building and installing the kernel

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> Disclaimer: Info here is from: LDF103

clone the stable release

```
1 git clone git://git.kernel.org/pub/scm/linux/
     kernel/git/stable/linux-stable.git
     linux_stable
2 cd linux_stable
```

switch to latest stable branch

```
git branch -a
* master
  remotes/origin/HEAD -> origin/master
  remotes/origin/linux-2.6.11.y
  ...
  remotes/origin/linux-6.7.y
  remotes/origin/linux-6.8.y
  remotes/origin/linux-6.9.y
  remotes/origin/linux-rolling-lts
  remotes/origin/linux-rolling-stable
  remotes/origin/master

git switch remotes/origin/linux-6.9.y
```

generating .config

- copy the current configuration, into `linux_stable` directory

```
1 ls /boot # look for config-...-generic
2 cp /boot/config-...-generic /path/to/linux\
      _stable
```

- genereate `.config` based on current configuration

```
1  make oldconfig
```

- keep pressing enter to set default options, or choose what features you need

install dependencies

- these are the dependencies that I had to install; yours might be different based on configuration

```
1  sudo apt-get install build-essential vim git
       cscope libncurses-dev libssl-dev bison flex
        libelf-dev
```

compile the kernel

- run the command

```
make -jN
```

- where `N` is number of threads on your CPU

```
make -j$(nproc)
```

- if it gives an error like <xyz.h> missing, then install the missing dependencies
- after successfull compilation, `vmlinux` binary would be generated

install the kernel

```
1  make modules_install
2  sudo make install
```

```
sudo su
[sudo] password for kaku:
make modules_install install
  SYMLINK /lib/modules/6.9.10/build
  INSTALL /lib/modules/6.9.10/modules.order
    ...other drivers
  INSTALL /lib/modules/6.9.10/kernel/net/qrtr/
     qrtr-mhi.ko
  SIGN    /lib/modules/6.9.10/kernel/net/qrtr/
     qrtr-mhi.ko
  DEPMOD  /lib/modules/6.9.10
  INSTALL /boot
```

check your new kernel in /boot

```
{4:04}/boot ➪ ll
total 599M
drwx------. 4 root root 4.0K Dec 31  1969 efi
-rw-r--r--. 1 root root  160 Apr 10 20:00 .vmlinuz-6.8.5-301.fc40.x86_64.hmac
-rwxr-xr-x. 1 root root  15M Apr 10 20:00 vmlinuz-6.8.5-301.fc40.x86_64
-rw-r--r--. 1 root root 8.5M Apr 10 20:00 System.map-6.8.5-301.fc40.x86_64
-rw-r--r--. 1 root root 266K Apr 10 20:00 config-6.8.5-301.fc40.x86_64
lrwxrwxrwx. 1 root root   45 Apr 14 19:01 symvers-6.8.5-301.fc40.x86_64.xz -> /lib/modules/6.8.5-301.fc40.x86_64/symvers.xz
-rw-r--r--. 1 root root  161 May 16 20:00 .vmlinuz-6.8.10-300.fc40.x86_64.hmac
-rwxr-xr-x. 1 root root  15M May 16 20:00 vmlinuz-6.8.10-300.fc40.x86_64
-rw-r--r--. 1 root root 8.6M May 16 20:00 System.map-6.8.10-300.fc40.x86_64
-rw-r--r--. 1 root root 266K May 16 20:00 config-6.8.10-300.fc40.x86_64
drwx------. 2 root root  16K May 18 11:31 lost+found
drwxr-xr-x. 3 root root 4.0K May 18 11:36 loader
-rwxr-xr-x. 1 root root  15M May 18 11:37 vmlinuz-0-rescue-4f68f95714c84ebc8d232ac71f8406bc
-rw-------. 1 root root 155M May 18 11:38 initramfs-0-rescue-4f68f95714c84ebc8d232ac71f8406bc.img
-rw-------. 1 root root  58M May 18 11:39 initramfs-6.8.5-301.fc40.x86_64.img
-rw-r--r--. 1 root root  14M Jul 21 19:02 vmlinuz-6.9.10
dr-xr-xr-x. 1 root root  158 Jul 21 20:03 ..
-rw-------. 1 root root  47M Jul 21 20:25 initramfs-6.8.10-300.fc40.x86_64.img
lrwxrwxrwx. 1 root root   46 Jul 21 20:25 symvers-6.8.10-300.fc40.x86_64.xz -> /lib/modules/6.8.10-300.fc40.x86_64/symvers.xz
drwx------. 3 root root 4.0K Jul 22 03:47 grub2
dr-xr-xr-x. 6 root root 4.0K Jul 22 03:58 .
-rw-------. 1 root root 267M Jul 22 03:58 initramfs-6.9.10.img
{4:04}/boot ➪
```

Figure 1: your kernel must appear in **/boot**

update grub configuration

- there is no gurantee that newly installed kernel will boot
- need to ensure that there is atleast one **good kernel** to boot from
- increase the `GRUB\_TIMOUT` to make grub allow us enough time to be able to select kernel to boot
- in `/etc/default/grub`

enable early messages

- if the new kernel fails to boot; we should be able to see **early messages** to debug why it failed to boot
- enable early messages by changing `GRUB_CMDLINE_LINUX` to `earlyprintk-=vga`

```
1  GRUB_CMDLINE_LINUX="earlyprintk=vga"
```

- in `/etc/default/grub`
- run `sudo update-grub` to update grub configuration

restart the system

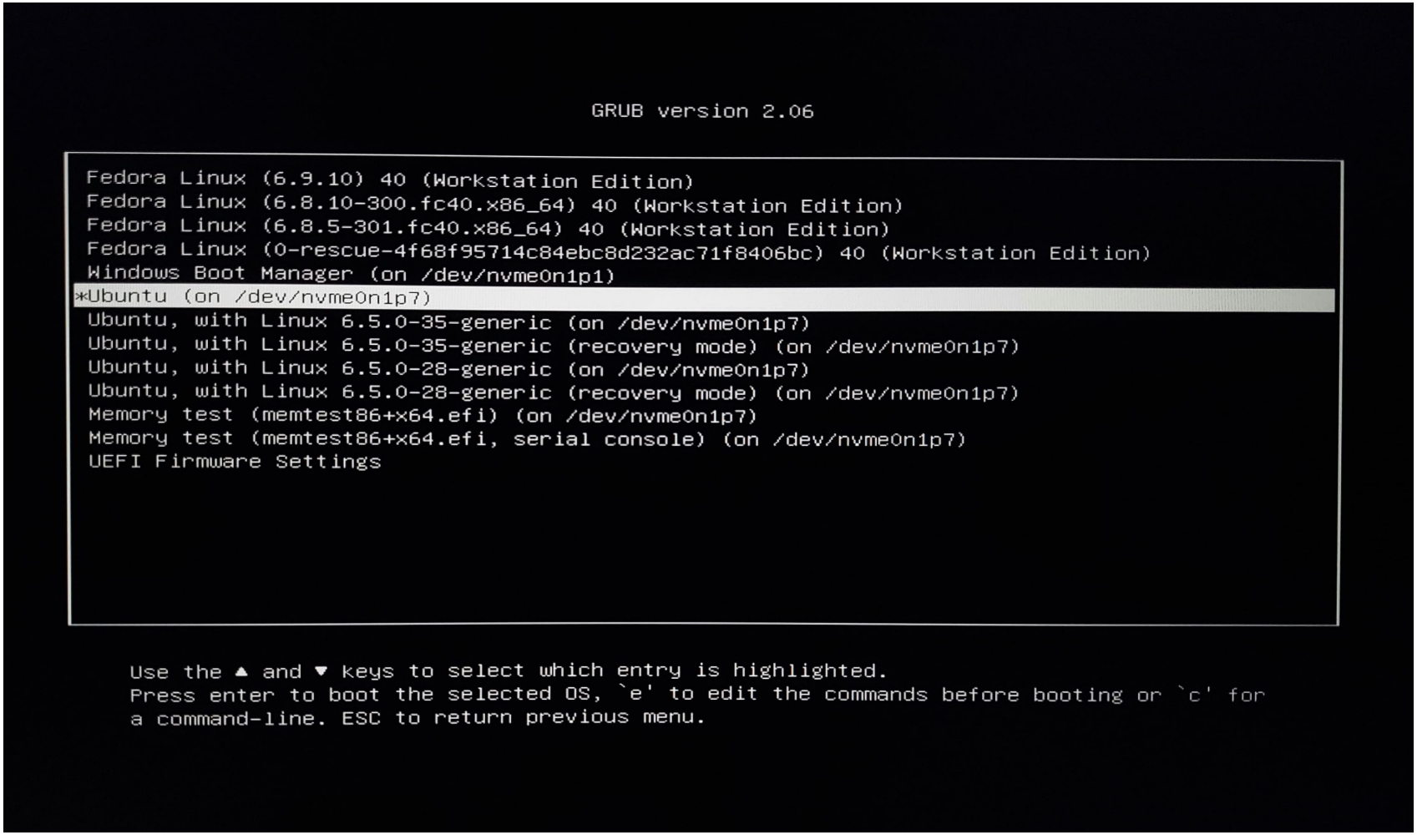

Figure 2: At the boot menu you see your new kernel; yours might look different

- boot into the new kernel
- check kernel verison to confirm

```
$ uname -r
6.9.10
```

new kernel fails to boot

- if kernel fails to boot; compare dmesg of your old kernel and newly build kernel to check for regressions (Checking whether changes to software have broken functionality that used to work).

Thank You