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LCF512 - Gestion du Noyau et des Quotas

Contenu du Module

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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 mettre à jour CentOS 8 :

```
[root@centos8 ~]# dnf update
...
[root@centos8 ~]# reboot
```

Identifiez ensuite le noyau utilisé par votre machine virtuelle :

```
[root@centos8 ~]# uname -r
4.18.0-305.7.1.el8_4.x86_64
```

LAB #1 - Modules

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@centos8 ~]# ls /lib/modules/`uname -r`/
bls.conf          modules.builtin    modules.networking  System.map
build             modules.builtin.bin modules.order        updates
```

config	modules.dep	modules.softdep	vdso
kernel	modules.dep.bin	modules.symbols	vmlinuz
modules.alias	modules.devname	modules.symbols.bin	weak-updates
modules.alias.bin	modules.drm	source	
modules.block	modules.modetesting	symvers.gz	

Les commandes pour manipuler les modules sont :

- insmod
- rmmod
- lsmod
- modprobe

Par exemple :

```
[root@centos8 ~]# lsmod
Module                Size  Used by
xt_CHECKSUM           16384  1
ipt_MASQUERADE        16384  3
xt_conntrack          16384  1
ipt_REJECT            16384  2
nft_compat            20480  16
nf_nat_tftp           16384  0
nft_objref            16384  1
nf_conntrack_tftp     16384  3 nf_nat_tftp
nft_counter           16384  33
tun                   53248  1
bridge               192512  0
stp                   16384  1 bridge
llc                   16384  2 bridge,stp
nft_fib_inet          16384  1
nft_fib_ipv4          16384  1 nft_fib_inet
nft_fib_ipv6          16384  1 nft_fib_inet
nft_fib               16384  3 nft_fib_ipv6,nft_fib_ipv4,nft_fib_inet
```

nft_reject_inet	16384	5	
nf_reject_ipv4	16384	2	nft_reject_inet, ipt_REJECT
nf_reject_ipv6	16384	1	nft_reject_inet
nft_reject	16384	1	nft_reject_inet
nft_ct	20480	19	
nf_tables_set	49152	21	
nft_chain_nat	16384	12	
nf_nat	45056	3	ipt_MASQUERADE, nf_nat_tftp, nft_chain_nat
nf_conntrack	172032	6	xt_conntrack, nf_nat, nf_conntrack_tftp, nft_ct, ipt_MASQUERADE, nf_nat_tftp
nf_defrag_ipv6	20480	1	nf_conntrack
nf_defrag_ipv4	16384	1	nf_conntrack
ip_set	49152	0	
nf_tables	172032	414	
nft_ct, nft_compat, nft_reject_inet, nft_fib_ipv6, nft_objref, nft_fib_ipv4, nft_counter, nft_chain_nat, nf_tables_set, nft_reject, nft_fib, nft_fib_inet			
nfnetlink	16384	4	nft_compat, nf_tables, ip_set
sunrpc	540672	1	
ext4	761856	1	
mbcache	16384	1	ext4
jbd2	131072	1	ext4
virtio_balloon	20480	0	
pcspkr	16384	0	
i2c_piix4	24576	0	
joydev	24576	0	
ip_tables	28672	0	
xfs	1515520	1	
libcrc32c	16384	4	nf_conntrack, nf_nat, nf_tables, xfs
sr_mod	28672	0	
sd_mod	53248	3	
cdrom	65536	1	sr_mod
t10_pi	16384	1	sd_mod
sg	40960	0	
ata_generic	16384	0	
bochs_drm	16384	1	

drm_vram_helper	28672	1	bochs_drm
drm_kms_helper	233472	4	drm_vram_helper,bochs_drm
syscopyarea	16384	1	drm_kms_helper
sysfillrect	16384	1	drm_kms_helper
sysimgblt	16384	1	drm_kms_helper
fb_sys_fops	16384	1	drm_kms_helper
drm_ttm_helper	16384	1	drm_vram_helper
ttm	114688	2	drm_vram_helper,drm_ttm_helper
drm	569344	7	drm_kms_helper,drm_vram_helper,bochs_drm,drm_ttm_helper,ttm
ahci	40960	2	
libahci	40960	1	ahci
virtio_net	53248	0	
net_failover	24576	1	virtio_net
ata_piix	36864	0	
serio_raw	16384	0	
failover	16384	1	net_failover
libata	270336	4	ata_piix,libahci,ahci,ata_generic
dm_mirror	28672	0	
dm_region_hash	20480	1	dm_mirror
dm_log	20480	2	dm_region_hash,dm_mirror
dm_mod	151552	8	dm_log,dm_mirror
fuse	151552	3	

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@centos8 ~]# modprobe bonding
[root@centos8 ~]# lsmod | more
Module                Size  Used by
bonding                196608  0
xt_CHECKSUM            16384   1
ipt_MASQUERADE         16384   3
xt_conntrack           16384   1
ipt_REJECT             16384   2
```

```

nft_compat      20480 16
nf_nat_tftp     16384 0
nft_objref      16384 1
nf_conntrack_tftp 16384 3 nf_nat_tftp
nft_counter     16384 33
tun             53248 1
bridge          192512 0
stp             16384 1 bridge
llc             16384 2 bridge,stp
nft_fib_inet    16384 1
nft_fib_ipv4    16384 1 nft_fib_inet
nft_fib_ipv6    16384 1 nft_fib_inet
nft_fib         16384 3 nft_fib_ipv6,nft_fib_ipv4,nft_fib_inet
nft_reject_inet 16384 5
nf_reject_ipv4  16384 2 nft_reject_inet,ipt_REJECT
nf_reject_ipv6  16384 1 nft_reject_inet
--More--

```

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

```

[root@centos8 ~]# modprobe -r bonding
[root@centos8 ~]# lsmod | more
Module          Size  Used by
xt_CHECKSUM     16384  1
ipt_MASQUERADE  16384  3
xt_conntrack    16384  1
ipt_REJECT      16384  2
nft_compat      20480 16
nf_nat_tftp     16384  0
nft_objref      16384  1
nf_conntrack_tftp 16384 3 nf_nat_tftp
nft_counter     16384 33
tun             53248  1
bridge          192512 0

```

```

stp          16384 1 bridge
llc          16384 2 bridge,stp
nft_fib_inet 16384 1
nft_fib_ipv4 16384 1 nft_fib_inet
nft_fib_ipv6 16384 1 nft_fib_inet
nft_fib      16384 3 nft_fib_ipv6,nft_fib_ipv4,nft_fib_inet
nft_reject_inet 16384 5
nf_reject_ipv4 16384 2 nft_reject_inet,ipt_REJECT
nf_reject_ipv6 16384 1 nft_reject_inet
nft_reject   16384 1 nft_reject_inet
--More--

```

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@centos8 ~]# more /lib/modules/`uname -r`/modules.dep
kernel/arch/x86/events/amd/power.ko.xz:
kernel/arch/x86/events/intel/intel-uncore.ko.xz:
kernel/arch/x86/events/intel/intel-cstate.ko.xz:
kernel/arch/x86/events/rapl.ko.xz:
kernel/arch/x86/kernel/cpu/mce/mce-inject.ko.xz:
kernel/arch/x86/crypto/des3_edc-x86_64.ko.xz: kernel/crypto/des_generic.ko.xz
kernel/arch/x86/crypto/camellia-x86_64.ko.xz:
kernel/arch/x86/crypto/blowfish-x86_64.ko.xz: kernel/crypto/blowfish_common.ko.xz
kernel/arch/x86/crypto/twofish-x86_64.ko.xz: kernel/crypto/twofish_common.ko.xz
kernel/arch/x86/crypto/twofish-x86_64-3way.ko.xz: kernel/arch/x86/crypto/twofish-x86_64.ko.
xz kernel/crypto/twofish_common.ko.xz
kernel/arch/x86/crypto/chacha20-x86_64.ko.xz: kernel/crypto/chacha20_generic.ko.xz
kernel/arch/x86/crypto/serpent-sse2-x86_64.ko.xz: kernel/crypto/serpent_generic.ko.xz
kernel/arch/x86/crypto/ghash-clmulni-intel.ko.xz:
kernel/arch/x86/crypto/crc32c-intel.ko.xz:
kernel/arch/x86/crypto/crc32-pclmul.ko.xz:
kernel/arch/x86/crypto/sha512-ssse3.ko.xz: kernel/crypto/sha512_generic.ko.xz
kernel/arch/x86/crypto/crct10dif-pclmul.ko.xz:

```

```
kernel/arch/x86/crypto/poly1305-x86_64.ko.xz: kernel/crypto/poly1305_generic.ko.xz
kernel/arch/x86/crypto/camellia-aesni-avx-x86_64.ko.xz: kernel/arch/x86/crypto/camellia-x86_64.ko.xz
kernel/arch/x86/crypto/cast5-avx-x86_64.ko.xz: kernel/crypto/cast5_generic.ko.xz kernel/cry
--More-- (0%)
```

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

```
[root@centos8 ~]# modinfo bonding
filename:      /lib/modules/4.18.0-305.7.1.el8_4.x86_64/kernel/drivers/net/bonding/bonding.ko.xz
author:        Thomas Davis, tadavis@lbl.gov and many others
description:   Ethernet Channel Bonding Driver
license:       GPL
alias:         rtnl-link-bond
rhelversion:   8.4
srcversion:    445F4CC9A2F7E64E3A87FD0
depends:
intree:        Y
name:          bonding
vermagic:      4.18.0-305.7.1.el8_4.x86_64 SMP mod_unload modversions
sig_id:        PKCS#7
signer:        CentOS kernel signing key
sig_key:       3B:5A:0A:B8:8E:4A:51:C0:AA:FF:97:FD:CB:94:D6:B6:D2:46:B8:17
sig_hashalgo:  sha256
signature:     B2:3A:20:BE:2B:F3:E0:5A:1A:74:0E:69:76:40:2A:D4:80:10:2C:5A:
               B7:F1:1E:7A:71:13:29:F0:0A:4A:28:EE:81:33:C8:C2:5C:BD:FF:E4:
               3F:A9:15:A3:9A:0E:A7:98:9E:99:06:23:10:47:D3:B2:48:B3:F1:61:
               BE:4B:B0:FC:62:B9:3B:D6:64:CC:E3:29:01:4D:91:92:32:FD:EB:54:
               44:F1:2C:1B:23:30:F1:3E:EE:69:EA:94:54:D9:A0:8D:16:53:F5:20:
               DE:38:A0:13:E8:2F:89:66:CB:11:D7:AA:30:37:7B:EC:DF:A1:69:29:
               7F:4E:80:4D:34:6E:F2:07:01:FA:18:23:94:58:10:C6:97:27:68:B9:
               D8:08:5E:9D:00:17:F4:1B:48:BE:CA:BF:5C:5A:A8:6D:36:EE:3F:95:
               BA:BE:59:82:EE:7B:CA:BB:32:1E:E3:05:ED:C9:C2:C8:10:64:B9:29:
               B8:09:4B:79:42:65:1A:FA:99:96:BA:7E:2D:6E:75:F1:91:0E:F4:9A:
```

```

8F:11:10:9F:70:BD:35:06:BE:F0:4C:D8:AB:D5:C4:E1:B3:A2:2A:CA:
58:CA:9E:16:1D:0C:BE:9C:37:A1:82:20:6F:24:CD:23:63:F7:F5:BC:
6E:81:14:F0:52:DA:04:0E:9D:CC:17:60:2D:B0:D8:BD:6E:2C:AD:E7:
50:48:49:B6:57:96:AC:FD:A4:29:33:01:43:92:32:88:A2:AC:CB:93:
2F:C3:29:F3:01:77:84:00:AB:AA:C8:59:43:F1:DA:90:7B:5F:9A:A9:
CA:60:97:34:85:5E:98:56:73:03:0D:D7:8D:A6:AB:51:D4:8C:92:91:
0C:0A:BA:6B:92:01:16:FE:8B:86:80:11:5F:8E:21:BD:C2:2F:02:58:
A6:CF:6C:E3:87:28:8B:4D:CE:54:8C:00:B3:F7:AE:9E:01:81:1E:83:
AE:6D:58:B0:10:98:36:D9:69:76:E2:C0:E2:15:94:3B:D4:14:19:D9:
59:86:75:31

```

```

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, 5 for vlan+srcmac
(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@centos8 ~]# ls /etc/modprobe.d
firewalld-sysctls.conf  lockd.conf  nvdim-security.conf  tuned.conf
kvm.conf               mlx4.conf  truescale.conf      vhost.conf

[root@centos8 ~]# cat /etc/modprobe.d/kvm.conf
# Setting modprobe kvm_intel/kvm_amd nested = 1
# only enables Nested Virtualization until the next reboot or
# module reload. Uncomment the option applicable
# to your system below to enable the feature permanently.
#
# User changes in this file are preserved across upgrades.
#
# For Intel
#options kvm_intel nested=1
#
# For AMD
#options kvm_amd nested=1
```

LAB #2 - Compilation et installation du noyau et des modules

Activez le dépôt **CentOS-Linux-PowerTools** en passant la directive **enabled** à **1** :

```
[root@centos8 ~]# vi /etc/yum.repos.d/CentOS-Linux-PowerTools.repo
[root@centos8 ~]# cat /etc/yum.repos.d/CentOS-Linux-PowerTools.repo
# CentOS-Linux-PowerTools.repo
#
# The mirrorlist system uses the connecting IP address of the client and the
# update status of each mirror to pick current mirrors that are geographically
# close to the client.  You should use this for CentOS updates unless you are
# manually picking other mirrors.
#
# If the mirrorlist does not work for you, you can try the commented out
# baseurl line instead.

[powertools]
name=CentOS Linux $releasever - PowerTools
mirrorlist=http://mirrorlist.centos.org/?release=$releasever&arch=$basearch&repo=PowerTools&infra=$infra
#baseurl=http://mirror.centos.org/$contentdir/$releasever/PowerTools/$basearch/os/
gpgcheck=1
enabled=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-centosofficial
```

Installez maintenant les paquets nécessaires :

```
[root@centos8 ~]# dnf groupinstall "Development Tools"
...
[root@centos8 ~]# dnf install asciidoc audit-libs-devel bash bc binutils binutils-devel bison diffutils elfutils
elfutils-devel elfutils-libelf-devel findutils flex gawk gcc gettext gzip htmldoc hostname make module-init-
tools ncurses-devel net-tools newt-devel numactl-devel openssl patch pciutils-devel perl perl-ExtUtils-Embed
pesign redhat-rpm-config rpm-build rpmdevtools sh-utils tar xmlto xz zlib-devel rpmdevtools
```

...

2.1 - Déplacer /home



Important - Il n'est pas conseillé de compiler en tant que root pour des raisons de sécurité. Pour pouvoir utiliser le compte d'un utilisateur pour créer un nouveau noyau, celui-ci doit disposer de plus de 10 Go d'espace libre.



A faire - Déconnectez-vous de votre session **CentOS8_SSH_10.0.2.45** et re-connectez-vous à la VM en tant que root en utilisant la connexion **CentOS8_ROOT_10.0.2.45**.

Créez ensuite une seule partition sur **/dev/sdc** :

```
[root@centos8 ~]# fdisk /dev/sdc

Welcome to fdisk (util-linux 2.32.1).
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 0xc321702b.

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 (2048-41943039, default 2048):  
Last sector, +sectors or +size{K,M,G,T,P} (2048-41943039, default 41943039):  
  
Created a new partition 1 of type 'Linux' and of size 20 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/sdc1** :

```
[root@centos8 ~]# mkfs.ext4 /dev/sdc1  
mke2fs 1.45.6 (20-Mar-2020)  
Discarding device blocks: done  
Creating filesystem with 16776960 4k blocks and 4194304 inodes  
Filesystem UUID: dc92c0d7-919b-4fff-8719-53e9e7e628dd  
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
```

Montez **/dev/sdc1** sur /mnt :

```
[root@centos8 ~]# mount /dev/sdc1 /mnt
```

Copiez le contenu de /home vers /mnt :

```
[root@centos8 ~]# cp -a /home/* /mnt
```

Démontez /dev/sdc1 et déplacez /home vers /root :

```
[root@centos8 ~]# umount /mnt
[root@centos8 ~]# mv /home /root
```

Identifiez l'UUID de /dev/sdc1 :

```
[root@centos8 ~]# ls -l /dev/disk/by-uuid/ | grep sdc1
lrwxrwxrwx. 1 root root 10 Jul 19 12:02 f76d6b66-985b-4a91-af9c-4987e8c1443c -> ../../sdc
[root@centos8 ~]#
```

Editez le fichier **/etc/fstab** et ajoutez une ligne pour /dev/sdc1 :

```
[root@centos8 ~]# vi /etc/fstab
[root@centos8 ~]# cat /etc/fstab

#
# /etc/fstab
# Created by anaconda on Wed Jun 16 06:21:32 2021
#
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
#
# After editing this file, run 'systemctl daemon-reload' to update systemd
# units generated from this file.
#
/dev/mapper/cl_centos8-root / xfs defaults 0 0
UUID=1c04981e-5317-4b73-9695-3ce25246835d /boot ext4 defaults 1 2
/dev/mapper/cl_centos8-swap swap swap defaults 0 0
UUID=f76d6b66-985b-4a91-af9c-4987e8c1443c /home ext4 defaults 1 2
```

Créez le point de montage /home :

```
[root@centos8 ~]# mkdir /home
```

Montez /dev/sdc1 :

```
[root@centos8 ~]# mount -a
[root@centos8 ~]# mount
sysfs on /sys type sysfs (rw,nosuid,nodev,noexec,relatime,seclabel)
proc on /proc type proc (rw,nosuid,nodev,noexec,relatime)
devtmpfs on /dev type devtmpfs (rw,nosuid,seclabel,size=1882880k,nr_inodes=470720,mode=755)
securityfs on /sys/kernel/security type securityfs (rw,nosuid,nodev,noexec,relatime)
tmpfs on /dev/shm type tmpfs (rw,nosuid,nodev,seclabel)
devpts on /dev/pts type devpts (rw,nosuid,noexec,relatime,seclabel,gid=5,mode=620,ptmxmode=000)
tmpfs on /run type tmpfs (rw,nosuid,nodev,seclabel,mode=755)
tmpfs on /sys/fs/cgroup type tmpfs (ro,nosuid,nodev,noexec,seclabel,mode=755)
cgroup on /sys/fs/cgroup/systemd type cgroup
(rw,nosuid,nodev,noexec,relatime,seclabel,xattr,release_agent=/usr/lib/systemd/systemd-cgroups-
agent,name=systemd)
pstore on /sys/fs/pstore type pstore (rw,nosuid,nodev,noexec,relatime,seclabel)
bpf on /sys/fs/bpf type bpf (rw,nosuid,nodev,noexec,relatime,mode=700)
cgroup on /sys/fs/cgroup/hugetlb type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,hugetlb)
cgroup on /sys/fs/cgroup/memory type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,memory)
cgroup on /sys/fs/cgroup/cpu,cpuacct type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,cpu,cpuacct)
cgroup on /sys/fs/cgroup/rdma type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,rdma)
cgroup on /sys/fs/cgroup/pids type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,pids)
cgroup on /sys/fs/cgroup/cpuset type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,cpuset)
cgroup on /sys/fs/cgroup/perf_event type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,perf_event)
cgroup on /sys/fs/cgroup/freezer type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,freezer)
cgroup on /sys/fs/cgroup/blkio type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,blkio)
cgroup on /sys/fs/cgroup/net_cls,net_prio type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,net_cls,net_prio)
cgroup on /sys/fs/cgroup/devices type cgroup (rw,nosuid,nodev,noexec,relatime,seclabel,devices)
none on /sys/kernel/tracing type tracefs (rw,relatime,seclabel)
configfs on /sys/kernel/config type configfs (rw,relatime)
```

```

/dev/mapper/cl_centos8-root on / type xfs (rw,relatime,seclabel,attr2,inode64,logbufs=8,logbsize=32k,noquota)
selinuxfs on /sys/fs/selinux type selinuxfs (rw,relatime)
mqueue on /dev/mqueue type mqueue (rw,relatime,seclabel)
hugetlbfs on /dev/hugepages type hugetlbfs (rw,relatime,seclabel,pagesize=2M)
debugfs on /sys/kernel/debug type debugfs (rw,relatime,seclabel)
systemd-1 on /proc/sys/fs/binfmt_misc type autofs
(rw,relatime,fd=40,prgrp=1,timeout=0,minproto=5,maxproto=5,direct,pipe_ino=6022)
fusectl on /sys/fs/fuse/connections type fusectl (rw,relatime)
/dev/sda1 on /boot type ext4 (rw,relatime,seclabel)
sunrpc on /var/lib/nfs/rpc_pipefs type rpc_pipefs (rw,relatime)
tmpfs on /run/user/1000 type tmpfs (rw,nosuid,nodev,relatime,seclabel,size=382500k,mode=700,uid=1000,gid=1000)
tmpfs on /run/user/42 type tmpfs (rw,nosuid,nodev,relatime,seclabel,size=382500k,mode=700,uid=42,gid=42)
gvfsd-fuse on /run/user/1000/gvfs type fuse.gvfsd-fuse (rw,nosuid,nodev,relatime,user_id=1000,group_id=1000)
tmpfs on /run/user/0 type tmpfs (rw,nosuid,nodev,relatime,seclabel,size=382500k,mode=700)
gvfsd-fuse on /run/user/0/gvfs type fuse.gvfsd-fuse (rw,nosuid,nodev,relatime,user_id=0,group_id=0)
/dev/sdc1 on /home type ext4 (rw,relatime,seclabel)

```

Notez la taille de /home :

```

[root@centos8 ~]# df -h

```

Filesystem	Size	Used	Avail	Use%	Mounted on
devtmpfs	1.8G	0	1.8G	0%	/dev
tmpfs	1.9G	0	1.9G	0%	/dev/shm
tmpfs	1.9G	9.4M	1.9G	1%	/run
tmpfs	1.9G	0	1.9G	0%	/sys/fs/cgroup
/dev/mapper/cl_centos8-root	28G	5.2G	23G	19%	/
/dev/sda1	976M	289M	620M	32%	/boot
tmpfs	374M	16K	374M	1%	/run/user/1000
tmpfs	374M	1.2M	373M	1%	/run/user/42
/dev/sdc1	63G	67M	60G	1%	/home



A faire - Déconnectez-vous de votre session **CentOS8_ROOT_10.0.2.45** et re-



connectez-vous à la VM en tant que trainee en utilisant la connexion
CentOS8_SSH_10.0.2.45.

2.2 - Préparer l'Environnement

Pour créer l'arborescence de l'environnement de création de paquets dans /home/trainee, utilisez la commande **rpmdev-setuptree** :

```
[trainee@centos8 ~]$ rpmdev-setuptree
...>
[trainee@centos8 ~]$ ls -laR rpmbuild/
rpmbuild/:
total 28
drwxrwxr-x.  7 trainee trainee 4096 Jul 19 12:10 .
drwxr-xr-x. 17 trainee trainee 4096 Jul 19 12:10 ..
drwxrwxr-x.  2 trainee trainee 4096 Jul 19 12:10 BUILD
drwxrwxr-x.  2 trainee trainee 4096 Jul 19 12:10 RPMS
drwxrwxr-x.  2 trainee trainee 4096 Jul 19 12:10 SOURCES
drwxrwxr-x.  2 trainee trainee 4096 Jul 19 12:10 SPECS
drwxrwxr-x.  2 trainee trainee 4096 Jul 19 12:10 SRPMS

rpmbuild/BUILD:
total 8
drwxrwxr-x. 2 trainee trainee 4096 Jul 19 12:10 .
drwxrwxr-x. 7 trainee trainee 4096 Jul 19 12:10 ..

rpmbuild/RPMS:
total 8
drwxrwxr-x. 2 trainee trainee 4096 Jul 19 12:10 .
drwxrwxr-x. 7 trainee trainee 4096 Jul 19 12:10 ..

rpmbuild/SOURCES:
```

```
total 8
drwxrwxr-x. 2 trainee trainee 4096 Jul 19 12:10 .
drwxrwxr-x. 7 trainee trainee 4096 Jul 19 12:10 ..

rpmbuild/SPECS:
total 8
drwxrwxr-x. 2 trainee trainee 4096 Jul 19 12:10 .
drwxrwxr-x. 7 trainee trainee 4096 Jul 19 12:10 ..

rpmbuild/SRPMS:
total 8
drwxrwxr-x. 2 trainee trainee 4096 Jul 19 12:10 .
drwxrwxr-x. 7 trainee trainee 4096 Jul 19 12:10 ..
```

Téléchargez le rpm source du noyau :

```
[trainee@centos8 ~]$ uname -a
Linux centos8.ittraining.loc 4.18.0-305.7.1.el8_4.x86_64 #1 SMP Tue Jun 29 21:55:12 UTC 2021 x86_64 x86_64 x86_64
GNU/Linux

[trainee@centos8 ~]$ cat /etc/centos-release
CentOS Linux release 8.4.2105

[trainee@centos8 ~]$ wget
https://vault.centos.org/8.4.2105/BaseOS/Source/SPackages/kernel-4.18.0-305.7.1.el8_4.src.rpm
--2021-07-14 02:54:14--
https://vault.centos.org/8.4.2105/BaseOS/Source/SPackages/kernel-4.18.0-305.7.1.el8_4.src.rpm
Resolving vault.centos.org (vault.centos.org)... 81.171.33.194, 2a05:d014:10:7803:4af1:9320:7050:d28e
Connecting to vault.centos.org (vault.centos.org)|81.171.33.194|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 123000617 (117M) [application/x-rpm]
Saving to: 'kernel-4.18.0-305.7.1.el8_4.src.rpm'

kernel-4.18.0-305.7.1. 100%[=====>] 117.30M  1.49MB/s   in 79s
```

```
2021-07-14 02:55:33 (1.49 MB/s) - 'kernel-4.18.0-305.7.1.el8_4.src.rpm' saved [123000617/123000617]
```

Installez maintenant les dépendances pour le rpm source en tant que root :

```
[trainee@centos8 ~]$ su -  
Mot de passe : fenestros  
  
[root@centos8 ~]# dnf install yum-utils  
...  
  
[root@centos8 ~]# yum-builddep /home/trainee/kernel-4.18.0-305.7.1.el8_4.src.rpm  
...
```

Installez maintenant le paquet **kernel-4.18.0-305.7.1.el8_4.src.rpm** :

[illegible]

[illegible]

[illegible]

```
warning: group mockbuild does not exist - using root
##### [100%]
warning: user mockbuild does not exist - using root
warning: group mockbuild does not exist - using root
warning: user mockbuild does not exist - using root
warning: group mockbuild does not exist - using root
warning: user mockbuild does not exist - using root
warning: group mockbuild does not exist - using root
warning: user mockbuild does not exist - using root
warning: group mockbuild does not exist - using root
warning: user mockbuild does not exist - using root
warning: group mockbuild does not exist - using root
warning: user mockbuild does not exist - using root
warning: group mockbuild does not exist - using root
warning: user mockbuild does not exist - using root
warning: group mockbuild does not exist - using root
warning: user mockbuild does not exist - using root
warning: group mockbuild does not exist - using root
```



Important - Les erreurs sont sans importance.

2.3 - Préparer l'Arborescence Source du Noyau

Naviguez vers le repertoire **~/rpmbuild/SPECS** et utilisez la commande **rpmbuild** pour préparer l'arborescence source du noyau :

```
[trainee@centos7 ~]$ cd ~/rpmbuild/SPECS
[trainee@centos7 SPECS]$ rpmbuild -bp --target=$(uname -m) kernel.spec
...
```

A l'issu du processus, examinez l'arborescence :

```
[trainee@centos8 SPECS]$ ls -la ~/rpmbuild/BUILD/kernel-4.18.0-305.7.1.el8_4/linux-4.18.0-305.7.1.el8.x86_64/
total 812
drwxr-xr-x. 26 trainee trainee 4096 Jul 14 03:13 .
drwxr-xr-x.  3 trainee trainee 4096 Jul 14 03:12 ..
drwxr-xr-x. 27 trainee trainee 4096 Jul 14 03:13 arch
drwxr-xr-x.  3 trainee trainee 4096 Jun 14 10:33 block
drwxr-xr-x.  2 trainee trainee 4096 Jul 14 03:13 certs
-rw-r--r--.  1 trainee trainee 13079 Jun 14 10:33 .clang-format
-rw-r--r--.  1 trainee trainee   59 Jun 14 10:33 .cocciconfig
drwxr-xr-x.  2 trainee trainee 4096 Jul 14 03:13 configs
-rw-r--r--.  1 trainee trainee  423 Jun 14 10:33 COPYING-4.18.0
-rw-r--r--.  1 trainee trainee 98651 Jun 14 10:33 CREDITS
drwxr-xr-x.  4 trainee trainee 4096 Jun 14 10:33 crypto
drwxr-xr-x. 119 trainee trainee 4096 Jul 14 03:13 Documentation
drwxr-xr-x. 137 trainee trainee 4096 Jun 14 10:33 drivers
drwxr-xr-x.  2 trainee trainee 4096 Jul 14 03:13 firmware
drwxr-xr-x. 73 trainee trainee 4096 Jun 14 10:33 fs
-rw-r--r--.  1 trainee trainee   68 Jun 14 10:33 .get_maintainer.conf
-rw-r--r--.  1 trainee trainee   31 Jun 14 10:33 .get_maintainer.ignore
-rw-r--r--.  1 trainee trainee   76 Jun 14 10:33 .gitattributes
-rw-r--r--.  1 trainee trainee 1639 Jun 14 10:33 .gitlab-ci-private.yml
-rw-r--r--.  1 trainee trainee 1668 Jun 14 10:33 .gitlab-ci.yml
drwxr-xr-x. 30 trainee trainee 4096 Jun 14 10:33 include
drwxr-xr-x.  2 trainee trainee 4096 Jun 14 10:33 init
drwxr-xr-x.  2 trainee trainee 4096 Jun 14 10:33 ipc
-rw-r--r--.  1 trainee trainee 2245 Jun 14 10:33 Kbuild
-rw-r--r--.  1 trainee trainee   575 Jun 14 10:33 Kconfig
drwxr-xr-x. 19 trainee trainee 4096 Jul 14 03:13 kernel
drwxr-xr-x. 20 trainee trainee 12288 Jul 14 03:13 lib
drwxr-xr-x.  5 trainee trainee 4096 Jun 14 10:33 LICENSES
-rw-r--r--.  1 trainee trainee  9559 Jun 14 10:33 .mailmap
-rw-r--r--.  1 trainee trainee 471696 Jun 14 10:33 MAINTAINERS
-rw-r--r--.  1 trainee trainee 61558 Jun 14 10:33 Makefile
-rw-r--r--.  1 trainee trainee  1324 Jun 14 10:33 Makefile.rhelver
```

```
-rw-r--r--. 1 trainee trainee 0 Jul 14 03:13 .mismatches
drwxr-xr-x. 3 trainee trainee 4096 Jun 14 10:33 mm
drwxr-xr-x. 72 trainee trainee 4096 Jun 14 10:33 net
-rw-r--r--. 1 trainee trainee 800 Jun 14 10:33 README
drwxr-xr-x. 28 trainee trainee 4096 Jun 14 10:33 samples
-rw-r--r--. 1 trainee trainee 0 Jul 14 03:12 .scmversion
drwxr-xr-x. 14 trainee trainee 4096 Jul 14 03:13 scripts
drwxr-xr-x. 10 trainee trainee 4096 Jun 14 10:33 security
drwxr-xr-x. 26 trainee trainee 4096 Jun 14 10:33 sound
drwxr-xr-x. 33 trainee trainee 4096 Jun 14 10:33 tools
drwxr-xr-x. 2 trainee trainee 4096 Jul 14 03:13 usr
drwxr-xr-x. 4 trainee trainee 4096 Jun 14 10:33 virt
```

Le Fichier .config

Changez de répertoire de travail :

```
[trainee@centos8 SPECS]$ cd ~/rpmbuild/BUILD/kernel-*/linux-*/
```

Copiez le fichier **configs/kernel-4.18.0-`uname -m`.config** vers **.config** dans le répertoire courant :

```
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ cp configs/kernel-4.18.0-`uname -m`.config .config
```

Mettez à jour le fichier .config par rapport à la configuration actuelle du noyau :

```
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ make oldconfig
scripts/kconfig/conf --oldconfig Kconfig
#
# configuration written to .config
#
```





Important - Cette commande lit le fichier `.config` du noyau actuel et le compare avec celui des sources du noyau. S'il existent des nouvelles configurations à effectuer dans les sources du noyau, la commande vous pose des questions.

La configuration du noyau se trouve dans un fichier dénommé **.config**. Le fichier **.config** est généré par une des trois commandes suivantes et ne doit **pas** être édité manuellement :

- `make config`
- `make menuconfig`
- `make xconfig`

Exécutez la commande **make menuconfig** :

```
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ make menuconfig
UPD      scripts/kconfig/.mconf-cfg
HOSTCC   scripts/kconfig/mconf.o
HOSTCC   scripts/kconfig/lxdialog/checklist.o
HOSTCC   scripts/kconfig/lxdialog/inputbox.o
HOSTCC   scripts/kconfig/lxdialog/menubox.o
HOSTCC   scripts/kconfig/lxdialog/textbox.o
HOSTCC   scripts/kconfig/lxdialog/util.o
HOSTCC   scripts/kconfig/lxdialog/yesno.o
HOSTLD   scripts/kconfig/mconf
scripts/kconfig/mconf  Kconfig
#
# using defaults found in /boot/config-4.18.0-305.7.1.el8_4.x86_64
#
```

Dans l'interface, vous pouvez constater la présence de lignes correspondantes à des fonctionnalités 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.



Important - Cette commande permet la modification de la configuration du noyau.

Sauvegardez simplement la configuration actuelle et sortez de l'interface :

```
*** End of the configuration.
*** Execute 'make' to start the build or try 'make help'.
```

Vérifiez que le fichier **.config** a été créé par l'exécution de makeconfig :

```
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ ls -a
.      certs      configs      Documentation  .get_maintainer.conf  .gitlab-ci.yml  Kbuild  LICENSES
Makefile.rhelver  README      security  virt
..     .clang-format  COPYING-4.18.0  drivers      .get_maintainer.ignore  include        Kconfig  .mailmap
.mismatches      samples      sound
arch  .coocciconfig  CREDITS      firmware    .gitattributes        init           kernel   MAINTAINERS
mm     .scmversion    tools
block .config        crypto      fs          .gitlab-ci-private.yml  ipc           lib      Makefile
net    scripts      usr
```

Consultez ce fichier :

```
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ more .config
#
# Automatically generated file; DO NOT EDIT.
# Linux/x86 4.18.0 Kernel Configuration
#
```

```
#
# Compiler: gcc (GCC) 8.4.1 20200928 (Red Hat 8.4.1-1)
#
CONFIG_64BIT=y
CONFIG_X86_64=y
CONFIG_X86=y
CONFIG_INSTRUCTION_DECODER=y
CONFIG_OUTPUT_FORMAT="elf64-x86-64"
CONFIG_ARCH_DEFCONFIG="arch/x86/configs/x86_64_defconfig"
CONFIG_LOCKDEP_SUPPORT=y
CONFIG_STACKTRACE_SUPPORT=y
CONFIG_MMU=y
CONFIG_ARCH_MMAP_RND_BITS_MIN=28
CONFIG_ARCH_MMAP_RND_BITS_MAX=32
CONFIG_ARCH_MMAP_RND_COMPAT_BITS_MIN=8
CONFIG_ARCH_MMAP_RND_COMPAT_BITS_MAX=16
CONFIG_GENERIC_ISA_DMA=y
CONFIG_GENERIC_BUG=y
CONFIG_GENERIC_BUG_RELATIVE_POINTERS=y
CONFIG_GENERIC_HWEIGHT=y
CONFIG_ARCH_MAY_HAVE_PC_FDC=y
CONFIG_GENERIC_CALIBRATE_DELAY=y
CONFIG_ARCH_HAS_CPU_RELAX=y
CONFIG_ARCH_HAS_CACHE_LINE_SIZE=y
CONFIG_ARCH_HAS_FILTER_PGPROT=y
CONFIG_HAVE_SETUP_PER_CPU_AREA=y
CONFIG_NEED_PER_CPU_EMBED_FIRST_CHUNK=y
CONFIG_NEED_PER_CPU_PAGE_FIRST_CHUNK=y
CONFIG_ARCH_HIBERNATION_POSSIBLE=y
CONFIG_ARCH_SUSPEND_POSSIBLE=y
CONFIG_ARCH_WANT_HUGE_PMD_SHARE=y
CONFIG_ARCH_WANT_GENERAL_HUGETLB=y
CONFIG_ZONE_DMA32=y
CONFIG_AUDIT_ARCH=y
```

```
CONFIG_ARCH_SUPPORTS_OPTIMIZED_INLINING=y
CONFIG_ARCH_SUPPORTS_DEBUG_PAGEALLOC=y
CONFIG_HAVE_INTEL_TXT=y
CONFIG_X86_64_SMP=y
--More-- (0%)
```

Le Fichier Makefile

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 Red Hat :

```
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ more Makefile
# SPDX-License-Identifier: GPL-2.0
VERSION = 4
PATCHLEVEL = 18
SUBLEVEL = 0
EXTRAVERSION =
NAME = Merciless Moray

#
# DRM backport version
#
RHEL_DRM_VERSION = 5
RHEL_DRM_PATCHLEVEL = 9
RHEL_DRM_SUBLEVEL = 14

# *DOCUMENTATION*
```

```
# To see a list of typical targets execute "make help"
# More info can be located in ./README
# Comments in this file are targeted only to the developer, do not
# expect to learn how to build the kernel reading this file.

# That's our default target when none is given on the command line
PHONY := _all
_all:

# o Do not use make's built-in rules and variables
#   (this increases performance and avoids hard-to-debug behaviour);
# o Look for make include files relative to root of kernel src
MAKEFLAGS += -rR --include-dir=$(CURDIR)

# Avoid funny character set dependencies
unexport LC_ALL
LC_COLLATE=C
LC_NUMERIC=C
export LC_COLLATE LC_NUMERIC

# Avoid interference with shell env settings
unexport GREP_OPTIONS

# Set RHEL variables
# Use this spot to avoid future merge conflicts
include Makefile.rhelver

# We are using a recursive build, so we need to do a little thinking
--Plus--(2%)
```



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. Depuis l'arrivée de la version 3 du noyau, la signification de la valeur de PATCHLEVEL paire et impaire a été abandonnée.

2.4 - Paramétrage du noyau

Insérez la sortie de la commande **uname -i** sur la première ligne du fichier .config :

```
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ uname -i
x86_64
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ vi .config
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ head .config
# x86_64
#
# Automatically generated file; DO NOT EDIT.
# Linux/x86 4.18.0 Kernel Configuration
#
#
# Compiler: gcc (GCC) 8.4.1 20200928 (Red Hat 8.4.1-1)
#
CONFIG_64BIT=y
```

Renommez le fichier .config en le plaçant dans le répertoire **~/rpmbuild/SOURCES/** :

```
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ cp .config ~/rpmbuild/SOURCES/config-`uname -m`-generic
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ ls ~/rpmbuild/SOURCES
centos-ca-secureboot.der  cpupower.config          filter-x86_64.sh          kernel-
s390x.config              mod-extra.list           Module.kabi_s390x
centos-dup.x509           cpupower.service        generate_all_configs.sh   kernel-s390x-
debug.config              mod-internal.list        Module.kabi_x86_64
```

centos-kpatch.x509	debrand-rh-i686-cpu.patch	generate_bls_conf.sh	kernel-s390x-
zfcpdump.config	mod-sign.sh	parallel_xz.sh	
centos.pem	debrand-rh_taint.patch	kernel-aarch64.config	kernel-
x86_64.config	Module.kabi_aarch64	process_configs.sh	
centossecureboot001.der	debrand-single-cpu.patch	kernel-aarch64-debug.config	kernel-x86_64-
debug.config	Module.kabi_dup_aarch64	x509.genkey	
centossecureboot201.der	filter-aarch64.sh	kernel-abi-stablelists-4.18.0-305.tar.bz2	
kvm_stat.logrotate	Module.kabi_dup_ppc64le		
centossecurebootca2.der	filter-modules.sh	kernel-kabi-dw-4.18.0-305.tar.bz2	
linux-4.18.0-305.7.1.el8_4.tar.xz	Module.kabi_dup_s390x		
check-kabi	filter-ppc64le.sh	kernel-ppc64le.config	linux-kernel-
test.patch	Module.kabi_dup_x86_64		
config-x86_64-generic	filter-s390x.sh	kernel-ppc64le-debug.config	mod-blacklist.sh
Module.kabi_ppc64le			

Copiez le contenu du répertoire **configs** vers le répertoire **~/rpmbuild/SOURCES/** :

```
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ cp configs/* ~/rpmbuild/SOURCES/
```

Editez la directive **buildid** dans le fichier **~/rpmbuild/SPECS/kernel.spec** :

```
[trainee@centos8 linux-4.18.0-305.7.1.el8.x86_64]$ cd ~/rpmbuild/SPECS
```

```
[trainee@centos8 SPECS]$ vi kernel.spec
```

```
[trainee@centos8 SPECS]$ head -n 50 kernel.spec
```

```
# We have to override the new %%install behavior because, well... the kernel is special.
```

```
%global __spec_install_pre %{__build_pre}
```

```
# At the time of this writing (2019-03), RHEL8 packages use w2.xzdio
```

```
# compression for rpms (xz, level 2).
```

```
# Kernel has several large (hundreds of mbytes) rpms, they take ~5 mins
```

```
# to compress by single-threaded xz. Switch to threaded compression,
```

```
# and from level 2 to 3 to keep compressed sizes close to "w2" results.
```

```
#
# NB: if default compression in /usr/lib/rpm/redhat/macros ever changes,
# this one might need tweaking (e.g. if default changes to w3.xzdio,
# change below to w4T.xzdio):
%define _binary_payload w3T.xzdio

# For a kernel released for public testing, released_kernel should be 1.
# For internal testing builds during development, it should be 0.
%global released_kernel 1

%global distro_build 305

# Sign the x86_64 kernel for secure boot authentication
%ifarch x86_64 aarch64
%global signkernel 1
%else
%global signkernel 0
%endif

# Sign modules on all arches
%global signmodules 1

# Compress modules only for architectures that build modules
%ifarch noarch
%global zipmodules 0
%else
%global zipmodules 1
%endif

%if %{zipmodules}
%global zipsed -e 's/\.ko$/\.ko.xz/'
%endif

%define buildid .i2tch
```

```
%define rpmversion 4.18.0
%define pkgrelease 305.7.1.el8_4

# allow pkg_release to have configurable %{?dist} tag
%define specrelease 305.7.1%{?dist}

%define pkg_release %{specrelease}%{?buildid}
```

2.5 - Compiler le Noyau

La compilation du noyau peut prendre beaucoup de temps (~5 heures). La commande utilisée est la suivante :

```
[trainee@centos7 SPECS]$ rpmbuild -bb --target=`uname -m` kernel.spec 2> build-err.log | tee build-out.log &
```



Important - La compilation peut prendre des heures. Arrêtez donc le processus avec les touches ^C. Arrêtez ensuite votre VM. Demandez à votre formateur de démarrer la VM contenant le noyau déjà compilé.

A l'issu du processus, les RPMs se trouvent dans le répertoire **/home/trainee/rpmbuild/RPMS/x86_64/** :

```
...
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-headers-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-cross-headers-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-debuginfo-common-x86_64-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/perf-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/perf-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/python3-perf-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/python3-perf-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-tools-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
```

```
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-tools-libs-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-tools-libs-devel-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-tools-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/bpftool-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/bpftool-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-selftests-internal-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-debug-core-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-debug-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-debug-devel-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-debug-modules-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-debug-modules-extra-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-debug-modules-internal-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-debug-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-core-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-devel-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-modules-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-modules-extra-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-modules-internal-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Wrote: /home/trainee/rpmbuild/RPMS/x86_64/kernel-ipacloones-internal-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
Executing(%clean): /bin/sh -e /var/tmp/rpm-tmp.rk0gfs
```

```
[1]+  Done                rpmbuild -bb --target=`uname -m` kernel.spec 2> build-err.log | tee build-out.log
```

```
[trainee@centos8 SPECS]$ cd ../RPMS
[trainee@centos8 RPMS]$ ls
x86_64
[trainee@centos8 RPMS]$ cd x86_64/
[trainee@centos8 x86_64]$ ls
bpftool-4.18.0-305.7.1.el8.i2tch.x86_64.rpm          kernel-debuginfo-common-
x86_64-4.18.0-305.7.1.el8.i2tch.x86_64.rpm          kernel-selftests-internal-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
bpftool-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64.rpm  kernel-debug-
modules-4.18.0-305.7.1.el8.i2tch.x86_64.rpm          kernel-tools-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
kernel-4.18.0-305.7.1.el8.i2tch.x86_64.rpm           kernel-debug-modules-
```

```

extra-4.18.0-305.7.1.el8.i2tch.x86_64.rpm      kernel-tools-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
kernel-core-4.18.0-305.7.1.el8.i2tch.x86_64.rpm      kernel-debug-modules-
internal-4.18.0-305.7.1.el8.i2tch.x86_64.rpm      kernel-tools-libs-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
kernel-cross-headers-4.18.0-305.7.1.el8.i2tch.x86_64.rpm      kernel-devel-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
kernel-tools-libs-devel-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
kernel-debug-4.18.0-305.7.1.el8.i2tch.x86_64.rpm      kernel-headers-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
perf-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
kernel-debug-core-4.18.0-305.7.1.el8.i2tch.x86_64.rpm      kernel-ipa clones-
internal-4.18.0-305.7.1.el8.i2tch.x86_64.rpm      perf-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
kernel-debug-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64.rpm      kernel-modules-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
python3-perf-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
kernel-debug-devel-4.18.0-305.7.1.el8.i2tch.x86_64.rpm      kernel-modules-
extra-4.18.0-305.7.1.el8.i2tch.x86_64.rpm      python3-perf-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64.rpm
kernel-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64.rpm      kernel-modules-
internal-4.18.0-305.7.1.el8.i2tch.x86_64.rpm

```

Notez que la génération du nouveau noyau peut consommer jusqu'à 21 Go d'espace disque :

```

[trainee@centos8 x86_64]$ df -h
Filesystem      Size  Used Avail Use% Mounted on
devtmpfs        1.8G   0  1.8G   0% /dev
tmpfs           1.9G   0  1.9G   0% /dev/shm
tmpfs           1.9G  9.4M  1.9G   1% /run
tmpfs           1.9G   0  1.9G   0% /sys/fs/cgroup
/dev/mapper/cl_centos8-root 28G  5.5G  23G  20% /
/dev/sda1       976M  289M  620M  32% /boot
tmpfs          374M   24K  374M   1% /run/user/1000
tmpfs          374M  1.2M  373M   1% /run/user/42
/dev/sdc1      63G   21G   39G  35% /home

```

2.6 - Installer le Nouveau Noyau

Installez maintenant les paquets **kernel***. L'installation du noyau peut prendre beaucoup de temps (~2 heures). La commande utilisée est la suivante :

:

```
[root@centos8 x86_64]# dnf localinstall kernel-*.rpm
Last metadata expiration check: 2:25:32 ago on Tue 20 Jul 2021 08:37:00 EDT.
Dependencies resolved.
```

=====			
Package		Architecture	Version
Repository	Size		
=====			
Installing:			
kernel		x86_64	
4.18.0-305.7.1.el8.i2tch		@commandline	5.9 M
kernel-core		x86_64	
4.18.0-305.7.1.el8.i2tch		@commandline	36 M
kernel-cross-headers		x86_64	
4.18.0-305.7.1.el8.i2tch		@commandline	11 M
kernel-debug		x86_64	
4.18.0-305.7.1.el8.i2tch		@commandline	5.9 M
kernel-debug-core		x86_64	
4.18.0-305.7.1.el8.i2tch		@commandline	63 M
kernel-debug-debuginfo		x86_64	
4.18.0-305.7.1.el8.i2tch		@commandline	683 M
kernel-debug-devel		x86_64	
4.18.0-305.7.1.el8.i2tch		@commandline	19 M
kernel-debug-modules		x86_64	
4.18.0-305.7.1.el8.i2tch		@commandline	54 M
kernel-debug-modules-extra		x86_64	
4.18.0-305.7.1.el8.i2tch		@commandline	7.2 M
kernel-debug-modules-internal		x86_64	
4.18.0-305.7.1.el8.i2tch		@commandline	6.3 M
kernel-debuginfo		x86_64	
4.18.0-305.7.1.el8.i2tch		@commandline	570 M

kernel-debuginfo-common-x86_64	x86_64	
4.18.0-305.7.1.el8.i2tch	@commandline	75 M
kernel-devel	x86_64	
4.18.0-305.7.1.el8.i2tch	@commandline	18 M
kernel-ipa clones-internal	x86_64	
4.18.0-305.7.1.el8.i2tch	@commandline	20 M
kernel-modules	x86_64	
4.18.0-305.7.1.el8.i2tch	@commandline	28 M
kernel-modules-extra	x86_64	
4.18.0-305.7.1.el8.i2tch	@commandline	6.5 M
kernel-modules-internal	x86_64	
4.18.0-305.7.1.el8.i2tch	@commandline	6.1 M
kernel-selftests-internal	x86_64	
4.18.0-305.7.1.el8.i2tch	@commandline	19 M
kernel-tools-debuginfo	x86_64	
4.18.0-305.7.1.el8.i2tch	@commandline	6.2 M
kernel-tools-libs-devel	x86_64	
4.18.0-305.7.1.el8.i2tch	@commandline	5.9 M
Downgrading:		
kernel-headers	x86_64	
4.18.0-305.7.1.el8.i2tch	@commandline	7.1 M
kernel-tools	x86_64	
4.18.0-305.7.1.el8.i2tch	@commandline	6.1 M
kernel-tools-libs	x86_64	
4.18.0-305.7.1.el8.i2tch	@commandline	5.9 M

Transaction Summary

```
=====
Install      20 Packages
Downgrade    3 Packages
```

```
Total size: 1.6 G
Is this ok [y/N]: y
```

A l'issu de l'installation, re-démarrez la VM :

```
[root@centos7 ~]# reboot
```

Connectez-vous en tant que trainee et devenez root. Listez ensuite les noyaux installés :

```
[root@centos8 ~]# rpm -qa | grep kernel
kernel-modules-4.18.0-305.3.1.el8.x86_64
kernel-tools-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-headers-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-debug-core-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-modules-internal-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-modules-4.18.0-305.7.1.el8_4.x86_64
kernel-debug-modules-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-devel-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-tools-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-tools-libs-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-debug-modules-internal-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-cross-headers-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-core-4.18.0-305.7.1.el8_4.x86_64
kernel-devel-4.18.0-305.7.1.el8_4.x86_64
kernel-debuginfo-common-x86_64-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-debug-modules-extra-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-debug-devel-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-tools-libs-devel-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-modules-extra-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-4.18.0-305.7.1.el8_4.x86_64
kernel-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-core-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-selftests-internal-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-debug-debuginfo-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-debug-4.18.0-305.7.1.el8.i2tch.x86_64
kernel-4.18.0-305.3.1.el8.x86_64
```

```
kernel-core-4.18.0-305.3.1.el8.x86_64  
kernel-modules-4.18.0-305.7.1.el8.i2tch.x86_64  
kernel-ipa clones-internal-4.18.0-305.7.1.el8.i2tch.x86_64
```

Constatez l'entrée **saved-entry** du fichier **/boot/grub2/grubenv** :

```
[root@centos8 ~]# grep i2tch /boot/grub2/grubenv  
saved_entry=95bd69e34a7444a7b58cb74fbfb86df2-4.18.0-305.7.1.el8.i2tch.x86_64
```

Dernièrement, vérifiez l'utilisation du nouveau noyau :

```
[root@centos8 ~]# uname -r  
4.18.0-305.7.1.el8.i2tch.x86_64
```

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.

Déconnectez-vous et reconnectez-vous **directement** en tant que root :

```
root@computeXX:~# ssh -l root 10.0.2.45  
root@10.0.2.45's password: fenestros  
Activate the web console with: systemctl enable --now cockpit.socket  
  
Last login: Wed Jul 21 11:14:31 2021  
[root@centos8 ~]#
```

Avant de mettre en place des quotas, configurer SELINUX en mode **permissive** afin de ne pas avoir d'erreurs de ce dernier :

```
[root@centos8 ~]# getenforce
```

```
Enforcing
[root@centos8 ~]# setenforce permissive
[root@centos8 ~]# getenforce
Permissive
[root@centos8 ~]#
```

Editez ensuite le fichier `/etc/sysconfig/selinux` ainsi :

```
[root@centos8 ~]# vi /etc/sysconfig/selinux
[root@centos8 ~]# cat /etc/sysconfig/selinux

# This file controls the state of SELinux on the system.
# SELINUX= can take one of these three values:
#     enforcing - SELinux security policy is enforced.
#     permissive - SELinux prints warnings instead of enforcing.
#     disabled - No SELinux policy is loaded.
SELINUX=permissive
# SELINUXTYPE= can take one of these three values:
#     targeted - Targeted processes are protected,
#     minimum - Modification of targeted policy. Only selected processes are protected.
#     mls - Multi Level Security protection.
SELINUXTYPE=targeted
```

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

```
[root@centos8 ~]# rpm -qa | grep quota
quota-4.04-12.el8.x86_64
quota-nls-4.04-12.el8.noarch
```

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

```
[root@centos8 ~]# vi /etc/fstab
[root@centos8 ~]# cat /etc/fstab
```

```
#
# /etc/fstab
# Created by anaconda on Wed Jun 16 06:21:32 2021
#
# Accessible filesystems, by reference, are maintained under '/dev/disk/'.
# See man pages fstab(5), findfs(8), mount(8) and/or blkid(8) for more info.
#
# After editing this file, run 'systemctl daemon-reload' to update systemd
# units generated from this file.
#
/dev/mapper/cl_centos8-root / xfs defaults 0 0
UUID=1c04981e-5317-4b73-9695-3ce25246835d /boot ext4 defaults 1 2
/dev/mapper/cl_centos8-swap swap defaults 0 0
UUID=f76d6b66-985b-4a91-af9c-4987e8c1443c /home ext4 defaults,usrquota,grpquota 1 2
```

Redémarrez la VM :

```
[root@centos8 ~]# reboot
```

Reconnectez-vous **directement** en tant que root :

```
root@computeXX:~# ssh -l root 10.0.2.45
root@10.0.2.45's password: fenestros
Activate the web console with: systemctl enable --now cockpit.socket

Last login: Wed Jul 21 11:19:46 2021
[root@centos8 ~]#
```

Vérifiez ensuite que les options **usrquota** et **grpquota** soient prises en compte :

```
[root@centos8 ~]# cat /etc/mtab | grep /home
/dev/sdc1 /home ext4 rw,seclabel,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@centos8 ~]# quotacheck -cugvm -f /dev/sdc1
quotacheck: Your kernel probably supports journaled quota but you are not using it. Consider switching to
journaled quota to avoid running quotacheck after an unclean shutdown.
quotacheck: Scanning /dev/sdc1 [/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 6763 directories and 129772 files
quotacheck: Old file not found.
quotacheck: Old file not found.
```

Les options de la commande quotacheck sont :

```
[root@centos8 ~]# 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@centos8 ~]# ls -la /home
total 40
drwxr-xr-x.  4 root    root    4096 Jul 21 11:27 .
dr-xr-xr-x. 17 root    root     224 Jul 19 12:05 ..
-rw-----.  1 root    root    7168 Jul 21 11:27 aquota.group
-rw-----.  1 root    root    7168 Jul 21 11:27 aquota.user
drwx-----.  2 root    root   16384 Jul 19 12:02 lost+found
drwxr-xr-x. 17 trainee trainee 4096 Jul 21 11:22 trainee
```

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

```
[root@centos8 ~]# groupadd fenestros && useradd fenestros -c Fenestr0s -d /home/fenestros -g fenestros -s
/bin/bash
[root@centos8 ~]# passwd fenestros
Changing password for user fenestros.
New password:
BAD PASSWORD: The password contains the user name in some form
Retype new password:
```

```
passwd: all authentication tokens updated successfully.
```

3.2 - La Commande edquota

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

```
[root@centos8 ~]# 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/sdc1        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/sdc1        0         8000     10000        0          0          0
```

Sauvegardez et quittez le fichier.

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

```
[root@centos8 ~]# 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@centos8 ~]# quotaon -a
```

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

```
[root@centos8 ~]# quotaon --help
quotaon: Usage:
```

```
quotaon [-guPvp] [-F quotaformat] [-x state] -a
quotaon [-guPvp] [-F quotaformat] [-x state] filesystems ...
```

```
-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 désactiver les quotas est **quotaoff**.

3.4 - La Commande repquota

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

```
[root@centos8 ~]# repquota /home
```

```
*** Report for user quotas on device /dev/sdc1
Block grace time: 7days; Inode grace time: 7days
```

User		used	Block limits			File limits			
			soft	hard	grace	used	soft	hard	grace
root	--	20	0	0		2	0	0	
trainee	--	21495888	0	0		136532	0	0	



Important - Notez que l'utilisateur fenestros ne figure pas dans la liste. Sous RHEL / CentOS, le quota n'est pas visible tant que l'utilisateur ne s'est pas connecté pour la première fois.

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

```
[root@centos8 ~]# 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    show numbers in human friendly units (MB, GB, ...)
-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
```

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3.5 - La Commande quota

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

```
[root@centos8 ~]# quota fenestros
Disk quotas for user fenestros (uid 1001): no limited resources used
[root@centos8 ~]# su - fenestros
[fenestros@centos8 ~]$ touch test
[fenestros@centos8 ~]$ exit
logout
[root@centos8 ~]# quota fenestros
Disk quotas for user fenestros (uid 1001):
    Filesystem  blocks   quota  limit  grace  files   quota  limit  grace
    /dev/sdc1      8    8000 10000      0      3      0      0
```

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

```
[root@centos8 ~]# 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 [-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 display numbers in human friendly units (MB, GB...)
    --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
-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
```

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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 enrégée générale appelée par un job cron. Cependant elle peut aussi est appelée d'une manière interactive.

Sous RHEL/CentOS, warnquota n'est pas installé par défaut :

```
[root@centos8 ~]# which warnquota
/usr/bin/which: no warnquota in (/usr/local/sbin:/usr/local/bin:/usr/sbin:/usr/bin:/root/bin)
```

Installez donc le paquet **quota-warnquota** :

```
[root@centos7 ~]# dnf install quota-warnquota
...
```

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

```
[root@centos8 ~]# 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      send information in more human friendly 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
-h, --help                display this help message and exit
-v, --version             display version information and exit

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