

Compilation du noyau

Introduction :

Recompiler le noyau... une tâche qui semble ardue pour le nouveau venu sous Linux, et même pour les plus anciens qui ne se sont jamais lancés dans cette faramineuse besogne.

On dit souvent que recompiler son kernel est une chose difficile et très dangereuse. Ce n'est pas tout faux. Le noyau est le cœur du système GNU/Linux, c'est l'équivalent du "cerveau" software de la machine, et l'altérer peut nuire à sa fonction première : faire fonctionner votre ordinateur. Cependant, la difficulté de compilation n'est en fait qu'affaire d'habitude, et en cas de problème, il y a toujours moyen de s'en sortir (avec plus ou moins "sans trop de casse" selon les cas).

Enoncé : pour compiler le noyau, il y a des étapes à suivre pour chaque version de noyau ,nous allons dans ce rapport détailler comment compiler un noyau pour la version ubuntu.

Comme première étape, on vérifie le kernel actuel, pour cet objet on tape la commande `uname -sr`. On remarque que le kernel est linux de version 3.13.0 sur 32 bits.

```
root@ubuntu:/home/meryemjanatiidriissi#  
root@ubuntu:/home/meryemjanatiidriissi# uname -sr  
Linux 3.13.0-32-generic  
root@ubuntu:/home/meryemjanatiidriissi#
```

On commence la compilation du notre noyau :

-d'abord on installe les outils de compilation par taper les deux commande :

```
apt-get update
```

```
apt-get install gcc libncurses5-dev dpkg-dev
```

```
root@ubuntu:/home/meryemjanatiidriissi#  
root@ubuntu:/home/meryemjanatiidriissi# apt-get update  
Ign http://extras.ubuntu.com trusty InRelease  
Ign http://security.ubuntu.com trusty-security InRelease  
Get:1 http://security.ubuntu.com trusty-security Release.gpg [933 B]  
Get:2 http://extras.ubuntu.com trusty Release.gpg [72 B]  
Ign http://us.archive.ubuntu.com trusty InRelease  
Hit http://extras.ubuntu.com trusty Release  
Get:3 http://security.ubuntu.com trusty-security Release [62.0 kB]  
Ign http://us.archive.ubuntu.com trusty-updates InRelease  
Ign http://us.archive.ubuntu.com trusty-backports InRelease  
Hit http://extras.ubuntu.com trusty/main Sources  
Hit http://us.archive.ubuntu.com trusty Release.gpg  
Hit http://extras.ubuntu.com trusty/main i386 Packages  
Get:4 http://security.ubuntu.com trusty-security/main Sources [72.1 kB]  
Get:5 http://us.archive.ubuntu.com trusty-updates Release.gpg [933 B]  
Hit http://us.archive.ubuntu.com trusty-backports Release.gpg
```

Vérification :

```

Get:42 http://us.archive.ubuntu.com trusty-backports/universe i386 Packages [25.8 kB]
Get:43 http://us.archive.ubuntu.com trusty-backports/multiverse i386 Packages [1,249 B]
Get:44 http://us.archive.ubuntu.com trusty-backports/main Translation-en [3,233 B]
Get:45 http://us.archive.ubuntu.com trusty-backports/multiverse Translation-en [776 B]
Get:46 http://us.archive.ubuntu.com trusty-backports/restricted Translation-en [14 B]
Get:47 http://us.archive.ubuntu.com trusty-backports/universe Translation-en [23.9 kB]
Ign http://us.archive.ubuntu.com trusty/main Translation-en_US
Ign http://us.archive.ubuntu.com trusty/multiverse Translation-en_US
Ign http://us.archive.ubuntu.com trusty/restricted Translation-en_US
Ign http://us.archive.ubuntu.com trusty/universe Translation-en_US
Fetched 20.9 MB in 3min 29s (99.5 kB/s)
Reading package lists... Done
root@ubuntu:/home/meryemjanatiidrissi#

```

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```

root@ubuntu:/home/meryemjanatiidrissi# apt-get install gcc libncurses5-dev dpkg-dev
Reading package lists... Done
Building dependency tree
Reading state information... Done
gcc is already the newest version.
The following extra packages will be installed:
  build-essential fakeroot g++ g++-4.8 libalgorithm-diff-perl
  libalgorithm-diff-xs-perl libalgorithm-merge-perl libfakeroot
  libstdc++-4.8-dev libtinfo-dev
Suggested packages:
  debian-keyring g++-multilib g++-4.8-multilib gcc-4.8-doc libstdc++6-4.8-dbg
  ncurses-doc libstdc++-4.8-doc
The following NEW packages will be installed:
  build-essential dpkg-dev fakeroot g++ g++-4.8 libalgorithm-diff-perl
  libalgorithm-diff-xs-perl libalgorithm-merge-perl libfakeroot
  libncurses5-dev libstdc++-4.8-dev libtinfo-dev
0 upgraded, 12 newly installed, 0 to remove and 335 not upgraded.
Need to get 9,207 kB of archives.
After this operation, 31.9 MB of additional disk space will be used.
Do you want to continue? [Y/n]

```

```

Unpacking libfakeroot:i386 (1.20-3ubuntu2) ...
Selecting previously unselected package fakeroot.
Preparing to unpack .../fakeroot_1.20-3ubuntu2_i386.deb ...
Unpacking fakeroot (1.20-3ubuntu2) ...
Selecting previously unselected package libalgorithm-diff-perl.
Preparing to unpack .../libalgorithm-diff-perl_1.19.02-3_all.deb ...
Unpacking libalgorithm-diff-perl (1.19.02-3) ...
Selecting previously unselected package libalgorithm-diff-xs-perl.
Preparing to unpack .../libalgorithm-diff-xs-perl_0.04-2build4_i386.deb ...
Unpacking libalgorithm-diff-xs-perl (0.04-2build4) ...
Selecting previously unselected package libalgorithm-merge-perl.
Preparing to unpack .../libalgorithm-merge-perl_0.08-2_all.deb ...
Unpacking libalgorithm-merge-perl (0.08-2) ...
Selecting previously unselected package libtinfo-dev:i386.
Preparing to unpack .../libtinfo-dev_5.9+20140118-1ubuntu1_i386.deb ...
Unpacking libtinfo-dev:i386 (5.9+20140118-1ubuntu1) ...
Selecting previously unselected package libncurses5-dev:i386.
Preparing to unpack .../libncurses5-dev_5.9+20140118-1ubuntu1_i386.deb ...
Unpacking libncurses5-dev:i386 (5.9+20140118-1ubuntu1) ...
Processing triggers for man-db (2.6.7.1-1) ...
Setting up libstdc++-4.8-dev:i386 (4.8.2-19ubuntu1) ...
Setting up g++-4.8 (4.8.2-19ubuntu1) ...
Setting up g++ (4:4.8.2-1ubuntu6) ...
update-alternatives: using /usr/bin/g++ to provide /usr/bin/c++ (c++) in auto mode
Setting up dpkg-dev (1.17.5ubuntu5.3) ...
Setting up build-essential (11.6ubuntu6) ...
Setting up libfakeroot:i386 (1.20-3ubuntu2) ...
Setting up fakeroot (1.20-3ubuntu2) ...
update-alternatives: using /usr/bin/fakeroot-sysv to provide /usr/bin/fakeroot (fakeroot) in auto mode
Setting up libalgorithm-diff-perl (1.19.02-3) ...
Setting up libalgorithm-diff-xs-perl (0.04-2build4) ...
Setting up libalgorithm-merge-perl (0.08-2) ...
Setting up libtinfo-dev:i386 (5.9+20140118-1ubuntu1) ...
Setting up libncurses5-dev:i386 (5.9+20140118-1ubuntu1) ...
root@ubuntu:/home/meryemjanatiidrissi#

```

-on crée un dossier de compilation : on tape la commande `mkdir kernel` pour créer le répertoire kernel puis la commande `cd /kernel` pour positionner dessus.

```

root@ubuntu:/home/meryemjanatiidrissi#
root@ubuntu:/home/meryemjanatiidrissi#
root@ubuntu:/home/meryemjanatiidrissi# mkdir /kernel
root@ubuntu:/home/meryemjanatiidrissi# cd /kernel
root@ubuntu:/kernel#
root@ubuntu:/kernel#

```

Afin de télécharger la nouvelle version de noyau (dans notre exemple linux-3.19) on utilise comme commande :

```
Wget --no-check-certificate
```

<http://www.kernel.org/pub/linux/kernel/v3.x/linux-3.19.tar.xz>

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```

root@ubuntu:/kernel#
root@ubuntu:/kernel# wget --no-check-certificate http://www.kernel.org/pub/linux/kernel/v3.x/linux-3.19.tar.xz
--2015-03-20 03:05:04-- http://www.kernel.org/pub/linux/kernel/v3.x/linux-3.19.tar.xz
Resolving www.kernel.org (www.kernel.org)... 198.145.20.140, 199.204.44.194, 149.20.4.69, ...
Connecting to www.kernel.org (www.kernel.org)|198.145.20.140|:80... connected.
HTTP request sent, awaiting response... 301 Moved Permanently
Location: https://www.kernel.org/pub/linux/kernel/v3.x/linux-3.19.tar.xz [following]
--2015-03-20 03:05:05-- https://www.kernel.org/pub/linux/kernel/v3.x/linux-3.19.tar.xz
Connecting to www.kernel.org (www.kernel.org)|198.145.20.140|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 81688872 (78M) [application/x-xz]
Saving to: 'linux-3.19.tar.xz'

56% [=====] 46,432,768 356KB/s in 5m 40s

2015-03-20 03:10:46 (133 KB/s) - Connection closed at byte 46432768. Retrying.

--2015-03-20 03:10:47-- (try: 2) https://www.kernel.org/pub/linux/kernel/v3.x/linux-3.19.tar.xz
Connecting to www.kernel.org (www.kernel.org)|198.145.20.140|:443... connected.
HTTP request sent, awaiting response... 206 Partial Content
Length: 81688872 (78M), 35256104 (34M) remaining [application/x-xz]
Saving to: 'linux-3.19.tar.xz'

68% [+++++] 55,908,248 182KB/s eta 2m 52s

```

On tape `ls` pour vérifier que notre piquet est vraiment présent.

```

root@ubuntu:/kernel# ls
linux-3.19.tar.xz
root@ubuntu:/kernel#

```

Dans ce niveau là on essaye de décompresser notre fichier **linux-3.19.1.tar.xz** comme le suivant :

```
Tar xvfJ linux-3.19.tar.xz
```

```

root@ubuntu:/kernel#
root@ubuntu:/kernel#
root@ubuntu:/kernel# tar xvfJ linux-3.19.1.tar.xz

```

Vérification :

```
linux-3.19/virt/kvm/kvmconfig
linux-3.19/virt/kvm/arm/
linux-3.19/virt/kvm/arm/arch_timer.c
linux-3.19/virt/kvm/arm/vgic-v2.c
linux-3.19/virt/kvm/arm/vgic-v3.c
linux-3.19/virt/kvm/arm/vgic.c
linux-3.19/virt/kvm/async_pf.c
linux-3.19/virt/kvm/async_pf.h
linux-3.19/virt/kvm/coalesced_mmio.c
linux-3.19/virt/kvm/coalesced_mmio.h
linux-3.19/virt/kvm/eventfd.c
linux-3.19/virt/kvm/iodev.h
linux-3.19/virt/kvm/irqchip.c
linux-3.19/virt/kvm/kvm_main.c
linux-3.19/virt/kvm/vfio.c
linux-3.19/virt/kvm/vfio.h
root@ubuntu:/kernel#
```

On se positionne dans /kernel/linux-3.19/

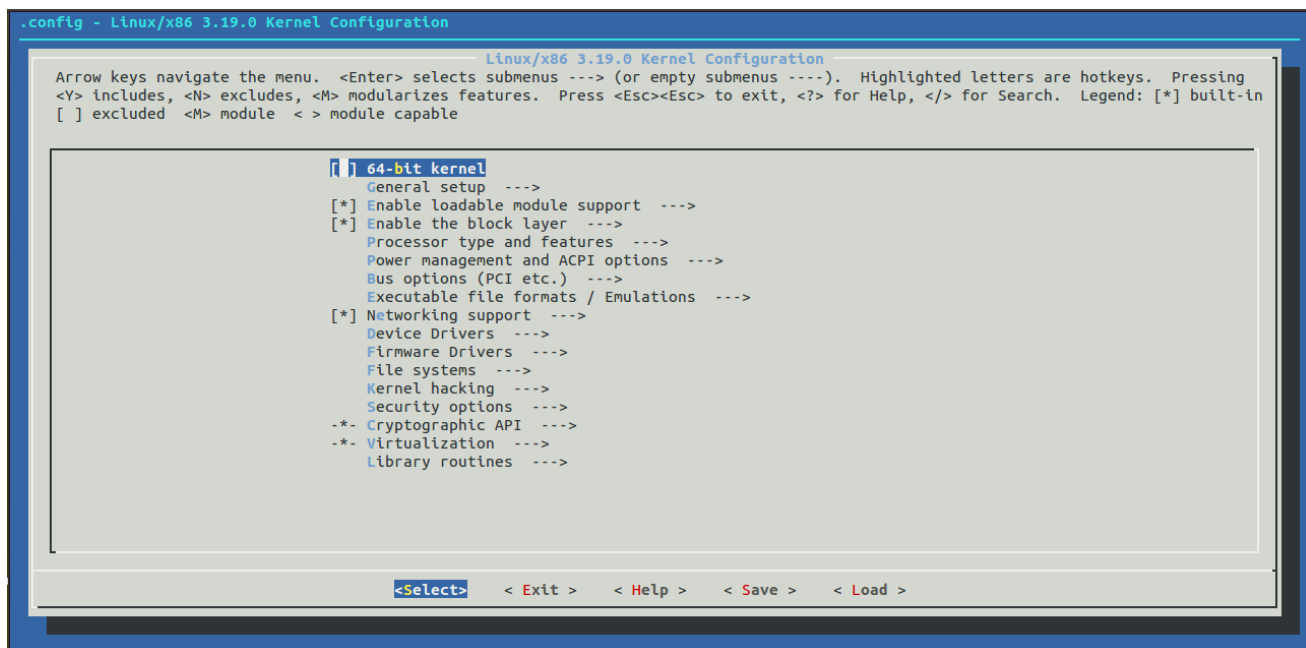
```
root@ubuntu:/kernel#
root@ubuntu:/kernel# cd linux-3.19/
root@ubuntu:/kernel/linux-3.19#
root@ubuntu:/kernel/linux-3.19#
```

On commence la configuration de futur noyau :

```
make menuconfig
```

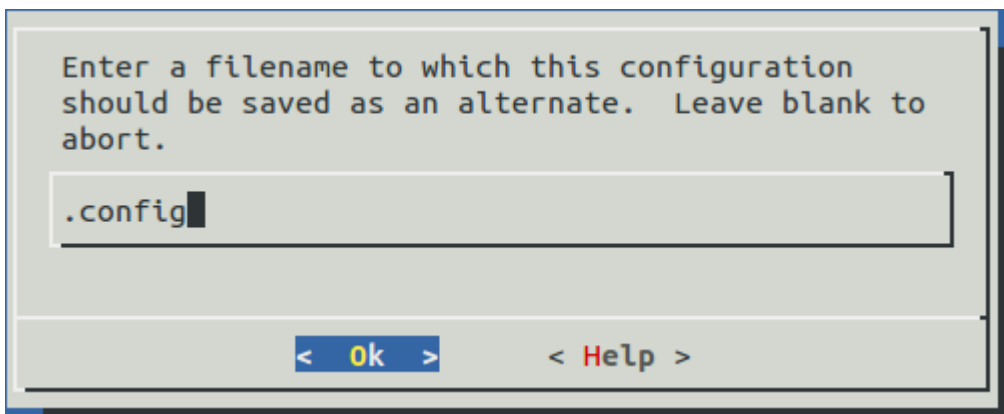
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Vérification :

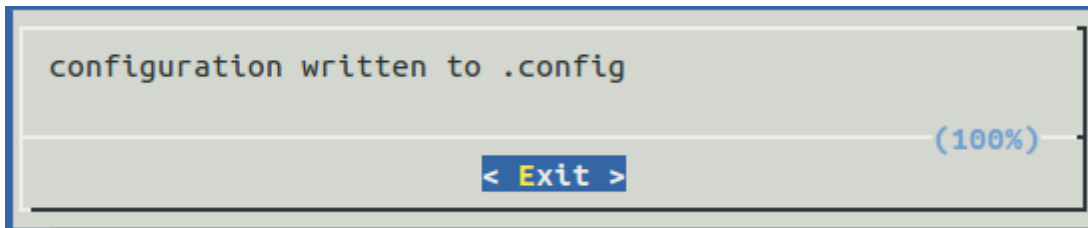


On décoche **64-bit kernel** car notre machine est de **32-bit** et on fait l'enregistrement.

Vérification :



On tape **exit** pour terminer la configuration.



On fait la compilation du notre noyau. On tape la commande :

```
make -j 5 KDEB_PKGVERSION=1.dzintegrateur deb-pkg
```

```
root@ubuntu:/kernel/linux-3.19#  
root@ubuntu:/kernel/linux-3.19# make -j 5 KDEB_PKGVERSION=1.dzintegrateur deb-pkg  
HOSTCC scripts/kconfig/conf.o  
HOSTLD scripts/kconfig/conf  
scripts/kconfig/conf --silentoldconfig Kconfig  
CHK include/config/kernel.release  
UPD include/config/kernel.release  
make KBUILD_SRC=  
CHK include/config/kernel.release  
WRAP arch/x86/include/generated/asm/clkdev.h  
WRAP arch/x86/include/generated/asm/cputime.h  
WRAP arch/x86/include/generated/asm/dma-contiguous.h  
SYSTBL arch/x86/syscalls/../include/generated/asm/syscalls_32.h  
WRAP arch/x86/include/generated/asm/early_ioremap.h  
WRAP arch/x86/include/generated/asm/mcs_spinlock.h  
WRAP arch/x86/include/generated/asm/scatterlist.h
```

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Vérification :

```
INSTALL debian/headertmp/usr/include/rdma/ (6 files)  
INSTALL debian/headertmp/usr/include/scsi/fc/ (4 files)  
INSTALL debian/headertmp/usr/include/scsi/ (3 files)  
INSTALL debian/headertmp/usr/include/sound/ (11 files)  
INSTALL debian/headertmp/usr/include/video/ (3 files)  
INSTALL debian/headertmp/usr/include/xen/ (4 files)  
INSTALL debian/headertmp/usr/include/uapi/ (0 file)  
INSTALL debian/headertmp/usr/include/asm/ (65 files)  
dpkg-deb: building package 'linux-firmware-image-3.19.0' in '../linux-firmware-image-3.19.0_1.dzintegrateur_i386.deb'.  
dpkg-deb: building package 'linux-headers-3.19.0' in '../linux-headers-3.19.0_1.dzintegrateur_i386.deb'.  
dpkg-deb: building package 'linux-libc-dev' in '../linux-libc-dev_1.dzintegrateur_i386.deb'.  
dpkg-deb: building package 'linux-image-3.19.0' in '../linux-image-3.19.0_1.dzintegrateur_i386.deb'.  
dpkg-deb: building package 'linux-image-3.19.0-dbg' in '../linux-image-3.19.0-dbg_1.dzintegrateur_i386.deb'.  
root@ubuntu:/kernel/linux-3.19#
```

Vérification de la présence de notre noyau :

```
root@ubuntu:/kernel/linux-3.19#  
root@ubuntu:/kernel/linux-3.19# ls -l ../*.deb  
-rw-r--r-- 1 root root 964098 Mar 20 08:52 ../linux-firmware-image-3.19.0_1.dzintegrateur_i386.deb  
-rw-r--r-- 1 root root 6817098 Mar 20 08:53 ../linux-headers-3.19.0_1.dzintegrateur_i386.deb  
-rw-r--r-- 1 root root 38167754 Mar 20 08:56 ../linux-image-3.19.0_1.dzintegrateur_i386.deb  
-rw-r--r-- 1 root root 365700598 Mar 20 09:30 ../linux-image-3.19.0-dbg_1.dzintegrateur_i386.deb  
-rw-r--r-- 1 root root 785804 Mar 20 08:53 ../linux-libc-dev_1.dzintegrateur_i386.deb  
root@ubuntu:/kernel/linux-3.19#
```

On installe le nouveau noyau :

```
root@ubuntu:/kernel/linux-3.19# dpkg -i ../linux*.deb
Selecting previously unselected package linux-firmware-image-3.19.0.
(Reading database ... 165529 files and directories currently installed.)
Preparing to unpack ../linux-firmware-image-3.19.0_1.dzintegrateur_i386.deb ...
Unpacking linux-firmware-image-3.19.0 (1.dzintegrateur) ...
Selecting previously unselected package linux-headers-3.19.0.
Preparing to unpack ../linux-headers-3.19.0_1.dzintegrateur_i386.deb ...
Unpacking linux-headers-3.19.0 (1.dzintegrateur) ...
Selecting previously unselected package linux-image-3.19.0.
Preparing to unpack ../linux-image-3.19.0_1.dzintegrateur_i386.deb ...
```

On redémarre notre machine par taper `reboot`

```
Setting up linux-headers-3.19.0 (1.dzintegrateur) ...
root@ubuntu:/kernel/linux-3.19# reboot
```

Finalement on vérifie une autre fois la version de notre noyau. Et voilà la compilation a bien réussi et la nouvelle version est **linux 3.19.0**

```
meryemjanatiidrisi@ubuntu:~$
meryemjanatiidrisi@ubuntu:~$ uname -sr
Linux 3.19.0
meryemjanatiidrisi@ubuntu:~$
```