

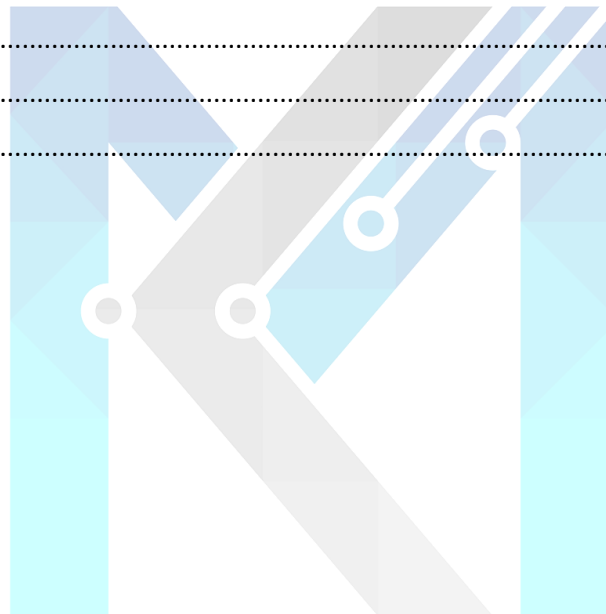
# KERNEL MASTERS

**Setup**

**Linux Device Drivers Development Environment**

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## Kernel Configuration, Compilation and installation [Own built Kernel]

Two ways to own built kernel:

1. Manual Method
2. Automation Method using script

### 1. Automation Method

Run the below script and execute all above commands automatically using shell script.

```
$ ./x86_kernel_build.sh
```

### 2. Manual Method

#### **2.1. Install Required Packages**

```
$ sudo apt-get install flex bison ncurses-dev libssl-dev
```

#### **2.2. Download Kernel Source code**

**Create KM\_GITLAB folder in home directory**

```
$ mkdir ~/KM_GITLAB
```

**Enter KM\_GITLAB folder**

```
$ cd ~/KM_GITLAB
```

**Clone linux-5.4.182 repository from KM GITLAB Server.**

```
$ git clone http://138.197.197.6/eldd-level1/linux-5.4.182.git
```

#### **2.3. Kernel Configuration**

**Enter kernel source tree**

```
$ cd ~/KM_GITLAB/ linux-5.4.182
```

```
$ du -sh .
```

```
1.9 G
```

**Run configuration command to configure kernel source code**

```
$ make menuconfig (By default configuration file for x86 platform is  
/boot/config-`uname -r`)
```

output of kernel configuration is .config file.

```
CONFIG_<option>=y/m/notset ; y -Static ; m-module(Dynamic)
```

## 2.4. Kernel Compilation

### Static Compilation

```
$ make -j4 (Static Compilation)
out put is vmlinux (kernel raw image) - virtual memory linux
$ du -sh vmlinux (without compressing)
389 M
```

### Dynamic Compilation

```
$ make modules (Dynamic Compilation)
out put is .ko
$ du -sh .
19 G
```

## 2.5. Kernel Installation

### Dynamic Installation

```
$ sudo make modules_install (.ko installation)
out put is /lib/modules/`uname -r`/build/
```

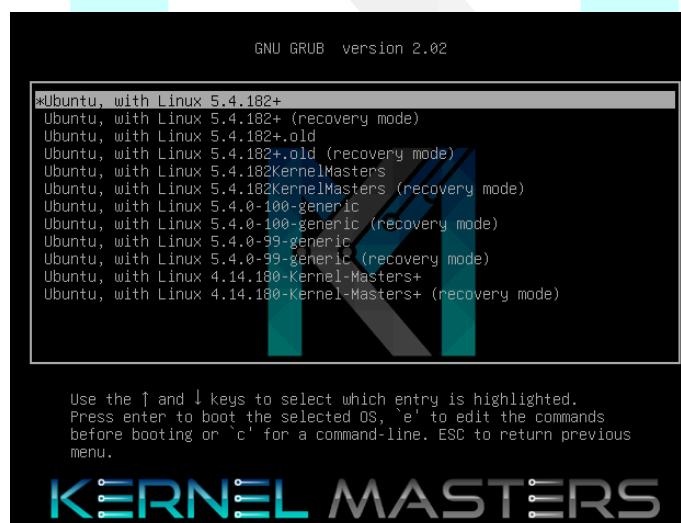
### Static Installation

```
$ sudo make install
out put is /boot/vmlinuz-`uname -r`
(vmlinuz is compressed linux kernel is virtual memory linux gZip)
out put is /boot/config-`uname -r`
out put is /boot/System.map-`uname -r`
out put is /boot/initrd-`uname -r`
out put is /boot/abi-`uname -r`
$ du -sh vmlinuz-`uname -r`
6.6 M
```

## 2.6. Reboot

```
$ sudo reboot
```

In grub menu, select advanced options then select 5.4.182 kernel to boot.



## 3. Issues

### Issue 1:

```
[ 0.004000] Spectre V2 : Spectre mitigation: LFENCE not serializing, switching
to generic retpoline
WARNING: Failed to connect to lvmtool. Falling back to device scanning.
Volume group "lubuntu-vg" not found
Cannot process volume group lubuntu-vg
Gave up waiting for suspend/resume device
WARNING: Failed to connect to lvmtool. Falling back to device scanning.
Volume group "lubuntu-vg" not found
Cannot process volume group lubuntu-vg
Gave up waiting for root file system device. Common problems:
- Boot args (cat /proc/cmdline)
- Check rootdelay= (did the system wait long enough?)
- Missing modules (cat /proc/modules; ls /dev)
ALERT! /dev/mapper/lubuntu--vg-root does not exist. Dropping to a shell!

BusyBox v1.27.2 (Ubuntu 1:1.27.2-2ubuntu3.2) built-in shell (ash)
Enter 'help' for a list of built-in commands.

(initramfs) _
```

This issue seems like initramfs failed and this problem occur first install modules then static installation.

*\$ sudo make modules\_install*

*\$ sudo make install*

### Solution:

First static install then module installation. See the below steps

*\$ sudo make install*

*\$ sudo make modules\_install*