	avgrq-sz	avgqu-sz	await	svctm	%util
01:45:03 PM	dev8-0	1.28	0.00	23.98	18.67	0.00	2.00	2.00	0.26
Average:	DEV	tps	rd_sec/s	wr_sec/s	avgrq-sz	avgqu-sz	await	svctm	%util
Average:	dev8-0	0.43	0.00	7.97	18.67	0.00	2.00	2.00	0.09

```
[root@centos7 ~]# sar -p 5 3
```

```
Linux 3.10.0-229.4.2.el7.x86_64 (centos7.fenestros.loc) 11/02/2015 _x86_64_ (1 CPU)
```

03:37:16 PM	CPU	%user	%nice	%system	%iowait	%steal	%idle
03:37:21 PM	all	38.30	0.00	7.31	0.00	0.00	54.39
03:37:26 PM	all	45.81	0.00	9.58	0.00	0.00	44.61
03:37:31 PM	all	33.33	0.00	7.67	0.00	0.00	59.00
Average:	all	39.11	0.00	8.18	0.00	0.00	52.71

```
root@debian8:~# sar -p 5 3
```

```
Linux 3.16.0-4-686-pae (debian8) 11/02/2015 _i686_ (1 CPU)
```

01:45:23 PM	CPU	%user	%nice	%system	%iowait	%steal	%idle
01:45:28 PM	all	59.87	0.00	11.28	0.00	0.00	28.85
01:45:33 PM	all	48.01	0.00	9.43	1.26	0.00	41.30
01:45:38 PM	all	45.91	0.00	9.70	0.00	0.00	44.40
Average:	all	51.21	0.00	10.13	0.43	0.00	38.23

```
[root@centos7 ~]# sar -v 5 3
```

```
Linux 3.10.0-229.4.2.el7.x86_64 (centos7.fenestros.loc) 11/02/2015 _x86_64_ (1 CPU)
```

03:38:44 PM	dentunusd	file-nr	inode-nr	pty-nr
03:38:49 PM	136266	5792	122548	2

03:38:54 PM	136266	5792	122548	2
03:38:59 PM	136266	5792	122548	2
Average:	136266	5792	122548	2

```

root@debian8:~# sar -v 5 3
Linux 3.16.0-4-686-pae (debian8)    11/02/2015    _i686_    (1 CPU)

01:45:58 PM dentunusd    file-nr    inode-nr    pty-nr
01:46:03 PM          26140          4576          26525          2
01:46:08 PM          26140          4576          26525          2
01:46:13 PM          26140          4576          26525          2
Average:           26140          4576          26525          2

```

Les options de cette commande sont :

```

[root@centos7 ~]# sar --help
Usage: sar [ options ] [ <interval> [ <count> ] ]
Options are:
[ -A ] [ -B ] [ -b ] [ -C ] [ -d ] [ -H ] [ -h ] [ -p ] [ -q ] [ -R ]
[ -r ] [ -S ] [ -t ] [ -u [ ALL ] ] [ -V ] [ -v ] [ -W ] [ -w ] [ -y ]
[ -I { <int> [,...] | SUM | ALL | XALL } ] [ -P { <cpu> [,...] | ALL } ]
[ -m { <keyword> [,...] | ALL } ] [ -n { <keyword> [,...] | ALL } ]
[ -j { ID | LABEL | PATH | UUID | ... } ]
[ -f [ <filename> ] | -o [ <filename> ] | -[0-9]+ ]
[ -i <interval> ] [ -s [ <hh:mm:ss> ] ] [ -e [ <hh:mm:ss> ] ]

```

```

root@debian8:~# sar --help
Usage: sar [ options ] [ <interval> [ <count> ] ]
Options are:
[ -A ] [ -B ] [ -b ] [ -C ] [ -D ] [ -d ] [ -F ] [ -H ] [ -h ] [ -p ] [ -q ]
[ -R ] [ -r ] [ -S ] [ -t ] [ -u [ ALL ] ] [ -V ] [ -v ] [ -W ] [ -w ] [ -y ]
[ -I { <int> [,...] | SUM | ALL | XALL } ] [ -P { <cpu> [,...] | ALL } ]
[ -m { <keyword> [,...] | ALL } ] [ -n { <keyword> [,...] | ALL } ]
[ -j { ID | LABEL | PATH | UUID | ... } ]

```

```
[ -f [ <filename> ] | -o [ <filename> ] | -[0-9]+ ]  
[ -i <interval> ] [ -s [ <hh:mm:ss> ] ] [ -e [ <hh:mm:ss> ] ]
```

Utilisation des commandes en production

Identifier un système limité par le processeur

Dans ce cas utilisez les commandes suivantes :

- uptime ou w
- vmstat
- mpstat -P ALL
- sar -u
- iostat -c

Identifier un système ayant un problème de mémoire

Dans ce cas utilisez les commandes suivantes :

- free
- sar -B

Identifier un système ayant un problème d'E/S

Utilisez la commande :

- iostat -d -x

Modules usb

L'**USB** (*Universal Serial Bus*) est un bus de données qui peut offrir des taux de transfert jusqu'à 480Mb/s sous la version 2.0 et jusqu'à 4.8 Gb/s sous la version 3.0. Les modules nécessaires pour les contrôleurs USB sont :

Version USB	Module	Nom Complet
1.0\1.1	UHCI	<i>Universal Controller Host Interface</i>
	OHCI	<i>Open Controller Host Interface</i>
2.0	EHCI	<i>Enhanced Host Controller Interface</i>
3.0	XHCI	<i>Extensible Host Controller Interface</i>

Le tableau suivant liste les modules couramment chargés en fonction du périphérique utilisé :

Module	Type de Périphérique
usb_storage	Supports de masse
usbhid	Périphériques HID (<i>Human Interface Device</i>)
snd-usb-audio	Cartes son usb
usbvidéo	Cartes vidéo et d'acquisition
irda-usb	Périphériques infrarouges
usbnet	Cartes réseaux usb

Les modules peuvent être chargés par un des moyens suivants :

- INITrd,
- Le processus init,
- kmod, d'une manière dynamique et transparente lors du branchement du périphérique, en utilisant le fichier **/lib/modules/2.6.18-194.3.1.el5/modules.usbmap**,
- udev,
- manuellement.



A faire : Branchez une clef USB avant de continuer. Si vous utilisez VirtualBox, activez la



clef dans votre machine virtuelle grâce aux menus **Périphériques > Périphériques USB**
> le_nom_de_votre_clef.

udev

Depuis le noyau Linux 2.6 Linux est capable de détecter des périphériques branchés à chaud. Cette technologie s'appelle le **hotplugging**. Le *hotplugging* est obtenu grâce à l'utilisation de trois composants :

- Udev,
- HAL,
- Dbus.

Les rôles de chaque composant sont les suivants :

- Udev se charge de créer et supprimer d'une manière dynamique les nœuds dans le répertoire **/dev**,
- HAL obtient des informations à partir d'Udev et crée un fichier au format XML représentant le périphérique branché. Il informe ensuite Nautilus en utilisant le Dbus,
- Dbus joue le rôle d'un bus système qui est utilisé pour la communication inter-processus.

Lors de démarrage de Linux, Udev joue un rôle important :

- Au démarrage **tmpfs** est monté sur **/dev**,
- Udev copie les éventuels nœuds statiques de **/lib/udev/devices** vers **/dev**,
- le démon **udev** collecte des données appelées **uevents** du noyau et cherche une règle correspondante dans le répertoire **/lib/udev/rules.d/**,
- Udev crée les nœuds et liens symboliques spécifiés dans la règle identifiée,
- Udev stocke les règles contenues dans **/lib/udev/rules.d/*.rules** en mémoire,
- En cas de modification des ces règles, Udev met à jour la mémoire.

Udev repose sur le filesystem **sysfs** monté sur **/sys** qui permet de rendre les périphériques visibles à Udev dans l'*User Space*. Par exemple, lors du branchement d'une clé USB, Udev crée **/dev/sdb1** automatiquement et utilise les informations contenues dans le fichier **/lib/modules/`uname -r`/modules.alias** pour trouver le pilote nécessaire :

Le fichier de configuration principal d'Udev est **/etc/udev/udev.conf** :

```
[root@centos7 ~]# cat /etc/udev/udev.conf
# see udev(7) for details

#udev_log="info"
```

```
root@debian8:~# cat /etc/udev/udev.conf
# see udev(7) for details
#
# udevd is started in the initramfs, so when this file is modified the
# initramfs should be rebuilt.

#udev_log="info"
```

Les fichiers de règles se trouvent dans **/lib/udev/rules.d/** :

```
[root@centos7 ~]# ls /lib/udev/rules.d/
10-dm.rules                61-gnome-bluetooth-rfkill.rules  77-mm-ericsson-mbm.rules      90-
iprutils.rules             62-multipath.rules              77-mm-huawei-net-port-types.rules  90-
11-dm-lvm.rules            63-md-raid-arrays.rules         77-mm-longcheer-port-types.rules  90-
pulseaudio.rules          64-btrfs.rules                 77-mm-nokia-port-types.rules     91-
11-dm-mpath.rules         65-libwacom.rules              77-mm-pcmcia-device-blacklist.rules  95-
vconsole.rules            65-md-incremental.rules        77-mm-platform-serial-whitelist.rules  95-
13-dm-disk.rules          65-sane-backends.rules         77-mm-simtech-port-types.rules     95-
drm-modeset.rules         69-cd-sensors.rules           77-mm-telit-port-types.rules      95-
40-libgphoto2.rules       upower-battery-recall-dell.rules
```

50-rbd.rules	69-dm-lvm-metad.rules	77-mm-usb-device-blacklist.rules	95-
upower-battery-recall-fujitsu.rules			
50-udev-default.rules	69-libmtp.rules	77-mm-usb-serial-adapters-greylist.rules	95-
upower-battery-recall-gateway.rules			
56-hpmud.rules	69-xorg-vmmouse.rules	77-mm-x22x-port-types.rules	95-
upower-battery-recall-ibm.rules			
60-alias-kmsg.rules	70-power-switch.rules	77-mm-zte-port-types.rules	95-
upower-battery-recall-lenovo.rules			
60-cdrom_id.rules	70-printers.rules	77-nm-olpc-mesh.rules	95-
upower-battery-recall-toshiba.rules			
60-fprint-autosuspend.rules	70-spice-vdagentd.rules	78-sound-card.rules	95-
upower-csr.rules			
60-keyboard.rules	70-touchpad-quirks.rules	80-drivers.rules	95-
upower-hid.rules			
60-net.rules	70-uaccess.rules	80-kvm.rules	95-
upower-wup.rules			
60-persistent-alsa.rules	70-wacom.rules	80-mm-candidate.rules	97-
bluetooth-serial.rules			
60-persistent-input.rules	71-biosdevname.rules	80-net-name-slot.rules	98-
kexec.rules			
60-persistent-serial.rules	71-seat.rules	80-udisks2.rules	98-
rdma.rules			
60-persistent-storage.rules	73-idrac.rules	81-kvm-rhel.rules	99-
qemu-guest-agent.rules			
60-persistent-storage-tape.rules	73-seat-late.rules	85-regulatory.rules	99-
systemd.rules			
60-persistent-v4l.rules	75-net-description.rules	85-usbmuxd.rules	
60-raw.rules	75-probe_mtd.rules	90-alsa-restore.rules	
61-accelerometer.rules	75-tty-description.rules	90-alsa-tools-firmware.rules	

root@debian8:~# ls /lib/udev/rules.d/			
39-usbmuxd.rules	60-persistent-serial.rules	75-net-description.rules	78-
sound-card.rules			
40-usb-media-players.rules	60-persistent-storage-dm.rules	75-persistent-net-generator.rules	

80-drivers.rules			
40-usb_modeswitch.rules	60-persistent-storage.rules	75-probe_mtd.rules	80-mm-
candidate.rules			
42-usb-hid-pm.rules	60-persistent-storage-tape.rules	75-tty-description.rules	80-
net-setup-link.rules			
50-bluetooth-hci-auto-poweron.rules	60-persistent-v4l.rules	77-mm-cinterion-port-types.rules	
80-networking.rules			
50-firmware.rules	61-accelerometer.rules	77-mm-ericsson-mbm.rules	80-
udisks2.rules			
50-udev-default.rules	61-gnome-bluetooth-rfkill.rules	77-mm-huawei-net-port-types.rules	
85-hdparm.rules			
55-dm.rules	61-gnome-settings-daemon-rfkill.rules	77-mm-longcheer-port-types.rules	85-
hplj10xx.rules			
56-hpmud.rules	64-btrfs.rules	77-mm-mtk-port-types.rules	85-
hwclock.rules			
60-cdrom_id.rules	64-xorg-xkb.rules	77-mm-nokia-port-types.rules	85-
regulatory.rules			
60-crda.rules	69-cd-sensors.rules	77-mm-pcmcia-device-blacklist.rules	90-alsa-
restore.rules			
60-drm.rules	69-libmtp.rules	77-mm-platform-serial-whitelist.rules	90-
libgpod.rules			
60-fuse.rules	69-wacom.rules	77-mm-qdl-device-blacklist.rules	90-
pulseaudio.rules			
60-gnupg.rules	69-xorg-vmmouse.rules	77-mm-simtech-port-types.rules	95-cd-
devices.rules			
60-keyboard.rules	70-power-switch.rules	77-mm-telit-port-types.rules	95-udev-
late.rules			
60-libgphoto2-6.rules	70-printers.rules	77-mm-usb-device-blacklist.rules	95-
upower-csr.rules			
60-libsane.rules	70-uaccess.rules	77-mm-usb-serial-adapters-greylist.rules	95-upower-
hid.rules			
60-open-vm-tools.rules	71-seat.rules	77-mm-x22x-port-types.rules	95-upower-
wup.rules			
60-persistent-alsa.rules	73-idrac.rules	77-mm-zte-port-types.rules	97-

hid2hci.rules

60-persistent-input.rules

73-seat-late.rules

77-nm-olpc-mesh.rules

99-

systemd.rules



Important : Il vous est possible d'ajouter des règles si besoin est. Dans ce cas, créez un fichier **99-local.rules** et éditez-le au lieu d'éditer les fichiers existants.

Comme indique le nom de chaque fichier, le contenu est composé de règles à l'attention d'udev. Le fichier des règles par défaut est le **50-udev-default.rules** :

```
[root@centos7 ~]# cat /lib/udev/rules.d/50-udev-default.rules | more
# do not edit this file, it will be overwritten on update

SUBSYSTEM=="virtio-ports", KERNEL=="vport*", ATTR{name}=="?*", SYMLINK+="virtio-ports/${attr{name}}"

# select "system RTC" or just use the first one
SUBSYSTEM=="rtc", ATTR{hctosys}=="1", SYMLINK+="rtc"
SUBSYSTEM=="rtc", KERNEL=="rtc0", SYMLINK+="rtc", OPTIONS+="link_priority=-100"

SUBSYSTEM=="usb", ENV{DEVTYPE}=="usb_device", IMPORT{builtin}="usb_id", IMPORT{builtin}="hwdb --subsystem=usb"
SUBSYSTEM=="input", ENV{ID_INPUT}=="", IMPORT{builtin}="input_id"
ENV{MODALIAS}!="", IMPORT{builtin}="hwdb --subsystem=$env{SUBSYSTEM}"

ACTION!="add", GOTO="default_permissions_end"

SUBSYSTEM=="tty", KERNEL=="ptmx", GROUP=="tty", MODE="0666"
SUBSYSTEM=="tty", KERNEL=="tty", GROUP=="tty", MODE="0666"
SUBSYSTEM=="tty", KERNEL=="tty[0-9]*", GROUP=="tty", MODE="0620"
SUBSYSTEM=="tty", KERNEL=="sclp_line[0-9]*", GROUP=="tty", MODE="0620"
SUBSYSTEM=="tty", KERNEL=="ttysclp[0-9]*", GROUP=="tty", MODE="0620"
SUBSYSTEM=="tty", KERNEL=="3270/tty[0-9]*", GROUP=="tty", MODE="0620"
```



```
SUBSYSTEM=="vc", KERNEL=="vcs*|vcsa*", GROUP="tty"
KERNEL=="tty[A-Z]*[0-9]|ppox[0-9]*|ircomm[0-9]*|noz[0-9]*|rfcomm[0-9]*", GROUP="dialout"

SUBSYSTEM=="mem", KERNEL=="mem|kmem|port", GROUP="kmem", MODE="0640"

SUBSYSTEM=="input", KERNEL=="js[0-9]*", MODE="0664"

SUBSYSTEM=="video4linux", GROUP="video"
SUBSYSTEM=="misc", KERNEL=="agpgart", GROUP="video"
--More--
```

```
root@debian8:~# cat /lib/udev/rules.d/50-udev-default.rules | more
# do not edit this file, it will be overwritten on update
```

```
SUBSYSTEM=="virtio-ports", KERNEL=="vport*", ATTR{name}=="?*", SYMLINK+="virtio-ports/${attr{name}}"

# select "system RTC" or just use the first one
SUBSYSTEM=="rtc", ATTR{hctosys}=="1", SYMLINK+="rtc"
SUBSYSTEM=="rtc", KERNEL=="rtc0", SYMLINK+="rtc", OPTIONS+="link_priority=-100"

SUBSYSTEM=="usb", ENV{DEVTYPE}=="usb_device", IMPORT{builtin}="usb_id", IMPORT{builtin}="hwdb --subsystem=usb"
SUBSYSTEM=="input", ENV{ID_INPUT}=="", IMPORT{builtin}="input_id"
ENV{MODALIAS}!="", IMPORT{builtin}="hwdb --subsystem=$env{SUBSYSTEM}"

ACTION!="add", GOTO="default_permissions_end"

SUBSYSTEM=="tty", KERNEL=="ptmx", GROUP="tty", MODE="0666"
SUBSYSTEM=="tty", KERNEL=="tty", GROUP="tty", MODE="0666"
SUBSYSTEM=="tty", KERNEL=="tty[0-9]*", GROUP="tty", MODE="0620"
SUBSYSTEM=="tty", KERNEL=="sclp_line[0-9]*", GROUP="tty", MODE="0620"
SUBSYSTEM=="tty", KERNEL=="ttypsc[0-9]*", GROUP="tty", MODE="0620"
SUBSYSTEM=="tty", KERNEL=="3270/tty[0-9]*", GROUP="tty", MODE="0620"
SUBSYSTEM=="vc", KERNEL=="vcs*|vcsa*", GROUP="tty"
KERNEL=="tty[A-Z]*[0-9]|ppox[0-9]*|ircomm[0-9]*|noz[0-9]*|rfcomm[0-9]*", GROUP="dialout"
```

```

KERNEL=="mISDNtimer", GROUP="dialout"
KERNEL=="mwave", GROUP="dialout"

SUBSYSTEM=="mem", KERNEL=="mem|kmem|port", GROUP="kmem", MODE="0640"
KERNEL=="nvram", GROUP="kmem", MODE="0640"

SUBSYSTEM=="input", GROUP="input"
SUBSYSTEM=="input", KERNEL=="js[0-9]*", MODE="0664"

--More--

```

Chaque règle prend la forme suivante :

KEY, [KEY, ...] NAME [, SYMLINK]

Chaque KEY est un champ au format **type=valeur** qui doit correspondre à un périphérique unique. La valeur de type peut prendre plusieurs formes :

Type	Description	Exemples
BUS	Type de bus	usb, scsi, ide
KERNEL	Le nom par défaut du périphérique donné par le noyau	hda, ttyUSB0, lp0
SUBSYSTEM	Le nom noyau du sous-système, généralement identique à la valeur du BUS	usb, scsi
DRIVER	Le nom du pilote qui contrôle le périphérique	usb-storage
ID	Le numéro du périphérique sur son bus	PCI bus id, USB id
PLACE	Ne concerne que les périphériques USB et donne la position topologique du périphérique sur son bus	S/O
SYSFS{filename}	Le nom du fichier dans /sys pour le périphérique. Ce fichier contient le fabricant, le label, le numéro de série et UUID du périphérique. La vérification de jusqu'à 5 fichiers est possible par règle	S/O
PROGRAM	Ceci permet à Udev d'appeler un programme externe pour nommer un périphérique	S/O
RESULT	Valeur à comparer au résultat de PROGRAM	S/O

NAME et SYMLINK sont utilisées pour stipuler ce que Udev doit faire avec le périphérique :

Type	Description	Exemples
NAME	Le nom du nœud dans /dev	S/O

Type	Description	Exemples
SYMLINK	Le ou les lien(s) symbolique(s) qui pointe(nt) vers le NAME	S/O

La commande udevadm

Pour obtenir de l'information sur un périphérique il convient d'utiliser la commande **udevadm** :

[illegible]


```
E: SUBSYSTEM=block
E: TAGS=:systemd:
E: USEC_INITIALIZED=9411
```

Les options de la commande

Les options de la commande udevadm sont :

```
[root@centos7 ~]# udevadm --help
Usage: udevadm [--help] [--version] [--debug] COMMAND [COMMAND OPTIONS]
  info          query sysfs or the udev database
  trigger       request events from the kernel
  settle        wait for the event queue to finish
  control       control the udev daemon
  monitor       listen to kernel and udev events
  hwdb          maintain the hardware database index
  test          test an event run
  test-builtin  test a built-in command

[root@centos7 ~]# udevadm info --help
Usage: udevadm info OPTIONS
  --query=<type>      query device information:
                      name          name of device node
                      symlink       pointing to node
                      path          sys device path
                      property      the device properties
                      all           all values
  --path=<syspath>    sys device path used for query or attribute walk
  --name=<name>       node or symlink name used for query or attribute walk
  --root             prepend dev directory to path names
  --attribute-walk    print all key matches while walking along the chain
                      of parent devices
  --device-id-of-file=<file> print major:minor of device containing this file
```

```
--export          export key/value pairs
--export-prefix   export the key name with a prefix
--export-db       export the content of the udev database
--cleanup-db      cleanup the udev database
--help
```

```
root@debian8:~# udevadm --help
```

```
Usage: udevadm [--help] [--version] [--debug] COMMAND [COMMAND OPTIONS]
```

```
info          query sysfs or the udev database
trigger       request events from the kernel
settle        wait for pending udev events
control       control the udev daemon
monitor       listen to kernel and udev events
hwdb          maintain the hardware database index
test          test an event run
test-builtin  test a built-in command
```

```
root@debian8:~# udevadm info --help
```

```
Usage: udevadm info [OPTIONS] [DEVPATH|FILE]
```

```
-q,--query=TYPE      query device information:
    name             name of device node
    symlink          pointing to node
    path             sys device path
    property         the device properties
    all              all values
-p,--path=SYSPATH    sys device path used for query or attribute walk
-n,--name=NAME       node or symlink name used for query or attribute walk
-r,--root            prepend dev directory to path names
-a,--attribute-walk  print all key matches walking along the chain
                    of parent devices
-d,--device-id-of-file=FILE print major:minor of device containing this file
-x,--export          export key/value pairs
-P,--export-prefix   export the key name with a prefix
-e,--export-db       export the content of the udev database
```

-c, --cleanup-db	cleanup the udev database
--version	print version of the program
-h, --help	print this message

Système de fichiers /sys

Le système de fichiers virtuel **/sys** a été introduit avec le noyau Linux **2.6**. Son rôle est de décrire le matériel pour udev.

Saisissez la commande suivante :

```
[root@centos7 ~]# ls -l /sys
total 0
drwxr-xr-x.  2 root root 0 Oct 28 09:40 block
drwxr-xr-x. 24 root root 0 Oct 28 09:40 bus
drwxr-xr-x. 45 root root 0 Oct 28 09:40 class
drwxr-xr-x.  4 root root 0 Oct 28 09:40 dev
drwxr-xr-x. 11 root root 0 Oct 28 09:40 devices
drwxr-xr-x.  5 root root 0 Oct 28 09:40 firmware
drwxr-xr-x.  6 root root 0 Oct 28 09:40 fs
drwxr-xr-x.  2 root root 0 Oct 28 09:40 hypervisor
drwxr-xr-x.  9 root root 0 Oct 28 09:40 kernel
drwxr-xr-x. 146 root root 0 Oct 28 09:40 module
drwxr-xr-x.  2 root root 0 Oct 28 09:40 power
```

```
root@debian8:~# ls -l /sys
total 0
drwxr-xr-x  2 root root 0 Nov  2 14:01 block
drwxr-xr-x 24 root root 0 Nov  2 14:01 bus
drwxr-xr-x 42 root root 0 Nov  2 14:01 class
drwxr-xr-x  4 root root 0 Nov  2 14:01 dev
drwxr-xr-x 13 root root 0 Nov  2 14:01 devices
drwxr-xr-x  5 root root 0 Nov  2 14:03 firmware
```

```
drwxr-xr-x  6 root root 0 Nov  2 14:01 fs
drwxr-xr-x  2 root root 0 Nov  2 14:01 hypervisor
drwxr-xr-x  7 root root 0 Nov  2 14:01 kernel
drwxr-xr-x 105 root root 0 Nov  2 14:01 module
drwxr-xr-x  2 root root 0 Nov  2 14:01 power
```

Chaque répertoire contient des informations :

- **block**
 - contient des informations sur les périphériques bloc
- **bus**
 - contient des informations sur les bus de données
- **class**
 - contient des informations sur des classes de matériel
- **devices**
 - contient des informations sur la position des périphériques sur les bus
- **firmware**
 - contient, entre autre, des informations sur l'ACPI
- **module**
 - contient des informations sur les modules du noyau
- **power**
 - contient des informations sur la gestion de l'énergie
- **fs**
 - contient des informations sur les systèmes de fichiers

Pour illustrer ceci, saisissez la commande suivante :

```
[root@centos7 ~]# cat /sys/block/sda/sda1/size
409600
```

```
root@debian8:~# cat /sys/block/sda/sda1/size
19529728
```

Ce chiffre correspond aux nombre de secteurs.

Limitation des ressources

Les ressources disponibles aux utilisateurs peuvent être limitées par l'utilisation de la commande **ulimit**.

La commande **ulimit** gère deux types de limite, la limite *hard* en utilisant l'option **-H** et la limite *soft* en utilisant l'option **-S**. Seul root peut positionner une limite *hard* et ceci à condition que la limite ne dépasse pas les ressources réelles.

La limite *soft* est la limite imposée à l'utilisateur par défaut tandis que la limite *hard* est la limite que l'utilisateur peut atteindre en utilisant la commande **ulimit** lui-même.

L'utilisateur root peut paramétrer les limites accordées en éditant la fichier **/etc/security/limits.conf** :

```
[root@centos7 ~]# cat /etc/security/limits.conf
# /etc/security/limits.conf
#
#This file sets the resource limits for the users logged in via PAM.
#It does not affect resource limits of the system services.
#
#Also note that configuration files in /etc/security/limits.d directory,
#which are read in alphabetical order, override the settings in this
#file in case the domain is the same or more specific.
#That means for example that setting a limit for wildcard domain here
#can be overridden with a wildcard setting in a config file in the
#subdirectory, but a user specific setting here can be overridden only
#with a user specific setting in the subdirectory.
#
#Each line describes a limit for a user in the form:
#
#<domain>          <type>  <item>  <value>
#
#Where:
#<domain> can be:
#          - a user name
```

```
#      - a group name, with @group syntax
#      - the wildcard *, for default entry
#      - the wildcard %, can be also used with %group syntax,
#          for maxlogin limit
#
#<type> can have the two values:
#      - "soft" for enforcing the soft limits
#      - "hard" for enforcing hard limits
#
#<item> can be one of the following:
#      - core - limits the core file size (KB)
#      - data - max data size (KB)
#      - fsize - maximum filesize (KB)
#      - memlock - max locked-in-memory address space (KB)
#      - nofile - max number of open file descriptors
#      - rss - max resident set size (KB)
#      - stack - max stack size (KB)
#      - cpu - max CPU time (MIN)
#      - nproc - max number of processes
#      - as - address space limit (KB)
#      - maxlogins - max number of logins for this user
#      - maxsyslogins - max number of logins on the system
#      - priority - the priority to run user process with
#      - locks - max number of file locks the user can hold
#      - sigpending - max number of pending signals
#      - msgqueue - max memory used by POSIX message queues (bytes)
#      - nice - max nice priority allowed to raise to values: [-20, 19]
#      - rtprio - max realtime priority
#
#<domain>      <type>  <item>          <value>
#
#*              soft    core              0
#*              hard    rss              10000
```

```
#@student      hard    nproc      20
#@faculty      soft    nproc      20
#@faculty      hard    nproc      50
#ftp           hard    nproc       0
#@student      -        maxlogins   4
```

```
# End of file
```

```
root@debian8:~# cat /etc/security/limits.conf
# /etc/security/limits.conf
#
#Each line describes a limit for a user in the form:
#
#<domain>      <type> <item> <value>
#
#Where:
#<domain> can be:
#      - a user name
#      - a group name, with @group syntax
#      - the wildcard *, for default entry
#      - the wildcard %, can be also used with %group syntax,
#        for maxlogin limit
#      - NOTE: group and wildcard limits are not applied to root.
#        To apply a limit to the root user, <domain> must be
#        the literal username root.
#
#<type> can have the two values:
#      - "soft" for enforcing the soft limits
#      - "hard" for enforcing hard limits
#
#<item> can be one of the following:
#      - core - limits the core file size (KB)
#      - data - max data size (KB)
#      - fsize - maximum filesize (KB)
```

```
# - memlock - max locked-in-memory address space (KB)
# - nfile - max number of open files
# - rss - max resident set size (KB)
# - stack - max stack size (KB)
# - cpu - max CPU time (MIN)
# - nproc - max number of processes
# - as - address space limit (KB)
# - maxlogins - max number of logins for this user
# - maxsyslogins - max number of logins on the system
# - priority - the priority to run user process with
# - locks - max number of file locks the user can hold
# - sigpending - max number of pending signals
# - msgqueue - max memory used by POSIX message queues (bytes)
# - nice - max nice priority allowed to raise to values: [-20, 19]
# - rtprio - max realtime priority
# - chroot - change root to directory (Debian-specific)
#
#<domain>      <type>  <item>      <value>
#
#*              soft    core        0
#root           hard    core        100000
#*              hard    rss         10000
#@student       hard    nproc       20
#@faculty       soft    nproc       20
#@faculty       hard    nproc       50
#ftp            hard    nproc       0
#ftp            -        chroot       /ftp
#@student       -        maxlogins    4

# End of file
```



Important : La valeur de la limite peut être un **nombre** ou le mot **unlimited**.

Par exemple, si root inscrit les deux ligne suivantes dans le fichier /etc/security/limits.conf :

```
...  
trainee          soft    nofile    1024  
trainee          hard    nofile    4096  
...
```

la limite du nombre de fichiers ouverts simultanément par trainee est de 1 024. Par contre, trainee a la possibilité d'augmenter cette limite jusqu'à 4 096 en utilisant la commande suivante :

```
$ ulimit -n 4096
```

Pour consulter la liste des limites actuelles, il convient d'utiliser la commande ulimit avec l'option **-a** :

```
[root@centos7 ~]# ulimit -a  
core file size          (blocks, -c) 0  
data seg size           (kbytes, -d) unlimited  
scheduling priority      (-e) 0  
file size                (blocks, -f) unlimited  
pending signals          (-i) 6929  
max locked memory        (kbytes, -l) 64  
max memory size          (kbytes, -m) unlimited  
open files               (-n) 1024  
pipe size                (512 bytes, -p) 8  
POSIX message queues     (bytes, -q) 819200  
real-time priority       (-r) 0  
stack size               (kbytes, -s) 8192  
cpu time                 (seconds, -t) unlimited  
max user processes       (-u) 6929  
virtual memory           (kbytes, -v) unlimited  
file locks               (-x) unlimited
```

```
root@debian8:~# ulimit -a  
core file size          (blocks, -c) 0
```

```
data seg size      (kbytes, -d) unlimited
scheduling priority      (-e) 0
file size          (blocks, -f) unlimited
pending signals      (-i) 7892
max locked memory    (kbytes, -l) 64
max memory size      (kbytes, -m) unlimited
open files          (-n) 65536
pipe size           (512 bytes, -p) 8
POSIX message queues (bytes, -q) 819200
real-time priority    (-r) 0
stack size          (kbytes, -s) 8192
cpu time            (seconds, -t) unlimited
max user processes    (-u) 7892
virtual memory       (kbytes, -v) unlimited
file locks           (-x) unlimited
```

Options de la commande

Les options de **ulimit** sont :

```
[root@centos7 ~]# help ulimit
ulimit: ulimit [-SHacdefilmnpqrstuvx] [limit]
  Modify shell resource limits.
  Provides control over the resources available to the shell and processes
  it creates, on systems that allow such control.
  Options:
    -S      use the `soft' resource limit
    -H      use the `hard' resource limit
    -a      all current limits are reported
    -b      the socket buffer size
    -c      the maximum size of core files created
    -d      the maximum size of a process's data segment
    -e      the maximum scheduling priority (`nice')
```

- f the maximum size of files written by the shell and its children
- i the maximum number of pending signals
- l the maximum size a process may lock into memory
- m the maximum resident set size
- n the maximum number of open file descriptors
- p the pipe buffer size
- q the maximum number of bytes in POSIX message queues
- r the maximum real-time scheduling priority
- s the maximum stack size
- t the maximum amount of cpu time in seconds
- u the maximum number of user processes
- v the size of virtual memory
- x the maximum number of file locks

If LIMIT is given, it is the new value of the specified resource; the special LIMIT values `soft', `hard', and `unlimited' stand for the current soft limit, the current hard limit, and no limit, respectively. Otherwise, the current value of the specified resource is printed. If no option is given, then -f is assumed.

Values are in 1024-byte increments, except for -t, which is in seconds, -p, which is in increments of 512 bytes, and -u, which is an unscaled number of processes.

Exit Status:

Returns success unless an invalid option is supplied or an error occurs.

```
root@debian8:~# ulimit --help
-su: ulimit: --: invalid option
ulimit: usage: ulimit [-SHabcdefilmnpqrstuvxT] [limit]
root@debian8:~# help ulimit
ulimit: ulimit [-SHabcdefilmnpqrstuvxT] [limit]
  Modify shell resource limits.
  Provides control over the resources available to the shell and processes
  it creates, on systems that allow such control.
  Options:
    -S    use the `soft' resource limit
```

- H use the `hard' resource limit
- a all current limits are reported
- b the socket buffer size
- c the maximum size of core files created
- d the maximum size of a process's data segment
- e the maximum scheduling priority (`nice')
- f the maximum size of files written by the shell and its children
- i the maximum number of pending signals
- l the maximum size a process may lock into memory
- m the maximum resident set size
- n the maximum number of open file descriptors
- p the pipe buffer size
- q the maximum number of bytes in POSIX message queues
- r the maximum real-time scheduling priority
- s the maximum stack size
- t the maximum amount of cpu time in seconds
- u the maximum number of user processes
- v the size of virtual memory
- x the maximum number of file locks
- T the maximum number of threads

Not all options are available on all platforms.

If LIMIT is given, it is the new value of the specified resource; the special LIMIT values `soft', `hard', and `unlimited' stand for the current soft limit, the current hard limit, and no limit, respectively. Otherwise, the current value of the specified resource is printed. If no option is given, then -f is assumed.

Values are in 1024-byte increments, except for -t, which is in seconds, -p, which is in increments of 512 bytes, and -u, which is an unscaled number of processes.

Exit Status:

Returns success unless an invalid option is supplied or an error occurs.

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