Version : **2024.01**

Dernière mise-à-jour : 2024/10/18 11:37

LDF607 - Gestion du Noyau et des Quotas

Contenu du Module

Rôle du noyau

Le noyau ou *kernel* est la partie du système d'exploitation qui gère les entrées/sorties avec des périphériques. Dans certains cas il est préférable de

recompiler le noyau de Linux. La motivation de cette recompilation peut être :

- la diminution de la taille du noyau,
- la prise en charge de nouveau matériel,
- l'ajout de fonctionnalités,
- l'optimisation du code,
- la correction de bogues,
- le besoin d'une fonctionnalité expérimentale.

Commencez par identifier le noyau utilisé par votre machine :

```
root@debian11:~# uname -r
5.10.0-13-amd64
```

Dans le cas d'une utilisation courante de Linux, il est cependant préférable de faire appel aux **modules**. Les modules se trouvent dans le répertoire **/lib/modules/<version-du-noyau>** :

```
root@debian11:~# ls /lib/modules/`uname -r`/
kernel         modules.alias.bin  modules.builtin.alias.bin  modules.builtin.modinfo  modules.dep.bin
modules.order    modules.symbols
modules.alias  modules.builtin    modules.builtin.bin        modules.dep              modules.devname
modules.softdep  modules.symbols.bin
```

Les commandes pour manipuler les modules sont :

- insmod
- rmmod
- lsmod
- modprobe

Par exemple :

```
root@debian11:~# lsmod
Module                  Size  Used by
```

```
rfkill                  28672  1
raid456                180224  1
async_raid6_recov       24576  1 raid456
async_memcpy            20480  2 raid456,async_raid6_recov
async_pq                20480  2 raid456,async_raid6_recov
async_xor               20480  3 async_pq,raid456,async_raid6_recov
async_tx                20480  5 async_pq,async_memcpy,async_xor,raid456,async_raid6_recov
md_mod                 180224  1 raid456
sg                      36864  0
virtio_balloon          24576  0
joydev                  28672  0
qemu_fw_cfg             20480  0
pcspkr                  16384  0
serio_raw               20480  0
evdev                   28672  2
ecryptfs               122880  0
parport_pc              40960  0
ppdev                   24576  0
lp                      20480  0
parport                 69632  3 parport_pc,lp,ppdev
fuse                   167936  1
configfs                57344  1
ip_tables               32768  0
x_tables                53248  1 ip_tables
autofs4                 53248  2
ext4                   921600  1
crc16                   16384  1 ext4
mbcache                 16384  1 ext4
jbd2                   151552  1 ext4
hid_generic             16384  0
btrfs                 1568768  0
usbhid                  65536  0
hid                    147456  2 usbhid,hid_generic
blake2b_generic         20480  0
```

```
xor                    24576  2 async_xor,btrfs
raid6_pq              122880  4 async_pq,btrfs,raid456,async_raid6_recov
libcrc32c              16384  2 btrfs,raid456
crc32c_generic         16384  3
usb_storage            81920  0
dm_mod                163840  4
sd_mod                 61440  10
t10_pi                 16384  1 sd_mod
crc_t10dif             20480  1 t10_pi
crct10dif_generic      16384  1
crct10dif_common       16384  2 crct10dif_generic,crc_t10dif
sr_mod                 28672  0
cdrom                  73728  1 sr_mod
virtio_net             61440  0
net_failover           24576  1 virtio_net
failover               16384  1 net_failover
virtio_scsi            24576  8
bochs_drm              16384  0
ata_generic            16384  0
drm_vram_helper        20480  1 bochs_drm
uhci_hcd               53248  0
drm_ttm_helper         16384  1 drm_vram_helper
ttm                   114688  2 drm_vram_helper,drm_ttm_helper
ehci_hcd               98304  0
drm_kms_helper        278528  4 drm_vram_helper,bochs_drm
cec                    61440  1 drm_kms_helper
psmouse               184320  0
drm                   618496  6 drm_kms_helper,drm_vram_helper,bochs_drm,drm_ttm_helper,ttm
usbcore               323584  4 usbhid,usb_storage,ehci_hcd,uhci_hcd
ata_piix               36864  0
virtio_pci             28672  0
libata                290816  2 ata_piix,ata_generic
virtio_ring            36864  4 virtio_balloon,virtio_scsi,virtio_pci,virtio_net
virtio                 16384  4 virtio_balloon,virtio_scsi,virtio_pci,virtio_net
```

```
i2c_piix4              28672  0
scsi_mod              262144  6 virtio_scsi,sd_mod,usb_storage,libata,sg,sr_mod
usb_common             16384  3 usbcore,ehci_hcd,uhci_hcd
floppy                 90112  0
button                 24576  0
```

Pour ajouter un module, on peut utiliser la commande **insmod** ou **modprobe**. Cette dernière ajoute non seulement le module passé en argument mais également ses dépendances :

```
root@debian11:~# modprobe bonding

root@debian11:~# lsmod | head
Module                  Size  Used by
bonding               192512  0
rfkill                 28672  1
raid456               180224  1
async_raid6_recov      24576  1 raid456
async_memcpy           20480  2 raid456,async_raid6_recov
async_pq               20480  2 raid456,async_raid6_recov
async_xor              20480  3 async_pq,raid456,async_raid6_recov
async_tx               20480  5 async_pq,async_memcpy,async_xor,raid456,async_raid6_recov
md_mod                180224  1 raid456
```

Pour supprimer un module, on peut utiliser la commande **rmmod** ou **modprobe -r**. Cette dernière essaie de supprimer les dépendances non-utilisées :

```
root@debian11:~# modprobe -r bonding
root@debian11:~# lsmod | head
Module                  Size  Used by
rfkill                 28672  1
raid456               180224  1
async_raid6_recov      24576  1 raid456
async_memcpy           20480  2 raid456,async_raid6_recov
async_pq               20480  2 raid456,async_raid6_recov
async_xor              20480  3 async_pq,raid456,async_raid6_recov
```

```
async_tx               20480  5 async_pq,async_memcpy,async_xor,raid456,async_raid6_recov
md_mod                180224  1 raid456
sg                     36864  0
```

Les dépendances des modules sont résolues par la commande **modprobe** grâce aux fichier **/lib/modules/<version-du-noyau>/modules.dep**. Ce dernier peut être créé manuellement grâce à la commande **depmod** :

```
root@debian11:~# more /lib/modules/`uname -r`/modules.dep
kernel/arch/x86/events/amd/power.ko:
kernel/arch/x86/events/intel/intel-uncore.ko:
kernel/arch/x86/events/intel/intel-cstate.ko:
kernel/arch/x86/events/rapl.ko:
kernel/arch/x86/kernel/cpu/mce/mce-inject.ko:
kernel/arch/x86/kernel/msr.ko:
kernel/arch/x86/kernel/cpuid.ko:
kernel/arch/x86/crypto/glue_helper.ko:
kernel/arch/x86/crypto/twofish-x86_64.ko: kernel/crypto/twofish_common.ko
kernel/arch/x86/crypto/twofish-x86_64-3way.ko: kernel/arch/x86/crypto/twofish-x86_64.ko
kernel/crypto/twofish_common.ko kernel/arch/x86/crypto/glue_helper.ko
kernel/arch/x86/crypto/twofish-avx-x86_64.ko: kernel/crypto/crypto_simd.ko kernel/crypto/cryptd.ko
kernel/arch/x86/crypto/twofish-x86_64-3way.ko kernel/arch/x86/crypto/twofish-x86_64.ko kernel/crypto/twofish_co
mmon.ko kernel/arch/x86/crypto/glue_helper.ko
kernel/arch/x86/crypto/serpent-sse2-x86_64.ko: kernel/crypto/serpent_generic.ko kernel/crypto/crypto_simd.ko
kernel/crypto/cryptd.ko kernel/arch/x86/crypto/glue_helper.ko
kernel/arch/x86/crypto/serpent-avx-x86_64.ko: kernel/crypto/serpent_generic.ko kernel/crypto/crypto_simd.ko
kernel/crypto/cryptd.ko kernel/arch/x86/crypto/glue_helper.ko
kernel/arch/x86/crypto/serpent-avx2.ko: kernel/arch/x86/crypto/serpent-avx-x86_64.ko
kernel/crypto/serpent_generic.ko kernel/crypto/crypto_simd.ko kernel/crypto/cryptd.ko
kernel/arch/x86/crypto/glue_helper.ko
kernel/arch/x86/crypto/des3_ede-x86_64.ko: kernel/lib/crypto/libdes.ko
kernel/arch/x86/crypto/camellia-x86_64.ko: kernel/arch/x86/crypto/glue_helper.ko
kernel/arch/x86/crypto/camellia-aesni-avx-x86_64.ko: kernel/arch/x86/crypto/camellia-x86_64.ko
kernel/crypto/crypto_simd.ko kernel/crypto/cryptd.ko kernel/arch/x86/crypto/glue_helper.ko
kernel/arch/x86/crypto/camellia-aesni-avx2.ko: kernel/arch/x86/crypto/camellia-aesni-avx-x86_64.ko
```

```
kernel/arch/x86/crypto/camellia-x86_64.ko kernel/crypto/crypto_simd.ko kernel/crypto/cryptd.ko kernel/arch/x86/
crypto/glue_helper.ko
kernel/arch/x86/crypto/blowfish-x86_64.ko: kernel/crypto/blowfish_common.ko
kernel/arch/x86/crypto/cast5-avx-x86_64.ko: kernel/crypto/cast5_generic.ko kernel/crypto/cast_common.ko
kernel/crypto/crypto_simd.ko kernel/crypto/cryptd.ko
kernel/arch/x86/crypto/cast6-avx-x86_64.ko: kernel/crypto/cast6_generic.ko kernel/crypto/cast_common.ko
kernel/crypto/crypto_simd.ko kernel/crypto/cryptd.ko kernel/arch/x86/crypto/glue_helper.ko
kernel/arch/x86/crypto/aegis128-aesni.ko: kernel/crypto/crypto_simd.ko kernel/crypto/cryptd.ko
kernel/arch/x86/crypto/chacha-x86_64.ko: kernel/lib/crypto/libchacha.ko
kernel/arch/x86/crypto/aesni-intel.ko: kernel/lib/crypto/libaes.ko kernel/crypto/crypto_simd.ko
kernel/crypto/cryptd.ko kernel/arch/x86/crypto/glue_helper.ko
kernel/arch/x86/crypto/sha1-ssse3.ko:
kernel/arch/x86/crypto/sha256-ssse3.ko:
kernel/arch/x86/crypto/sha512-ssse3.ko: kernel/crypto/sha512_generic.ko
kernel/arch/x86/crypto/blake2s-x86_64.ko: kernel/lib/crypto/libblake2s-generic.ko
kernel/arch/x86/crypto/ghash-clmulni-intel.ko: kernel/crypto/cryptd.ko
kernel/arch/x86/crypto/crc32c-intel.ko:
kernel/arch/x86/crypto/crc32-pclmul.ko:
kernel/arch/x86/crypto/crct10dif-pclmul.ko: kernel/crypto/crct10dif_common.ko
kernel/arch/x86/crypto/poly1305-x86_64.ko:
kernel/arch/x86/crypto/curve25519-x86_64.ko: kernel/lib/crypto/libcurve25519-generic.ko
kernel/arch/x86/kvm/kvm.ko: kernel/virt/lib/irqbypass.ko
kernel/arch/x86/kvm/kvm-intel.ko: kernel/arch/x86/kvm/kvm.ko kernel/virt/lib/irqbypass.ko
kernel/arch/x86/kvm/kvm-amd.ko: kernel/drivers/crypto/ccp/ccp.ko kernel/drivers/char/hw_random/rng-core.ko
kernel/arch/x86/kvm/kvm.ko kernel/virt/lib/irqbypass.ko
kernel/mm/hwpoison-inject.ko:
kernel/mm/zsmalloc.ko:
kernel/mm/z3fold.ko:
kernel/fs/nfs_common/nfs_acl.ko: kernel/net/sunrpc/sunrpc.ko
kernel/fs/nfs_common/grace.ko:
kernel/fs/nfs_common/nfs_ssc.ko:
kernel/fs/quota/quota_v1.ko:
kernel/fs/quota/quota_v2.ko: kernel/fs/quota/quota_tree.ko
kernel/fs/quota/quota_tree.ko:
```

```
kernel/fs/nls/nls_cp437.ko:
kernel/fs/nls/nls_cp737.ko:
kernel/fs/nls/nls_cp775.ko:
kernel/fs/nls/nls_cp850.ko:
kernel/fs/nls/nls_cp852.ko:
kernel/fs/nls/nls_cp855.ko:
kernel/fs/nls/nls_cp857.ko:
kernel/fs/nls/nls_cp860.ko:
kernel/fs/nls/nls_cp861.ko:
kernel/fs/nls/nls_cp862.ko:
--More--(0%)
[q]
```

Il est possible d'obtenir des informations sur un module grâce à la commande **modinfo** :

```
root@debian11:~# modinfo bonding
filename:       /lib/modules/5.10.0-13-amd64/kernel/drivers/net/bonding/bonding.ko
author:         Thomas Davis, tadavis@lbl.gov and many others
description:    Ethernet Channel Bonding Driver
license:        GPL
alias:          rtnl-link-bond
depends:
retpoline:      Y
intree:         Y
name:           bonding
vermagic:       5.10.0-13-amd64 SMP mod_unload modversions
sig_id:         PKCS#7
signer:         Debian Secure Boot CA
sig_key:        4B:6E:F5:AB:CA:66:98:25:17:8E:05:2C:84:66:7C:CB:C0:53:1F:8C
sig_hashalgo:   sha256
signature:      52:9F:34:1A:E8:04:22:2E:4C:92:17:82:D2:22:83:59:38:E2:EB:D6:
                EC:81:C3:CD:F8:C1:B9:5F:FC:C2:6D:27:BC:7B:91:13:87:5B:2E:92:
                77:36:A1:3D:F8:41:5C:9B:1D:62:E1:90:F7:48:F4:4E:7E:85:F5:54:
                CD:51:99:A6:C4:E0:FB:2C:4F:D6:5F:11:15:93:7E:30:62:A9:FA:46:
```

```
                29:90:B2:58:A4:B4:34:8B:EA:EF:14:AD:D6:5D:6C:4D:03:C9:AC:0F:
                F1:28:A0:65:3C:AA:C8:CA:83:59:25:F3:09:20:F2:74:7F:5A:7D:BB:
                84:17:57:F5:E6:16:E5:CB:A9:A3:0C:F0:A9:04:4A:B2:63:98:80:30:
                73:EE:39:3A:86:3E:67:3C:2F:5C:38:1E:35:F9:79:6C:F6:60:7B:B5:
                9D:3C:EA:0D:0F:23:E1:EC:EA:42:4C:EF:EC:AB:3E:07:D3:35:D7:E4:
                4A:E4:D1:7A:50:F8:C1:50:5E:93:0C:A2:7D:D1:77:E2:3A:97:74:BA:
                D7:38:7E:C0:4C:36:66:00:78:03:E0:E3:20:46:70:13:7D:15:10:3A:
                85:B7:CB:10:3B:9A:DF:1A:4E:64:3D:BF:EC:21:7B:B1:4C:37:CE:30:
                0D:90:FE:73:87:20:40:83:60:02:0F:4F:4D:85:78:E7
parm:           max_bonds:Max number of bonded devices (int)
parm:           tx_queues:Max number of transmit queues (default = 16) (int)
parm:           num_grat_arp:Number of peer notifications to send on failover event (alias of num_unsol_na) (int)
parm:           num_unsol_na:Number of peer notifications to send on failover event (alias of num_grat_arp) (int)
parm:           miimon:Link check interval in milliseconds (int)
parm:           updelay:Delay before considering link up, in milliseconds (int)
parm:           downdelay:Delay before considering link down, in milliseconds (int)
parm:           use_carrier:Use netif_carrier_ok (vs MII ioctls) in miimon; 0 for off, 1 for on (default) (int)
parm:           mode:Mode of operation; 0 for balance-rr, 1 for active-backup, 2 for balance-xor, 3 for
broadcast, 4 for 802.3ad, 5 for balance-tlb, 6 for balance-alb (charp)
parm:           primary:Primary network device to use (charp)
parm:           primary_reselect:Reselect primary slave once it comes up; 0 for always (default), 1 for only if
speed of primary is better, 2 for only on active slave failure (charp)
parm:           lacp_rate:LACPDU tx rate to request from 802.3ad partner; 0 for slow, 1 for fast (charp)
parm:           ad_select:802.3ad aggregation selection logic; 0 for stable (default), 1 for bandwidth, 2 for
count (charp)
parm:           min_links:Minimum number of available links before turning on carrier (int)
parm:           xmit_hash_policy:balance-alb, balance-tlb, balance-xor, 802.3ad hashing method; 0 for layer 2
(default), 1 for layer 3+4, 2 for layer 2+3, 3 for encap layer 2+3, 4 for encap layer 3+4 (charp)
parm:           arp_interval:arp interval in milliseconds (int)
parm:           arp_ip_target:arp targets in n.n.n.n form (array of charp)
parm:           arp_validate:validate src/dst of ARP probes; 0 for none (default), 1 for active, 2 for backup, 3
for all (charp)
parm:           arp_all_targets:fail on any/all arp targets timeout; 0 for any (default), 1 for all (charp)
parm:           fail_over_mac:For active-backup, do not set all slaves to the same MAC; 0 for none (default), 1
```

```
for active, 2 for follow (charp)
parm:           all_slaves_active:Keep all frames received on an interface by setting active flag for all slaves;
0 for never (default), 1 for always. (int)
parm:           resend_igmp:Number of IGMP membership reports to send on link failure (int)
parm:           packets_per_slave:Packets to send per slave in balance-rr mode; 0 for a random slave, 1 packet
per slave (default), >1 packets per slave. (int)
parm:           lp_interval:The number of seconds between instances where the bonding driver sends learning
packets to each slaves peer switch. The default is 1. (uint)
```

Dernièrement, les fichiers dans le repertoire **/etc/modprobe.d** sont utilisés pour spécifier les options éventuelles à passer aux modules lors de leur chargement ainsi que les alias utilisés pour leur faire référence :

```
root@debian11:~# ls /etc/modprobe.d
mdadm.conf

root@debian11:~# cat /etc/modprobe.d/mdadm.conf
# mdadm module configuration file
# set start_ro=1 to make newly assembled arrays read-only initially,
# to prevent metadata writes.  This is needed in order to allow
# resume-from-disk to work - new boot should not perform writes
# because it will be done behind the back of the system being
# resumed.  See http://bugs.debian.org/415441 for details.

options md_mod start_ro=1
```

LAB #1 - Compilation et installation du noyau

Commencez par installer les paquets necessaires :

```
root@debian11:~# apt-get update
Hit:1 http://deb.debian.org/debian bullseye InRelease
Get:2 http://deb.debian.org/debian bullseye-updates InRelease [39.4 kB]
```

```
Get:3 http://security.debian.org/debian-security bullseye-security InRelease [44.1 kB]
Fetched 83.5 kB in 1s (158 kB/s)
Reading package lists... Done

root@debian11:~# apt-get -y install build-essential linux-source bc kmod cpio flex libncurses5-dev libelf-dev
libssl-dev dwarves debconf-utils dpkg-dev debhelper ncurses-dev libelf-dev flex bison rsync libssl-dev
```

1.1 - Déplacer /home

Créez une seule partition sur **/dev/sdb** :

```
root@debian11:~# fdisk /dev/sdb

Welcome to fdisk (util-linux 2.36.1).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.

Device does not contain a recognized partition table.
Created a new DOS disklabel with disk identifier 0xa10c368d.

Command (m for help): n
Partition type
   p   primary (0 primary, 0 extended, 4 free)
   e   extended (container for logical partitions)
Select (default p):

Using default response p.
Partition number (1-4, default 1):
First sector (2048-134217727, default 2048):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-134217727, default 134217727):

Created a new partition 1 of type 'Linux' and of size 64 GiB.
```

```
Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.
```

Créez maintenant un système de fichiers ext4 sur **/dev/sdb1** :

```
root@debian11:~# mkfs.ext4 /dev/sdb1
mke2fs 1.46.2 (28-Feb-2021)
Discarding device blocks: done
Creating filesystem with 16776960 4k blocks and 4194304 inodes
Filesystem UUID: 24f1821e-1d5b-4256-8ee3-c9ee6b382ddc
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
        4096000, 7962624, 11239424

Allocating group tables: done
Writing inode tables: done
Creating journal (65536 blocks): done
Writing superblocks and filesystem accounting information: done
```

Editez le fichier **/etc/ssh/sshd_config** et modifiez la directive **PermitRootLogin** :

```
root@debian11:~# vi /etc/ssh/sshd_config
root@debian11:~# cat /etc/ssh/sshd_config
#       $OpenBSD: sshd_config,v 1.103 2018/04/09 20:41:22 tj Exp $

# This is the sshd server system-wide configuration file.  See
# sshd_config(5) for more information.

# This sshd was compiled with PATH=/usr/bin:/bin:/usr/sbin:/sbin

# The strategy used for options in the default sshd_config shipped with
# OpenSSH is to specify options with their default value where
```

```
# possible, but leave them commented.  Uncommented options override the
# default value.

Include /etc/ssh/sshd_config.d/*.conf

#Port 22
#AddressFamily any
#ListenAddress 0.0.0.0
#ListenAddress ::

#HostKey /etc/ssh/ssh_host_rsa_key
#HostKey /etc/ssh/ssh_host_ecdsa_key
#HostKey /etc/ssh/ssh_host_ed25519_key

# Ciphers and keying
#RekeyLimit default none

# Logging
#SyslogFacility AUTH
#LogLevel INFO

# Authentication:

#LoginGraceTime 2m
PermitRootLogin yes
#StrictModes yes
#MaxAuthTries 6
#MaxSessions 10

...
```

Re-démarrez le serveur ssh :

```
root@debian11:~# systemctl restart sshd
```

```
root@debian11:~# systemctl status sshd
● ssh.service - OpenBSD Secure Shell server
     Loaded: loaded (/lib/systemd/system/ssh.service; enabled; vendor preset: enabled)
     Active: active (running) since Sun 2022-05-01 15:35:50 CEST; 6s ago
       Docs: man:sshd(8)
             man:sshd_config(5)
    Process: 2793 ExecStartPre=/usr/sbin/sshd -t (code=exited, status=0/SUCCESS)
   Main PID: 2794 (sshd)
      Tasks: 1 (limit: 4656)
     Memory: 1.1M
        CPU: 25ms
     CGroup: /system.slice/ssh.service
             └─2794 sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups

May 01 15:35:50 debian11 systemd[1]: Starting OpenBSD Secure Shell server...
May 01 15:35:50 debian11 sshd[2794]: Server listening on 0.0.0.0 port 22.
May 01 15:35:50 debian11 sshd[2794]: Server listening on :: port 22.
May 01 15:35:50 debian11 systemd[1]: Started OpenBSD Secure Shell server.
```

A Faire - Déconnectez-vous en ssh. Connectez-vous directement en tant que root en ssh.

Montez **/dev/sdb1** sur /mnt :

```
root@debian11:~# mount /dev/sdb1 /mnt
```

Copiez le contenu de /home vers /mnt :

```
root@debian11:~# cp -a /home/* /mnt
```

Démontez /dev/sdb1 :

```
root@debian11:~# umount /mnt
```

Identifiez l'UUID de /dev/sdb1 :

```
root@debian11:~# ls -l /dev/disk/by-uuid/ | grep sdb1
lrwxrwxrwx 1 root root 10 May  1 15:31 24f1821e-1d5b-4256-8ee3-c9ee6b382ddc -> ../../sdb1
```

Editez le fichier **/etc/fstab** en ajoutant la ligne pour le montage de /home :

```
root@debian11:~# vi /etc/fstab
root@debian11:~# cat /etc/fstab
# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# systemd generates mount units based on this file, see systemd.mount(5).
# Please run 'systemctl daemon-reload' after making changes here.
#
# <file system> <mount point>   <type>  <options>       <dump>  <pass>
# / was on /dev/sda1 during installation
UUID=9887a74f-a680-4bde-8f04-db5ae9ea186e /               ext4    errors=remount-ro 0       1
UUID=24f1821e-1d5b-4256-8ee3-c9ee6b382ddc /home           ext4    defaults      0 0
# swap was on /dev/sda5 during installation
UUID=1f9439f5-4b19-49b1-b292-60c2c674cee9 none            swap    sw              0       0
/dev/sr0        /media/cdrom0   udf,iso9660 user,noauto     0       0
```

Créez le point de montage /home :

```
root@debian11:~# rm -rf /home
root@debian11:~# mkdir /home
```

Montez /dev/sdb1 :

```
root@debian11:~# mount -a

root@debian11:~# mount
sysfs on /sys type sysfs (rw,nosuid,nodev,noexec,relatime)
proc on /proc type proc (rw,nosuid,nodev,noexec,relatime)
udev on /dev type devtmpfs (rw,nosuid,relatime,size=1986968k,nr_inodes=496742,mode=755)
devpts on /dev/pts type devpts (rw,nosuid,noexec,relatime,gid=5,mode=620,ptmxmode=000)
tmpfs on /run type tmpfs (rw,nosuid,nodev,noexec,relatime,size=402560k,mode=755)
/dev/sda1 on / type ext4 (rw,relatime,errors=remount-ro)
securityfs on /sys/kernel/security type securityfs (rw,nosuid,nodev,noexec,relatime)
tmpfs on /dev/shm type tmpfs (rw,nosuid,nodev)
tmpfs on /run/lock type tmpfs (rw,nosuid,nodev,noexec,relatime,size=5120k)
cgroup2 on /sys/fs/cgroup type cgroup2 (rw,nosuid,nodev,noexec,relatime,nsdelegate,memory_recursiveprot)
pstore on /sys/fs/pstore type pstore (rw,nosuid,nodev,noexec,relatime)
none on /sys/fs/bpf type bpf (rw,nosuid,nodev,noexec,relatime,mode=700)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs
(rw,relatime,fd=29,pgrp=1,timeout=0,minproto=5,maxproto=5,direct,pipe_ino=11732)
mqueue on /dev/mqueue type mqueue (rw,nosuid,nodev,noexec,relatime)
debugfs on /sys/kernel/debug type debugfs (rw,nosuid,nodev,noexec,relatime)
hugetlbfs on /dev/hugepages type hugetlbfs (rw,relatime,pagesize=2M)
tracefs on /sys/kernel/tracing type tracefs (rw,nosuid,nodev,noexec,relatime)
configfs on /sys/kernel/config type configfs (rw,nosuid,nodev,noexec,relatime)
fusectl on /sys/fs/fuse/connections type fusectl (rw,nosuid,nodev,noexec,relatime)
tmpfs on /run/user/0 type tmpfs (rw,nosuid,nodev,relatime,size=402556k,nr_inodes=100639,mode=700)
/dev/sdb1 on /home type ext4 (rw,relatime)
```

Notez la taille de /home :

```
root@debian11:~# df -h
Filesystem      Size  Used Avail Use% Mounted on
udev            1.9G     0  1.9G   0% /dev
tmpfs           394M  892K  393M   1% /run
```

```
/dev/sda1        31G  4.1G   25G  14% /
tmpfs           2.0G     0  2.0G   0% /dev/shm
tmpfs           5.0M     0  5.0M   0% /run/lock
tmpfs           394M   36K  394M   1% /run/user/0
/dev/sdb1        63G  1.4M   60G   1% /home
```

A Faire - Fermez la session de root et connectez-vous en tant que trainee en ssh.

1.2 - Télécharger le Code Source du Noyau

Le code source est disponible sur le site **www.kernel.org** :

```
trainee@debian11:~$ wget https://mirrors.edge.kernel.org/pub/linux/kernel/v5.x/linux-5.11.1.tar.gz
```

Désarchivez le tar.xz que vous avez téléchargé :

```
trainee@debian8:~$ tar xf linux-5.11.1.tar.gz
```

Notez que l'occupation disque du code source du noyau linux-5.11.1 est de 1.2 Go :

```
trainee@debian11:~$ du -hs ./linux-5.11.1
1.2G    ./linux-5.11.1
```

1.3 - Configurer le Noyau

Le fichier **Makefile** contient le nom du noyau et spécifie les informations suivantes :

- VERSION,

- PATCHLEVEL,
- SUBLEVEL,
- EXTRAVERSION.

Les trois premières informations sont gérées par **kernel.org** et Linus Torvalds en personne tandis que l'EXTRAVERSION est gérée par Debian :

```
trainee@debian11:~$ cat ./linux-5.11.1/Makefile | head
# SPDX-License-Identifier: GPL-2.0
VERSION = 5
PATCHLEVEL = 11
SUBLEVEL = 1
EXTRAVERSION =
NAME = □ Valentine's Day Edition □

# *DOCUMENTATION*
# To see a list of typical targets execute "make help"
# More info can be located in ./README
```

Important - La version 2.6 du noyau a vu le jour en **2003**. Les **SUBLEVEL** se suivaient régulièrement. Avec la version 2.6 du noyau, la valeur paire du **PATCHLEVEL** indiquait que le noyau était stable. Quand vous recompilez le noyau à partir des sources, vous devez modifier la valeur de l'EXTRAVERSION. Le passage à la version 3.0 fut décidé par Linus Torvalds à l'occasion des 20 ans du noyau Linux.

Utilisez maintenant la commande **make defconfig** pour créer le fichier de configuration .config :

```
trainee@debian11:~$ su -
Password: fenestros
root@debian11:~# cd /home/trainee/linux-5.11.1/
root@debian11:/home/trainee/linux-5.11.1# make defconfig
  HOSTCC  scripts/basic/fixdep
  HOSTCC  scripts/kconfig/conf.o
  HOSTCC  scripts/kconfig/confdata.o
```

```
  HOSTCC  scripts/kconfig/expr.o
  LEX     scripts/kconfig/lexer.lex.c
  YACC    scripts/kconfig/parser.tab.[ch]
  HOSTCC  scripts/kconfig/lexer.lex.o
  HOSTCC  scripts/kconfig/parser.tab.o
  HOSTCC  scripts/kconfig/preprocess.o
  HOSTCC  scripts/kconfig/symbol.o
  HOSTCC  scripts/kconfig/util.o
  HOSTLD  scripts/kconfig/conf
*** Default configuration is based on 'x86_64_defconfig'
#
# configuration written to .config
#
```

Ce fichier est configuré par une des trois commandes suivantes :

- make config
- make menuconfig
- make xconfig

Dans ce fichier, vous pouvez constater la présence de lignes correspondantes à des fonctionalités suivies par une lettre ou une valeur. Dans le cas d'une lettre, la signification est la suivante :

- **y**
  - la fonctionnalité est incluse dans le noyau monolithique ou dans le cas d'une dépendance d'un module, dans le module concerné,
- **m**
  - la fonctionnalité est incluse en tant que module,
- **n**
  - la fonctionnalité n'est pas incluse. Cette option est rarement visible car dans bien les cas, la fonctionnalité est simplement commentée dans le fichier lui-même.

```
root@debian11:/home/trainee/linux-5.11.1# more .config
#
# Automatically generated file; DO NOT EDIT.
# Linux/x86 5.11.1 Kernel Configuration
```

```
#
CONFIG_CC_VERSION_TEXT="gcc (Debian 10.2.1-6) 10.2.1 20210110"
CONFIG_CC_IS_GCC=y
CONFIG_GCC_VERSION=100201
CONFIG_LD_VERSION=235020000
CONFIG_CLANG_VERSION=0
CONFIG_LLD_VERSION=0
CONFIG_CC_CAN_LINK=y
CONFIG_CC_CAN_LINK_STATIC=y
CONFIG_CC_HAS_ASM_GOTO=y
CONFIG_CC_HAS_ASM_INLINE=y
CONFIG_IRQ_WORK=y
CONFIG_BUILDTIME_TABLE_SORT=y
CONFIG_THREAD_INFO_IN_TASK=y

#
# General setup
#
CONFIG_INIT_ENV_ARG_LIMIT=32
# CONFIG_COMPILE_TEST is not set
CONFIG_LOCALVERSION=""
# CONFIG_LOCALVERSION_AUTO is not set
CONFIG_BUILD_SALT=""
CONFIG_HAVE_KERNEL_GZIP=y
CONFIG_HAVE_KERNEL_BZIP2=y
CONFIG_HAVE_KERNEL_LZMA=y
CONFIG_HAVE_KERNEL_XZ=y
CONFIG_HAVE_KERNEL_LZO=y
CONFIG_HAVE_KERNEL_LZ4=y
CONFIG_HAVE_KERNEL_ZSTD=y
CONFIG_KERNEL_GZIP=y
# CONFIG_KERNEL_BZIP2 is not set
# CONFIG_KERNEL_LZMA is not set
# CONFIG_KERNEL_XZ is not set
```

```
# CONFIG_KERNEL_LZO is not set
# CONFIG_KERNEL_LZ4 is not set
# CONFIG_KERNEL_ZSTD is not set
CONFIG_DEFAULT_INIT=""
CONFIG_DEFAULT_HOSTNAME="(none)"
CONFIG_SWAP=y
CONFIG_SYSVIPC=y
CONFIG_SYSVIPC_SYSCTL=y
CONFIG_POSIX_MQUEUE=y
CONFIG_POSIX_MQUEUE_SYSCTL=y
# CONFIG_WATCH_QUEUE is not set
CONFIG_CROSS_MEMORY_ATTACH=y
CONFIG_USELIB=y
CONFIG_AUDIT=y
CONFIG_HAVE_ARCH_AUDITSYSCALL=y
CONFIG_AUDITSYSCALL=y

#
# IRQ subsystem
#
CONFIG_GENERIC_IRQ_PROBE=y
--More--(1%)
[q]
```

1.4 - Compiler le Noyau

La compilation du noyau peut prendre beaucoup de temps. La commande utilisée est la suivante :

```
root@debian11:/home/trainee/linux-5.11.1# make deb-pkg clean
...
dpkg-buildpackage: info: full upload (original source is included)
  CLEAN   arch/x86/entry/vdso
  CLEAN   arch/x86/kernel/cpu
```

```
  CLEAN   arch/x86/kernel
  CLEAN   arch/x86/realmode/rm
  CLEAN   arch/x86/lib
  CLEAN   certs
  CLEAN   drivers/firmware/efi/libstub
  CLEAN   drivers/scsi
  CLEAN   drivers/tty/vt
  CLEAN   drivers/video/logo
  CLEAN   lib
  CLEAN   net/wireless
  CLEAN   security/selinux
  CLEAN   usr/include
  CLEAN   usr
  CLEAN   arch/x86/boot/compressed
  CLEAN   arch/x86/boot
  CLEAN   arch/x86/tools
  CLEAN   vmlinux.symvers modules.builtin modules.builtin.modinfo
```

A l'issu du processus, les paquets du nouveau noyau se trouvent dans le répertoire **/home/trainee** :

```
root@debian11:/home/trainee/linux-5.11.1# cd ..
root@debian11:/home/trainee# ls
Desktop    linux-5.11.1                          linux-5.11.1_5.11.1-1.diff.gz    linux-5.11.1.tar.gz
linux-libc-dev_5.11.1-1_amd64.deb  Public
Documents  linux-5.11.1_5.11.1-1_amd64.buildinfo  linux-5.11.1_5.11.1-1.dsc        linux-
headers-5.11.1_5.11.1-1_amd64.deb  Music                                 Templates
Downloads  linux-5.11.1_5.11.1-1_amd64.changes    linux-5.11.1_5.11.1.orig.tar.gz  linux-
image-5.11.1_5.11.1-1_amd64.deb    Pictures                              Videos
```

1.5 - Installer le Noyau

Installez maintenant les paquets **deb** :

```
root@debian11:/home/trainee# dpkg -i /home/trainee/linux*.deb
```

Constatez la création d'un nouveau grub.cfg :

```
root@debian11:/home/trainee# grep 5.11.1 /boot/grub/grub.cfg
        echo    'Loading Linux 5.11.1 ...'
        linux   /boot/vmlinuz-5.11.1 root=UUID=9887a74f-a680-4bde-8f04-db5ae9ea186e ro  quiet
        initrd  /boot/initrd.img-5.11.1
        menuentry 'Debian GNU/Linux, with Linux 5.11.1' --class debian --class gnu-linux --class gnu --class os
$menuentry_id_option 'gnulinux-5.11.1-advanced-9887a74f-a680-4bde-8f04-db5ae9ea186e' {
                echo    'Loading Linux 5.11.1 ...'
                linux   /boot/vmlinuz-5.11.1 root=UUID=9887a74f-a680-4bde-8f04-db5ae9ea186e ro  quiet
                initrd  /boot/initrd.img-5.11.1
        menuentry 'Debian GNU/Linux, with Linux 5.11.1 (recovery mode)' --class debian --class gnu-linux --class
gnu --class os $menuentry_id_option 'gnulinux-5.11.1-recovery-9887a74f-a680-4bde-8f04-db5ae9ea186e' {
                echo    'Loading Linux 5.11.1 ...'
                linux   /boot/vmlinuz-5.11.1 root=UUID=9887a74f-a680-4bde-8f04-db5ae9ea186e ro single
                initrd  /boot/initrd.img-5.11.1
```

1.6 - Désinstaller un Noyau

Lister les noyaux installés :

```
root@debian11:/home/trainee# dpkg -l | grep -i "linux-image*" | awk '{print $2}'
linux-image-5.10.0-13-amd64
linux-image-5.11.1
linux-image-amd64
```

Le noyau se désinstalle comme tout autre paquet :

```
root@debian11:/home/trainee# apt-get -y purge "linux-image-5.11.1"
Reading package lists... Done
```

```
Building dependency tree... Done
Reading state information... Done
The following packages will be REMOVED:
  linux-image-5.11.1*
0 upgraded, 0 newly installed, 1 to remove and 0 not upgraded.
After this operation, 15.1 MB disk space will be freed.
(Reading database ... 118012 files and directories currently installed.)
Removing linux-image-5.11.1 (5.11.1-1) ...
update-initramfs: Deleting /boot/initrd.img-5.11.1
Generating grub configuration file ...
Found background image: /usr/share/images/desktop-base/desktop-grub.png
Found linux image: /boot/vmlinuz-5.10.0-13-amd64
Found initrd image: /boot/initrd.img-5.10.0-13-amd64
done
(Reading database ... 117967 files and directories currently installed.)
Purging configuration files for linux-image-5.11.1 (5.11.1-1) ...
```

Vérifiez que le fichier grub.cfg a été modifié :

```
root@debian11:/home/trainee# grep 5.11.1 /boot/grub/grub.cfg
root@debian11:/home/trainee#
```

Dernièrement, listez les noyaux disponibles :

```
root@debian11:/home/trainee# dpkg -l | grep -i "linux-image*" | awk '{print $2}'
linux-image-5.10.0-13-amd64
linux-image-amd64
```

LAB #2 - Mise à Jour du Noyau avec le Gestionnaire des Paquets

Afin d'obtenir la **dernière version du noyau pré-compliée** par Debian, il convient d'ajouter les dépôts **unstable** :

```
root@debian11:/home/trainee# echo "deb http://deb.debian.org/debian unstable main contrib non-free" | sudo tee -a
/etc/apt/sources.list
deb http://deb.debian.org/debian unstable main contrib non-free
root@debian11:/home/trainee# echo "deb-src http://deb.debian.org/debian unstable main contrib non-free" | sudo
tee -a /etc/apt/sources.list
deb-src http://deb.debian.org/debian unstable main contrib non-free
```

Afin de ne faire que des mises à jour du **noyau** à partir de ce dépôt, créez le fichier **/etc/apt/preferences** :

```
root@debian11:/home/trainee# vi /etc/apt/preferences
root@debian11:/home/trainee# cat /etc/apt/preferences
Package: *
Pin: release a=bullseye
Pin-Priority: 500

Package: linux-image-amd64
Pin: release a=unstable
Pin-Priority: 1000

Package: *
Pin: release a=unstable
Pin-Priority: 100
```

Mettez à jour apt :

```
root@debian11:/home/trainee# apt update
Hit:1 http://security.debian.org/debian-security bullseye-security InRelease
Hit:2 http://deb.debian.org/debian bullseye InRelease
Get:3 http://deb.debian.org/debian bullseye-updates InRelease [39.4 kB]
Get:4 http://deb.debian.org/debian unstable InRelease [165 kB]
Get:5 http://deb.debian.org/debian unstable/contrib Sources [57.6 kB]
Get:6 http://deb.debian.org/debian unstable/main Sources [9,700 kB]
Get:7 http://deb.debian.org/debian unstable/non-free Sources [89.6 kB]
Get:8 http://deb.debian.org/debian unstable/main amd64 Packages [9,154 kB]
```

```
Get:9 http://deb.debian.org/debian unstable/main Translation-en [6,780 kB]
Get:10 http://deb.debian.org/debian unstable/contrib amd64 Packages [65.4 kB]
Get:11 http://deb.debian.org/debian unstable/contrib Translation-en [55.9 kB]
Get:12 http://deb.debian.org/debian unstable/non-free amd64 Packages [112 kB]
Get:13 http://deb.debian.org/debian unstable/non-free Translation-en [103 kB]
Fetched 26.3 MB in 5s (4,955 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
2 packages can be upgraded. Run 'apt list --upgradable' to see them.
```

Installez ensuite les mises-à-jour du noyau :

```
root@debian11:/home/trainee# apt -y  upgrade
```

Re-démarrez votre VM :

```
root@debian11:/home/trainee# reboot
```

Connectez-vous de nouveau à la VM et contrôlez la version du noyau :

```
trainee@debian11:~$ uname -a
Linux debian11 5.17.0-1-amd64 #1 SMP PREEMPT Debian 5.17.3-1 (2022-04-18) x86_64 GNU/Linux
```

Déconnectez-vous et re-connectez-vous directement en tant que root.

LAB #3 - Gestion des Quotas

Sous Linux il est possible de mettre en place des quotas par utilisateur et par groupe. Ceci étant, Linux ne sait pas gérer des quotas par répertoire, uniquement des quotas par partition. L'administrateur met souvent des quotas en place sur l'arborescence de /home pour limiter l'espace de stockage occupé par les utilisateurs.

Commencez par vérifiez que le paquet **quota** est bien installé :

```
root@debian11:~# dpkg --get-selections | grep quota
root@debian11:~# apt -y install quota
```

Editez le fichier **/etc/fstab** en ajoutant les options **usrquota** et **grpquota** à la ligne **/home** :

```
root@debian11:~# vi /etc/fstab
root@debian11:~# cat /etc/fstab
# /etc/fstab: static file system information.
#
# Use 'blkid' to print the universally unique identifier for a
# device; this may be used with UUID= as a more robust way to name devices
# that works even if disks are added and removed. See fstab(5).
#
# systemd generates mount units based on this file, see systemd.mount(5).
# Please run 'systemctl daemon-reload' after making changes here.
#
# <file system> <mount point>   <type>  <options>       <dump>  <pass>
# / was on /dev/sda1 during installation
UUID=9887a74f-a680-4bde-8f04-db5ae9ea186e /               ext4    errors=remount-ro 0       1
UUID=24f1821e-1d5b-4256-8ee3-c9ee6b382ddc /home           ext4    defaults,usrquota,grpquota    0 0
# swap was on /dev/sda5 during installation
UUID=1f9439f5-4b19-49b1-b292-60c2c674cee9 none            swap    sw              0       0
/dev/sr0        /media/cdrom0   udf,iso9660 user,noauto     0       0
```

Démontez puis remontez /home :

```
root@debian11:~# umount /home
root@debian11:~# mount -a
```

Vérifiez ensuite que les options soient prises en compte :

```
root@debian11:~# cat /etc/mtab
```

```
sysfs /sys sysfs rw,nosuid,nodev,noexec,relatime 0 0
proc /proc proc rw,nosuid,nodev,noexec,relatime 0 0
udev /dev devtmpfs rw,nosuid,relatime,size=1976600k,nr_inodes=494150,mode=755,inode64 0 0
devpts /dev/pts devpts rw,nosuid,noexec,relatime,gid=5,mode=620,ptmxmode=000 0 0
tmpfs /run tmpfs rw,nosuid,nodev,noexec,relatime,size=402384k,mode=755,inode64 0 0
/dev/sda1 / ext4 rw,relatime,errors=remount-ro 0 0
securityfs /sys/kernel/security securityfs rw,nosuid,nodev,noexec,relatime 0 0
tmpfs /dev/shm tmpfs rw,nosuid,nodev,inode64 0 0
tmpfs /run/lock tmpfs rw,nosuid,nodev,noexec,relatime,size=5120k,inode64 0 0
cgroup2 /sys/fs/cgroup cgroup2 rw,nosuid,nodev,noexec,relatime,nsdelegate,memory_recursiveprot 0 0
pstore /sys/fs/pstore pstore rw,nosuid,nodev,noexec,relatime 0 0
bpf /sys/fs/bpf bpf rw,nosuid,nodev,noexec,relatime,mode=700 0 0
systemd-1 /proc/sys/fs/binfmt_misc autofs
rw,relatime,fd=29,pgrp=1,timeout=0,minproto=5,maxproto=5,direct,pipe_ino=13172 0 0
mqueue /dev/mqueue mqueue rw,nosuid,nodev,noexec,relatime 0 0
hugetlbfs /dev/hugepages hugetlbfs rw,relatime,pagesize=2M 0 0
tracefs /sys/kernel/tracing tracefs rw,nosuid,nodev,noexec,relatime 0 0
debugfs /sys/kernel/debug debugfs rw,nosuid,nodev,noexec,relatime 0 0
configfs /sys/kernel/config configfs rw,nosuid,nodev,noexec,relatime 0 0
fusectl /sys/fs/fuse/connections fusectl rw,nosuid,nodev,noexec,relatime 0 0
tmpfs /run/user/0 tmpfs rw,nosuid,nodev,relatime,size=402380k,nr_inodes=100595,mode=700,inode64 0 0
/dev/sdb1 /home ext4 rw,relatime,quota,usrquota,grpquota 0 0
```

3.1 - La Commande quotacheck

Pour activer les quotas sur /home, il convient d'utiliser la commande **quotacheck** :

```
root@debian11:~# quotacheck -cugvm -f /dev/sdb1
quotacheck: Your kernel probably supports ext4 quota feature but you are using external quota files. Please
switch your filesystem to use ext4 quota feature as external quota files on ext4 are deprecated.
quotacheck: Scanning /dev/sdb1 [/home] done
quotacheck: Cannot stat old user quota file /home/aquota.user: No such file or directory. Usage will not be
subtracted.
```

```
quotacheck: Cannot stat old group quota file /home/aquota.group: No such file or directory. Usage will not be
subtracted.
quotacheck: Cannot stat old user quota file /home/aquota.user: No such file or directory. Usage will not be
subtracted.
quotacheck: Cannot stat old group quota file /home/aquota.group: No such file or directory. Usage will not be
subtracted.
quotacheck: Checked 7199 directories and 81583 files
quotacheck: Old file not found.
quotacheck: Old file not found.
```

Les options de la commande quotacheck sont :

```
root@debian11:~# quotacheck --help
Utility for checking and repairing quota files.
quotacheck [-gucbfinvdmMR] [-F <quota-format>] filesystem|-a

-u, --user                check user files
-g, --group               check group files
-c, --create-files        create new quota files
-b, --backup              create backups of old quota files
-f, --force               force check even if quotas are enabled
-i, --interactive         interactive mode
-n, --use-first-dquot     use the first copy of duplicated structure
-v, --verbose             print more information
-d, --debug               print even more messages
-m, --no-remount          do not remount filesystem read-only
-M, --try-remount         try remounting filesystem read-only,
                          continue even if it fails
-R, --exclude-root        exclude root when checking all filesystems
-F, --format=formatname   check quota files of specific format
-a, --all                 check all filesystems
-h, --help                display this message and exit
-V, --version             display version information and exit
```

```
Bugs to jack@suse.cz
```

Les quotas ont été activés et les fichier **aquota.user** et **aquota.group** ont été créés dans le répertoire /home :

```
root@debian11:~# ls -la /home
total 44
drwxr-xr-x  4 root    root     4096 May  1 18:05 .
drwxr-xr-x 20 root    root     4096 May  1 17:41 ..
-rw-------  1 root    root     7168 May  1 18:05 aquota.group
-rw-------  1 root    root     7168 May  1 18:05 aquota.user
drwx------  2 root    root    16384 May  1 15:31 lost+found
drwxr-xr-x 15 trainee trainee  4096 May  1 16:28 trainee
```

Créez maintenant un utilisateur **fenestros** avec le mot de passe **fenestros** :

```
root@debian11:~# groupadd fenestros && useradd -m fenestros -c FenestrOs -d /home/fenestros -g fenestros -s
/bin/bash
root@debian11:~# passwd fenestros
New password: fenestros
Retype new password: fenestros
passwd: password updated successfully
```

3.2 - La Commande edquota

Mettez en place maintenant un quota de 10Mo pour l'utilisateur **fenestros** :

```
root@debian8:~# EDITOR=/usr/bin/vi
root@debian8:~# export EDITOR
root@debian8:~# edquota -u fenestros -f /home
```

L'éditeur **vi** se lance et vous obtiendrez un résultat similaire à celui-ci :

```
Disk quotas for user fenestros (uid 1001):
  Filesystem                   blocks       soft       hard     inodes     soft     hard
  /dev/sdb1                         0          0          0          0        0        0
```

Modifiez ce fichier ainsi :

```
Disk quotas for user fenestros (uid 1001):
  Filesystem                   blocks       soft       hard     inodes     soft     hard
  /dev/sdb1                         0       8000      10000          0        0        0
```

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

```
root@debian11:~# edquota --help
edquota: Usage:
        edquota [-rm] [-u] [-F formatname] [-p username] [-f filesystem] username ...
        edquota [-rm] -g [-F formatname] [-p groupname] [-f filesystem] groupname ...
        edquota [-rm] -P [-F formatname] [-p projectname] [-f filesystem] projectname ...
        edquota [-u|g|-P] [-F formatname] [-f filesystem] -t
        edquota [-u|g|-P] [-F formatname] [-f filesystem] -T username|groupname|projectname ...

-u, --user                    edit user data
-g, --group                   edit group data
-P, --project                 edit project data
-r, --remote                  edit remote quota (via RPC)
-m, --no-mixed-pathnames      trim leading slashes from NFSv4 mountpoints
-F, --format=formatname       edit quotas of a specific format
-p, --prototype=name          copy data from a prototype user/group
    --always-resolve          always try to resolve name, even if it is
                              composed only of digits
-f, --filesystem=filesystem   edit data only on a specific filesystem
-t, --edit-period             edit grace period
-T, --edit-times              edit grace time of a user/group
-h, --help                    display this help text and exit
-V, --version                 display version information and exit
```

```
Bugs to: jack@suse.cz
```

Important - Pour mettre en place un quota par group, la procédure est similaire. Il suffit d'utiliser l'option -g de la commande edquota.

3.3 - La Commande quotaon

Appliquez maintenant les quotas :

```
root@debian11:~# quotaon -a
```

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

```
root@debian11:~# quotaon --help
quotaon: Usage:
        quotaon [-guPvp] [-F quotaformat] [-x state] -a
        quotaon [-guPvp] [-F quotaformat] [-x state] filesys ...

-a, --all               turn quotas on for all filesystems
-f, --off               turn quotas off
-u, --user              operate on user quotas
-g, --group             operate on group quotas
-P, --project           operate on project quotas
-p, --print-state       print whether quotas are on or off
-x, --xfs-command=cmd   perform XFS quota command
-F, --format=formatname  operate on specific quota format
-v, --verbose           print more messages
-h, --help              display this help text and exit
-V, --version           display version information and exit
```

De cette manière vous avez mis en place un quota **souple** pour fenestros de 8 000 Ko et un quota **stricte** de 10 000 Ko.

Quand l'utilisateur fenestros aura dépassé le quota **souple**, il recevra un message d'avertissement. Quand il dépasse le quota **stricte**, il ne pourra plus enregistrer dans /home, sauf dans le cas où il supprime des fichiers pour retomber en dessous de la limite **stricte**.

Il est à noter que vous pouvez soit mettre en place un quota en taille, soit mettre en place un quota basé sur le nombre d'inodes utilisés par l'utilisateur.

Important - La commande pour désactivez les quotas est **quotaoff**.

3.4 - La Commande repquota

Pour visualiser les quotas utilisez la commande **repquota** :

```
root@debian11:~# repquota /home
*** Report for user quotas on device /dev/sdb1
Block grace time: 7days; Inode grace time: 7days
                        Block limits                File limits
User            used    soft    hard  grace    used  soft  hard  grace
----------------------------------------------------------------------
root      --  241004       0       0           2528     0     0
trainee   -- 1409108       0       0          86253     0     0
```

Important - Notez que l'utilisateur fenestros ne figure pas dans la liste. Le quota n'est pas visible tant que l'utilisateur ne s'est pas connecté pour la première fois. Notez aussi les période de grâce de **7** jours.

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

```
root@debian11:~# repquota --help
```

```
repquota: Utility for reporting quotas.
Usage:
repquota [-vugsi] [-c|C] [-t|n] [-F quotaformat] [-O (default | xml | csv)] (-a | mntpoint)

-v, --verbose                 display also users/groups without any usage
-u, --user                    display information about users
-g, --group                   display information about groups
-P, --project                 display information about projects
-s, --human-readable[=units]  display numbers in human friendly units (MB, GB,
                              ...). Units can be also specified explicitely by
                              an optional argument in format [kgt],[kgt] where
                              the first character specifies space units and the
                              second character specifies inode units
-t, --truncate-names          truncate names to 9 characters
-p, --raw-grace               print grace time in seconds since epoch
-n, --no-names                do not translate uid/gid to name
-i, --no-autofs               avoid autofs mountpoints
-c, --cache                   translate big number of ids at once
-C, --no-cache                translate ids one by one
-F, --format=formatname       report information for specific format
-O, --output=format           format output as xml or csv
-a, --all                     report information for all mount points with
                              quotas
-h, --help                    display this help message and exit
-V, --version                 display version information and exit

Bugs to jack@suse.cz
```

3.5 - La Commande quota

Pour visualiser les quotas d'un utilisateur spécifique, il convient d'utiliser la commande **quota** :

```
root@debian11:~# quota fenestros
```

```
Disk quotas for user fenestros (uid 1001): no limited resources used

root@debian11:~# su - fenestros

fenestros@debian11:~$ touch test

fenestros@debian11:~$ exit
logout

root@debian11:~# quota fenestros
Disk quotas for user fenestros (uid 1001):
     Filesystem  blocks   quota   limit   grace   files   quota   limit   grace
      /dev/sdb1       4    8000   10000               2       0       0
```

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

```
root@debian11:~# quota --help
quota: Usage: quota [-guPqvswim] [-l | [-Q | -A]] [-F quotaformat]
        quota [-qvswim] [-l | [-Q | -A]] [-F quotaformat] -u username ...
        quota [-qvswim] [-l | [-Q | -A]] [-F quotaformat] -g groupname ...
        quota [-qvswim] [-l | [-Q | -A]] [-F quotaformat] -P projectname ...
        quota [-qvswugPQm] [-F quotaformat] -f filesystem ...

-u, --user                    display quota for user
-g, --group                   display quota for group
-P, --project                 display quota for project
-q, --quiet                   print more terse message
-v, --verbose                 print more verbose message
-s, --human-readable[=units]  display numbers in human friendly units (MB, GB,
                              ...). Units can be also specified explicitely by
                              an optional argument in format [kgt],[kgt] where
                              the first character specifies space units and the
                              second character specifies inode units
    --always-resolve          always try to translate name to id, even if it is
```

```
                              composed of only digits
-w, --no-wrap                 do not wrap long lines
-p, --raw-grace               print grace time in seconds since epoch
-l, --local-only              do not query NFS filesystems
-Q, --quiet-refuse            do not print error message when NFS server does
                              not respond
-i, --no-autofs               do not query autofs mountpoints
-F, --format=formatname       display quota of a specific format
-f, --filesystem-list         display quota information only for given
                              filesystems
    --filesystem=path         display quota information only for given
                              filesystem, remaining command line arguments
                              are still treated as user/group/project names
-A, --all-nfs                 display quota for all NFS mountpoints
-m, --no-mixed-pathnames      trim leading slashes from NFSv4 mountpoints
    --show-mntpoint           show mount point of the file system in output
    --hide-device             do not show file system device in output
-h, --help                    display this help message and exit
-V, --version                 display version information and exit

Bugs to: jack@suse.cz
```

3.6 - La Commande warnquota

La commande **warnquota** vérifie le ou les disques et envoie un message par mail à tout utilisateur qui a dépassé la limite soft. Elle est enrègle générale appelée par un job cron. Cependant elle peut aussi est appelée d'une manière intéractive.

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

```
root@debian11:~# warnquota --help
warnquota: Usage:
  warnquota [-ugsid] [-F quotaformat] [-c configfile] [-q quotatabfile] [-a adminsfile] [filesystem...]
```

```
-u, --user                      warn users
-g, --group                     warn groups
-s, --human-readable[=units]    display numbers in human friendly units (MB,
                                GB, ...). Units can be also specified
                                explicitely by an optional argument in format
                                [kgt],[kgt] where the first character specifies
                                space units and the second character specifies
                                inode units
-i, --no-autofs                 avoid autofs mountpoints
-d, --no-details                do not send quota information itself
-F, --format=formatname         use quotafiles of specific format
-c, --config=config-file        non-default config file
-q, --quota-tab=quotatab-file   non-default quotatab
-a, --admins-file=admins-file   non-default admins file
-I, --ignore-config-errors      ignore unknown statements in config file
-h, --help                      display this help message and exit
-V, --version                   display version information and exit

warnquota: Bugs to jack@suse.cz
```
