

OS Assignment 1

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Part 1

Qn. Download the latest stable Linux kernel from kernel.org, compile it and dual boot it with your current Linux version. Your current version as well as the new version should be present in the grub-menu.

Steps:

1. `$ wget https://cdn.kernel.org/pub/linux/kernel/v5.x/linux-5.8.14.tar.xz`

Command used to download Linux kernel source code.

```
meenakshimadhu@pop-os:~$ wget https://cdn.kernel.org/pub/linux/kernel/v5.x/linux-5.8.14.tar.xz
--2020-10-10 21:01:49-- https://cdn.kernel.org/pub/linux/kernel/v5.x/linux-5.8.14.tar.xz
Resolving cdn.kernel.org (cdn.kernel.org)... 151.101.153.176, 2a04:4e42:24::432
Connecting to cdn.kernel.org (cdn.kernel.org)|151.101.153.176|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 114506716 (109M) [application/x-xz]
Saving to: 'linux-5.8.14.tar.xz'

linux-5.8.14.tar.xz 41%[=====>] 45.63M 1.67MB/s eta 46s
```

2. `$ unxz -v linux-5.8.14.tar.xz`

Command for extracting the tar.xz file.

```
meenakshimadhu@pop-os:~$ tar -xf linux-5.8.14.tar.xz
meenakshimadhu@pop-os:~$ ls
Desktop Documents Downloads linux-5.8.14 linux-5.8.14.tar.xz Music Pictures Public Templates Videos
```

3. `$ cd linux-5.6.9`

Change directory to the unzipped folder.

```
meenakshimadhu@pop-os:~$ ls
Desktop Documents Downloads linux-5.8.14 linux-5.8.14.tar.xz Music Pictures Public Templates Videos
meenakshimadhu@pop-os:~$ cd linux-5.8.14/
```

4. `$ cp -v /boot/config-$(uname -r) .config`

Command to configure the Linux kernel features.

```
meenakshimadhu@pop-os:~/linux-5.8.14$ cp -v /boot/config-$(uname -r) .config
'/boot/config-5.4.0-7642-generic' -> '.config'
```

5. \$ sudo apt-get install build-essential libncurses-dev bison flex libssl-dev libelf-dev

Command to install development tools like GCC compilers and related tools, to compile the Linux kernel.

```
meenakshimadhu@pop-os:~/linux-5.8.14$ sudo apt install build-essential libncurses-dev flex bison libssl-dev libelf-dev
[sudo] password for meenakshimadhu:
Reading package lists... Done
Building dependency tree
Reading state information... Done
```

6. \$ make menuconfig

Command to configure the kernel. Can be used to enable or disable certain features or modules.

```
meenakshimadhu@pop-os:~/linux-5.8.14$ make menuconfig
scripts/kconfig/mconf Kconfig
.config:3815:warning: symbol value 'm' invalid for ISDN_CAPI
.config:8245:warning: symbol value 'm' invalid for ASHMEM
.config:9205:warning: symbol value 'm' invalid for ANDROID_BINDER_IPC
.config:9206:warning: symbol value 'm' invalid for ANDROID_BINDERFS
.config:9274:warning: symbol value 'm' invalid for INTERCONNECT
configuration written to .config

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

meenakshimadhu@pop-os:~/linux-5.8.14$
```

7. \$ make -j5

Make command is used to compile and create a compressed kernel image. -j5 is passed to speed up the compile time. Build time depends on the system's resources such as available CPU core and current system load.

```
meenakshimadhu@pop-os:~/linux-5.8.14$ make -j5
```

```
CC [M] fs/isofs/rock.o
CC [M] sound/core/compress_offload.o
CC [M] drivers/gpio/gpio-crystalcove.o
CC block/blk-mq-rdma.o
CC [M] fs/isofs/export.o
CC [M] drivers/gpio/gpio-da9052.o
CC [M] fs/isofs/joliet.o
LD [M] sound/core/snd.o
LD [M] sound/core/snd-hwdep.o
LD [M] sound/core/snd-timer.o
LD [M] sound/core/snd-hrtimer.o
LD [M] sound/core/snd-pcm.o
LD [M] sound/core/snd-pcm-dmaengine.o
LD [M] sound/core/snd-seq-device.o
LD [M] sound/core/snd-rawmidi.o
LD [M] sound/core/snd-compress.o
CC [M] sound/i2c/other/ak4117.o
CC block/blk-zoned.o
CC [M] fs/isofs/compress.o
CC [M] drivers/gpio/gpio-da9055.o
CC [M] sound/i2c/other/ak4xxx-adda.o
CC [M] drivers/gpio/gpio-dln2.o
LD [M] fs/isofs/isofs.o
CC block/blk-wbt.o
CC [M] fs/hfsplus/super.o
```

8. \$ sudo make modules_install

Command to install Linux kernel modules.

```
meenakshimadhu@pop-os:~/linux-5.8.14$ sudo make modules_install
[sudo] password for meenakshimadhu:
INSTALL arch/x86/crypto/aegis128-aesni.ko
INSTALL arch/x86/crypto/aesni-intel.ko
INSTALL arch/x86/crypto/blowfish-x86_64.ko
INSTALL arch/x86/crypto/camellia-aesni-avx-x86_64.ko
INSTALL arch/x86/crypto/camellia-aesni-avx2.ko
INSTALL arch/x86/crypto/camellia-x86_64.ko
INSTALL arch/x86/crypto/cast5-avx-x86_64.ko
INSTALL arch/x86/crypto/cast6-avx-x86_64.ko
```

```
INSTALL sound/synth/emux/snd-emux-synth.ko
INSTALL sound/synth/snd-util-mem.ko
INSTALL sound/usb/6fire/snd-usb-6fire.ko
INSTALL sound/usb/bcd2000/snd-bcd2000.ko
INSTALL sound/usb/caiaq/snd-usb-caiaq.ko
INSTALL sound/usb/hiface/snd-usb-hiface.ko
INSTALL sound/usb/line6/snd-usb-line6.ko
INSTALL sound/usb/line6/snd-usb-pod.ko
INSTALL sound/usb/line6/snd-usb-podhd.ko
INSTALL sound/usb/line6/snd-usb-toneport.ko
INSTALL sound/usb/line6/snd-usb-variiax.ko
INSTALL sound/usb/misc/snd-ua101.ko
INSTALL sound/usb/snd-usb-audio.ko
INSTALL sound/usb/snd-usbmidi-lib.ko
INSTALL sound/usb/usx2y/snd-usb-us122l.ko
INSTALL sound/usb/usx2y/snd-usb-usx2y.ko
INSTALL sound/x86/snd-hdmi-lpe-audio.ko
INSTALL sound/xen/snd_xen_front.ko
DEPMOD 5.8.14
```

9. \$ sudo make install

Command to install the kernel.

```
meenakshimadhu@pop-os:~/linux-5.8.14$ sudo make install
sh ./arch/x86/boot/install.sh 5.8.14 arch/x86/boot/bzImage \
    System.map "/boot"
un-parts: executing /etc/kernel/postinst.d/apt-auto-removal 5.8.14 /boot/vmlinuz-5.8.14
un-parts: executing /etc/kernel/postinst.d/dkms 5.8.14 /boot/vmlinuz-5.8.14
* dkms: running auto installation service for kernel 5.8.14
kernel preparation unnecessary for this kernel. Skipping...
applying patch disable_fstack-clash-protection_fcf-protection.patch...patching file Kbuild
```

```
DKMS: build completed.

system76_acpi.ko:
Running module version sanity check.
- Original module
- No original module exists within this kernel
- Installation
- Installing to /lib/modules/5.8.14/updates/dkms/

depmod.....

DKMS: install completed.

run-parts: executing /etc/kernel/postinst.d/initramfs-tools 5.8.14 /boot/vmlinuz-5.8.14
update-initramfs: Generating /boot/initrd.img-5.8.14
cryptsetup: WARNING: Resume target cryptswap uses a key file
run-parts: executing /etc/kernel/postinst.d/zz-update-grub 5.8.14 /boot/vmlinuz-5.8.14
Sourcing file `/etc/default/grub'
Sourcing file `/etc/default/grub.d/init-select.cfg'
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-5.8.14
Found initrd image: /boot/initrd.img-5.8.14
Found linux image: /boot/vmlinuz-5.4.0-7642-generic
Found initrd image: /boot/initrd.img-5.4.0-7642-generic
done
meenakshimadhu@pop-os:~/linux-5.8.14$
```

[OK]

On reboot, the newly installed kernel can be seen in the grub-menu:

