

Kernel 3.16 Released – Compile and Install on Debian GNU/Linux

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Kernel is the core of any operating System. The primary function of kernel is to act as mediator in-between Application – CPU, Application – Memory and Application – Devices (I/O). It function as Memory Manager, Device manager and attends System calls besides performing other tasks.



Compile and Install Kernel 3.16 in Debian Linux

For Linux, Kernel is its heart. The Linux Kernel is released under GNU General Public License. Linus Torvalds developed Linux Kernel in the year 1991 and he came with Initial Kernel Release Version 0.01. On 3rd of August, 2014 (this year) **Kernel 3.16** has been released. In this 22 years, Linux kernel has seen a lot of development. Now there are thousand of companies, millions of independent developer contributing to Linux Kernel.

A rough estimation of big brands and their contribution to the present Linux Kernel which is expected to have 17 million lines of code as per **Linux Foundation, Linux Kernel Development Report**.

1. RedHat – 10.2%
2. Intel – 8.8%
3. Texas Instruments – 4.1%

4. Linaro – 4.1%
5. SUSE – 3.5%
6. IBM – 3.1%
7. Samsung – 2.6%
8. Google – 2.4%
9. Vision Engraving Systems – 2.3%
10. Wolfson Microelectronics – 1.6%
11. Oracle – 1.3%
12. Broadcom – 1.3%
13. Nvidia – 1.3%
14. Freescale – 1.2%
15. Ingics Technology – 1.2%
16. Cisco – 0.9%
17. Linux Foundation – 0.9%
18. AMD – 0.9%
19. Academics – 0.9%
20. NetAPP – 0.8%
21. Fujitsu – 0.7%
22. parallels – 0.7%
23. ARM – 0.7%

Seventy percent of kernel development is done by Developers, who are working in Corporates and are paid for that, sounds Interesting?

Linux Kernel 3.16 is released for individual as well as companies in production environment, who will be updating their kernel for a number of reason, a few of which includes.

1. Security Patches
2. Stability Enhancement
3. Updated Drivers – Better device Support
4. Processing speed improvement
5. Latest Functions, etc

This article aims at updating Debian kernel, the Debian way, which means less manual work, less risk yet with perfection. We will also be updating Ubuntu Kernel in the later part of this article.

Step 1: Downloading Kernel 3.16

Before we proceed, we must know about our current kernel, that is installed.

```
avi@tecmint:~$ uname -mrns
Linux tecmint 3.14-1-amd64 x86_64
```

About options:

1. **-s** : Print Operating System ('Linux', Here).
2. **-n** : Print System Hostname ('tecmint', Here).
3. **-r** : Print Kernel Version ('tecmint 3.14-1-amd64', Here).
4. **-m** : Print Hardware Instruction Set ('x86_64', Here).

Download latest stable Kernel from the link below. Don't get confused by patches download link there. Download the one which clearly states – **"LATEST STABLE KERNEL"**.

1. <https://www.kernel.org/>

Alternatively you can use **wget** to download the kernel which is more convenient.

```
avi@tecmint:~/Downloads$ wget
https://www.kernel.org/pub/linux/kernel/v3.x/linux-3.16.tar.xz
```

Step 2: Verify Kernel 3.16 Signature

After the download is finished and before we move ahead, it is strongly advised to verify kernel signature.

```
avi@tecmint:~/Downloads$ wget
https://www.kernel.org/pub/linux/kernel/v3.x/linux-3.16.tar.sign
```

The signature verification needs to be done against uncompressed file. This is to require one signature against various compression format viz., .gz, .bz2, .xz.

Next, uncompress Linux Kernel Image.

```
avi@tecmint:~/Downloads$ unxz linux-3.16.tar.xz
```

Verify it against signature.

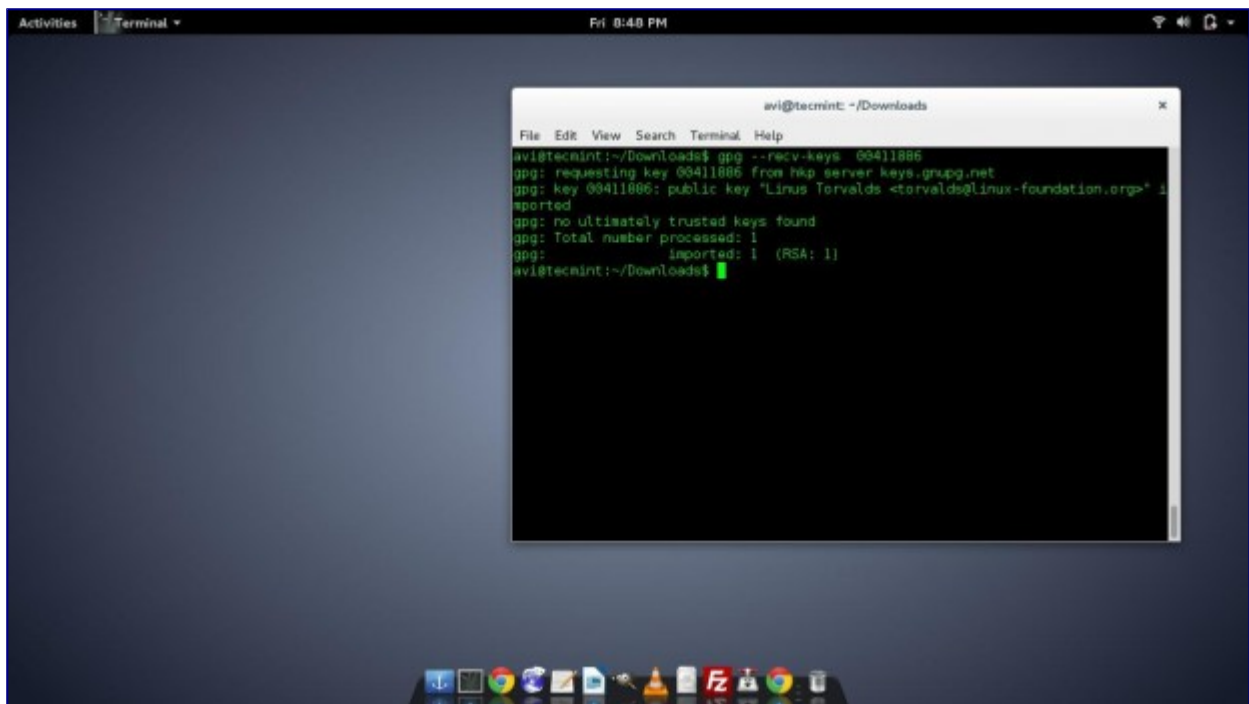
```
avi@tecmint:~/Downloads$ gpg --verify linux-3.16.tar.sign
```



Verify Kernel Signature

Note: If above command throws gpg: Can't check signature: public key not found error. That means we need to download Public key manually from PGP Server.

```
avi@tecmint:~/Downloads$ gpg --recv-keys 00411886
```

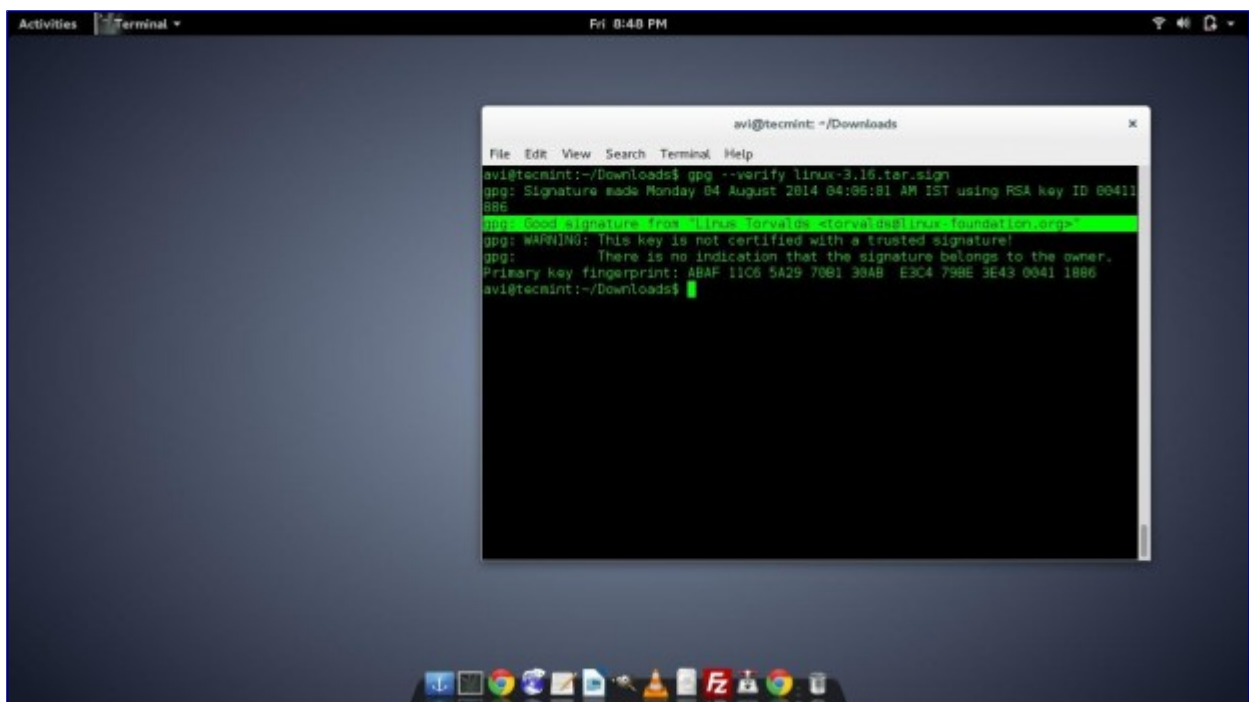
A terminal window titled 'avi@tecmint: ~/Downloads' showing the command 'gpg --recv-keys 00411886' and its output. The output indicates that the key 00411886 is a public key for Linus Torvalds. The terminal is running on a Linux desktop environment with a taskbar at the bottom.

```
avi@tecmint:~/Downloads$ gpg --recv-keys 00411886
gpg: requesting key 00411886 from hkp server keys.gnupg.net
gpg: key 00411886: public key "Linus Torvalds <torvalds@linux-foundation.org>" 1
imported
gpg: no ultimately trusted keys found
gpg: Total number processed: 1
gpg:       imported: 1 (RSA: 1)
avi@tecmint:~/Downloads$
```

Download Public Key

After downloading key, verify the the Key again.

```
avi@tecmint:~/Downloads$ gpg --verify linux-3.16.tar.sign
```

A terminal window titled 'avi@tecmint: ~/Downloads' showing the command 'gpg --verify linux-3.16.tar.sign' and its output. The output shows that the signature is good and from Linus Torvalds. The terminal is running on a Linux desktop environment with a taskbar at the bottom.

```
avi@tecmint:~/Downloads$ gpg --verify linux-3.16.tar.sign
gpg: Signature made Monday 04 August 2014 04:06:01 AM IST using RSA key ID 00411886
gpg: Good signature from "Linus Torvalds <torvalds@linux-foundation.org>"
gpg: WARNING: This key is not certified with a trusted signature!
gpg:       There is no indication that the signature belongs to the owner.
Primary key fingerprint: ABAF 11C6 5A29 70B1 30AB E3C4 79BE 3E43 0041 1886
avi@tecmint:~/Downloads$
```

Verify Key

Have you noticed two things about gpg key verification.

1. **gpg:** Good signature from "Linus Torvalds <torvalds@linux-foundation.org>".
2. **Primary key fingerprint:** ABAF 11C6 5A29 70B1 30AB E3C4 79BE 3E43 0041 1886 .

Nothing to worry about key fingerprint, we are sure now that the archive is OK and signed. Lets move ahead!

Step 3: Installing Required Packages

Before we go ahead and start building the kernel, we need to install certain packages to ease the kernel building and Installation process and do it risk-free Debian way.

Install libncurses5-dev, fakeroot and kernel-package.

```
avi@tecmint:~/Downloads$ sudo apt-get install libncurses5-dev
avi@tecmint:~/Downloads$ sudo apt-get install fakeroot
avi@tecmint:~/Downloads$ sudo apt-get install kernel-package
```

Step 4: Building Kernel 3.16

After successful installation of the above packages, we are ready to build kernel. Move to the extracted Linux Kernel Image (we extracted above, while verifying signature).

```
avi@tecmint:~/Downloads$ cd linux-3.16/
```

Now it's important to copy the current kernel configuration to present working directory as root user.

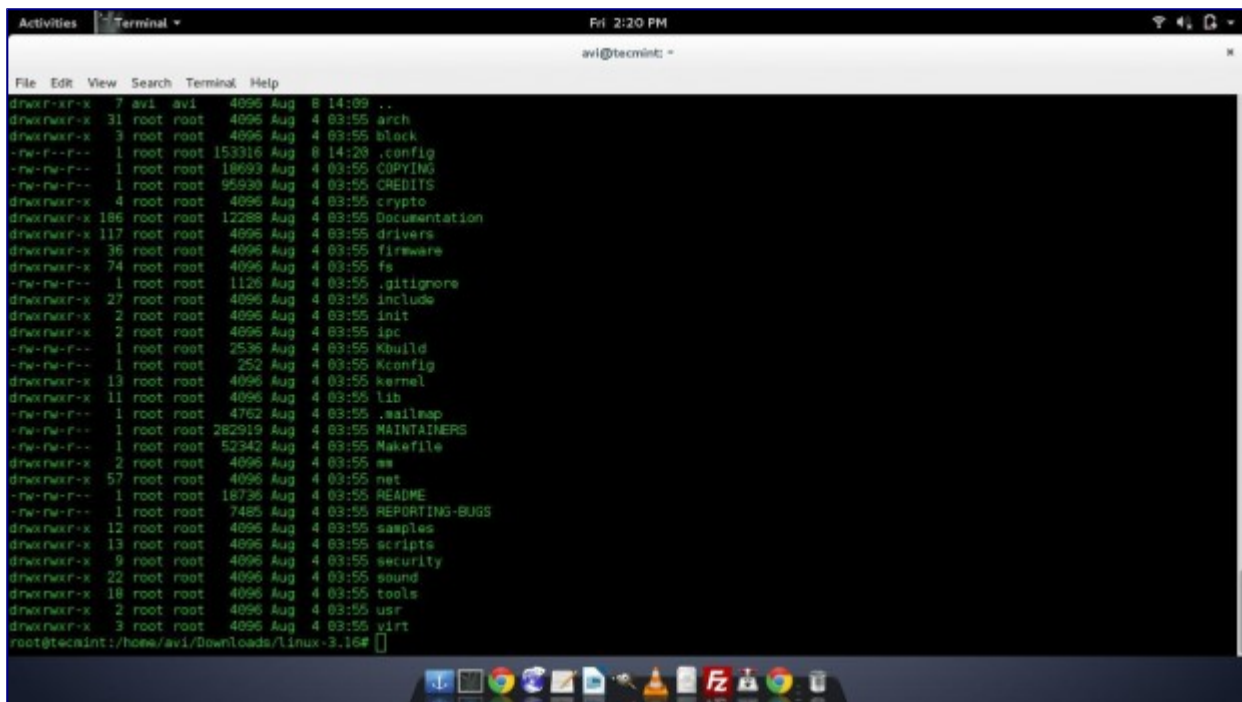
```
# cp /boot/config-'uname -r' .config
```

It is copying **/boot/config-`'uname -r'`** to present working directory **“/home/avi/Downloads/linux-3.16”** and saving it as **`'config'`**.

Here **`'uname -r'`** will automatically be replaced and processed with your currently installed kernel version.

Since a dot file can't be seen the normal way, you need to use option **`'-a'`** with **`ls`** to view this, in your present working directory'.

```
$ ls -al
```



Building Kernel 3.16

There are three ways to build a Linux Kernel.

1. **make oldconfig** : It is an interactive way in which kernel ask question one by one what it should support and what not. It is a Very time consuming Process.
2. **make menuconfig** : It is a Command-Line Menu based system where user can enable and disable an option. It requires ncurses library hence we Apt that above.
3. **make qconfig/xconfig/gconfig** : It is the Graphical Menu based system where user can enable and disable an option. It requires QT Library.

Obviously we will be using '**make menuconfig**'.

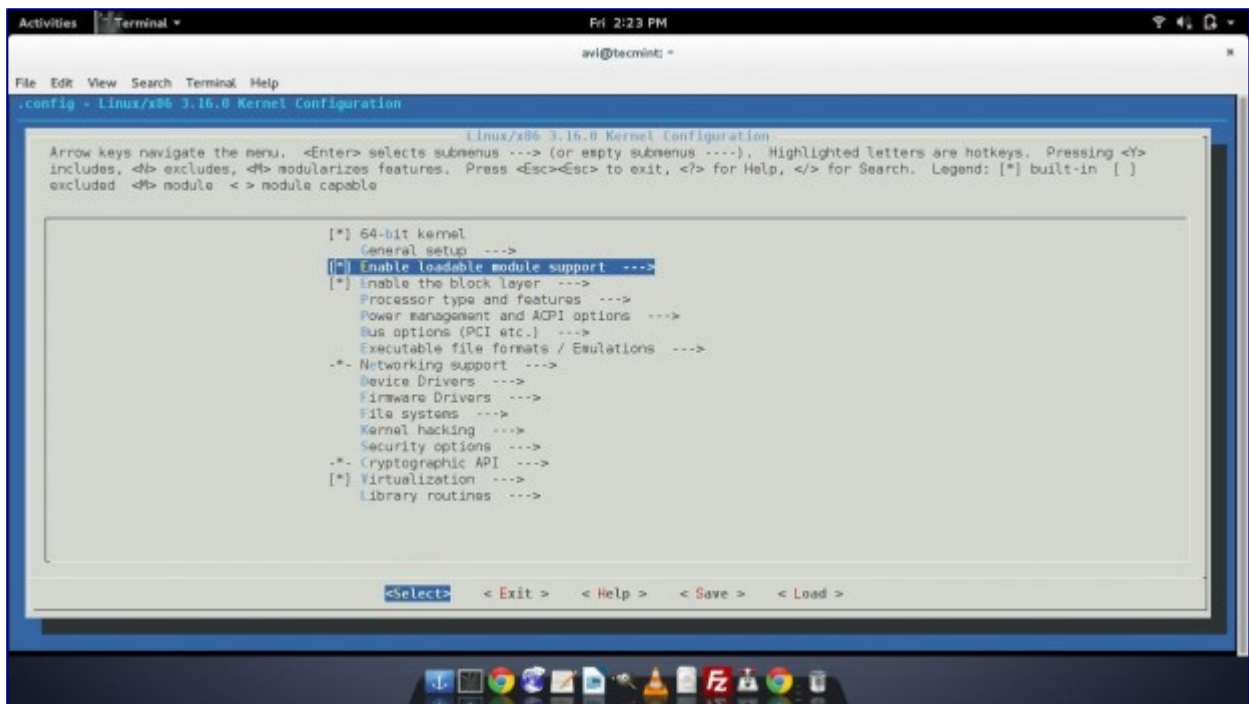
Afraid of building kernel? You should not be. Its fun, there is lot of stuff you will learn. You should keep in mind these following things.

1. Your hardware needs and appropriate drivers.
2. Choose new features while you are building kernel yourself like – high memory support.
3. Optimize kernel – select only those drivers which you need. It will speed up your boot process. If you are not sure of any driver, better include that.

Now, run the '**make menuconfig**' command.

```
# make menuconfig
```

Important: You must choose “**SELECT – ENABLE LOADABLE MODULE SUPPORT**“, if you forget to do this, you are going to get hard times.



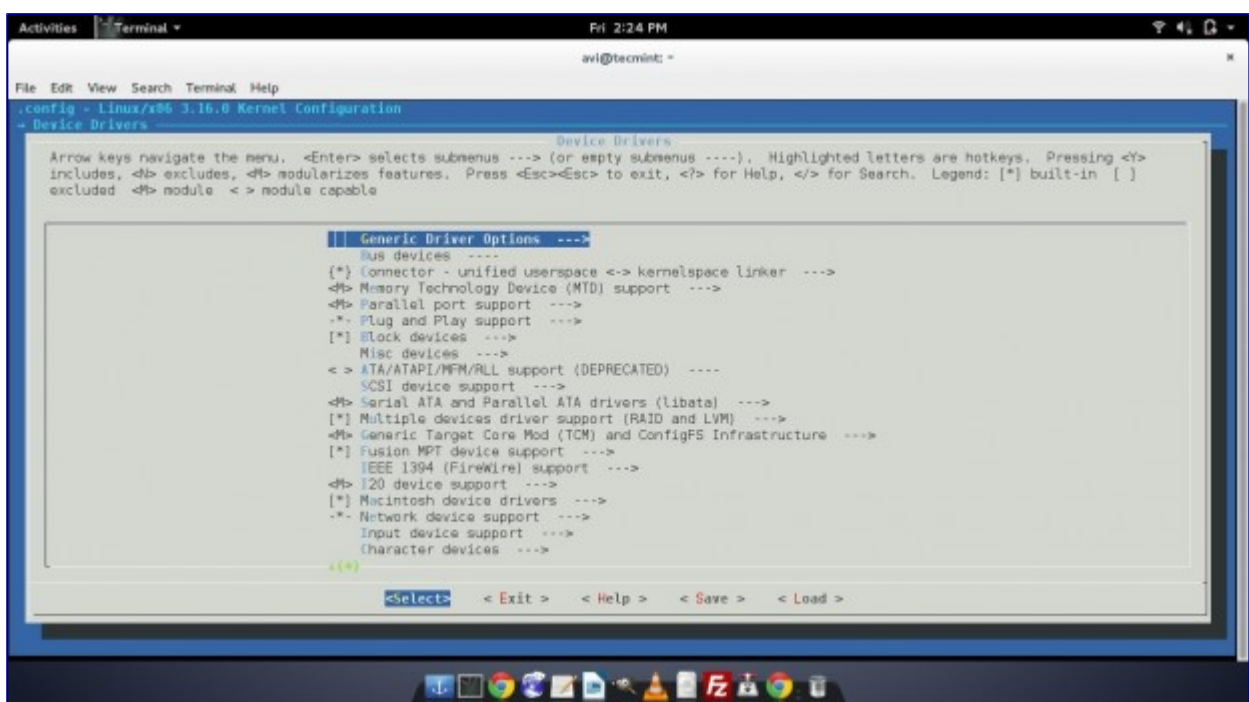
Run Make Menuconfig

Note: In the open configuration windows you can configure various options for your network card, bluetooth, Touchpad, Graphics card, Filesystem support such as NTFS and a lot other options.

There is no tutorial to guide you what you should select and what not. You come to know this only by Researching, studying stuff over web, learning from tutorials of tecmint and in every other possible way.

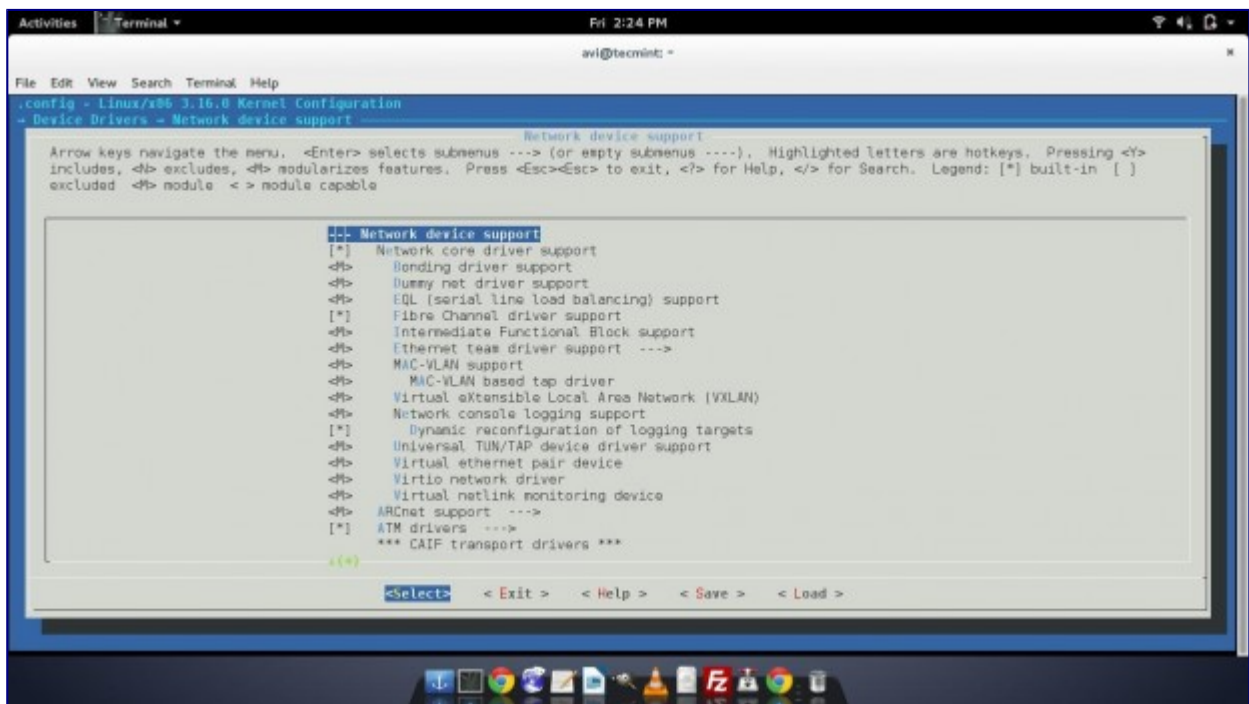
You may see there is an option kernel hacking. Hacking? Yup! Here it means exploration. You can add various options under kernel hacking and utilize a lot of features.

Next, select **Generic Driver Options**.



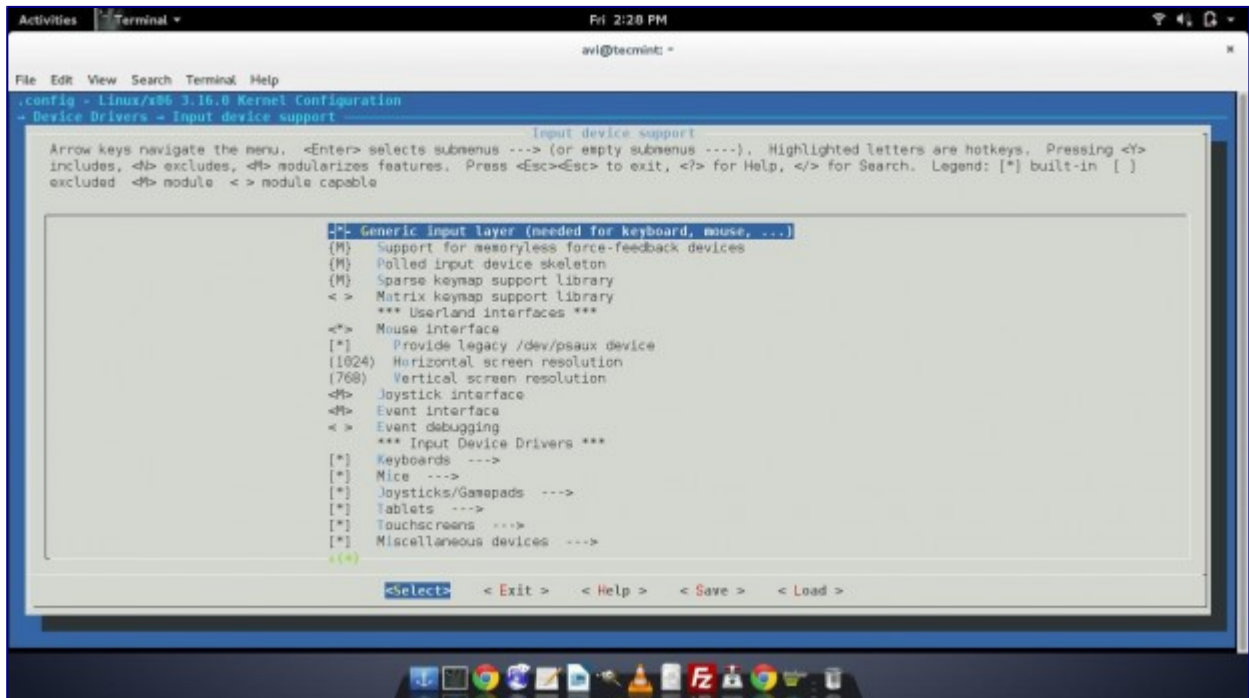
Select Drivers for Kernel Compilation

Network Device Support.



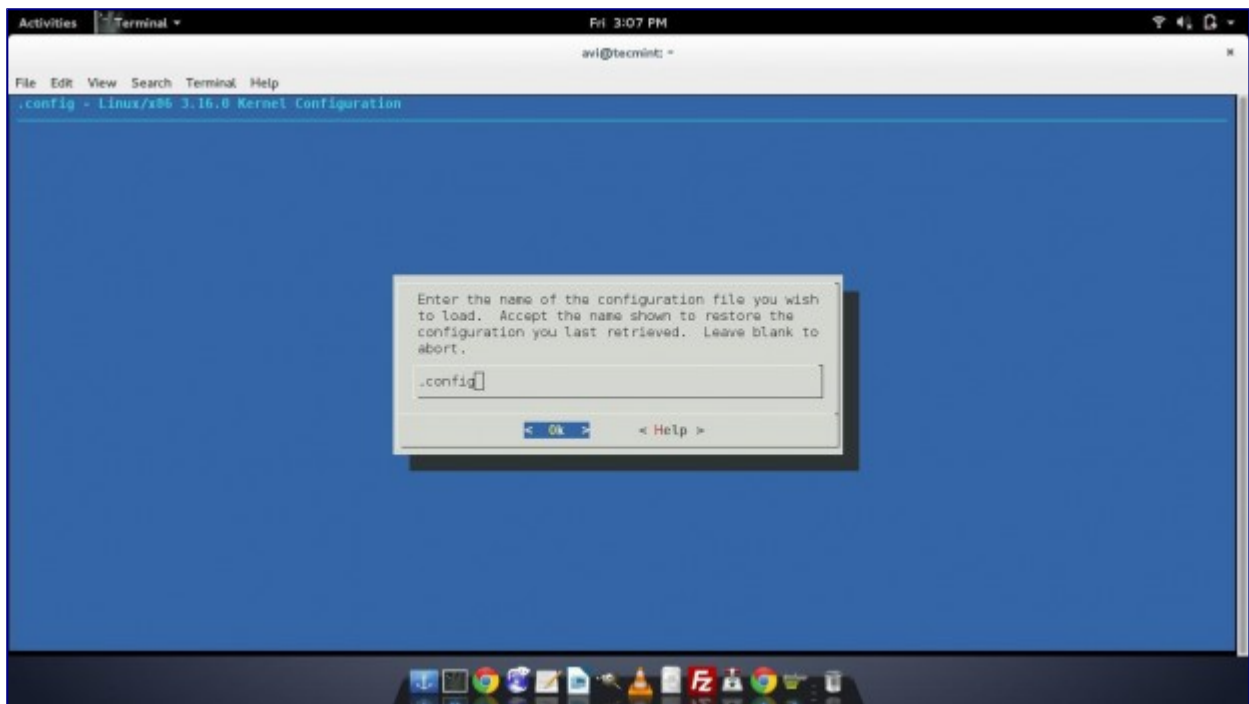
Select Network Support for Kernel

Input Device support.



Input Device Support for Kernel

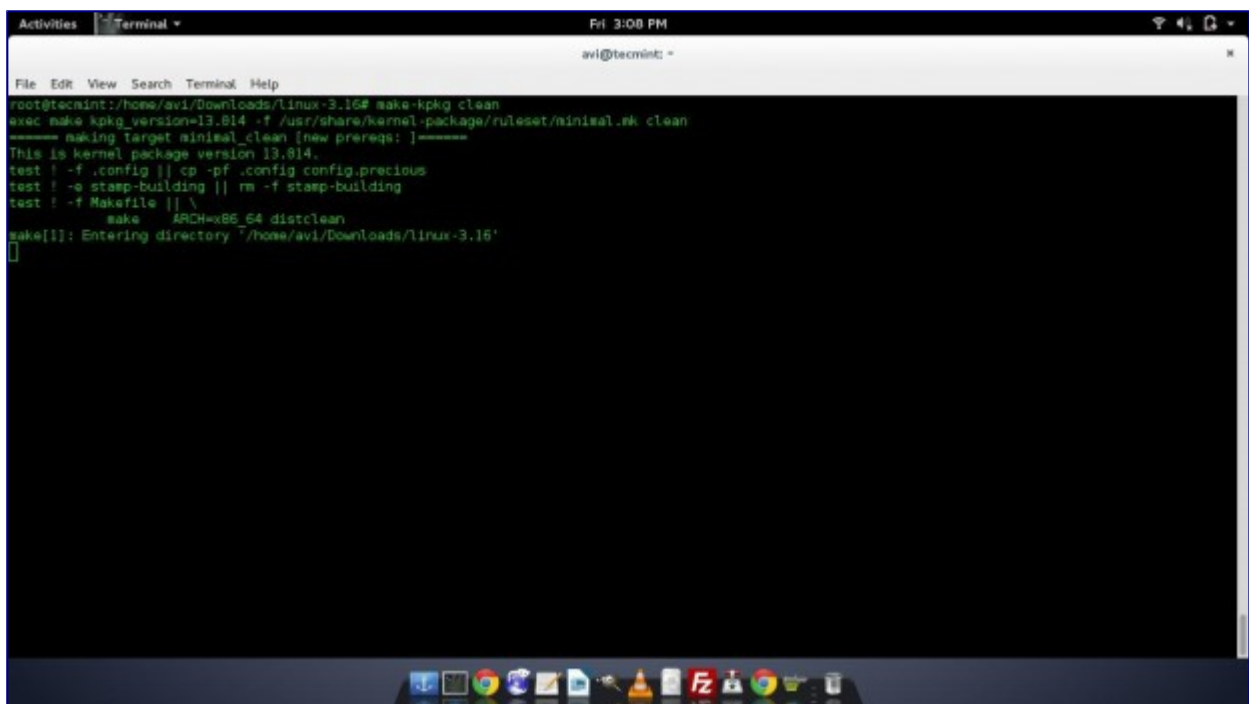
Load the configuration file (.config), we saved from /boot/config-`uname -r`.config.



Load Kernel Configuration

Click on OK, save and exit. Now clean the source tree and reset the kernel-package parameters.

```
# make-kpkg clean
```



Reset Kernel Parameters

Step 5: Compiling Kernel 3.16

Before we start compiling kernel, we need to export **CONCURRENCY_LEVEL**.

CONCURRENCY LEVEL of thumb has a rule to add Numeric 1 to the cores of kernel. If you have

2 cores, export CONCURRENCY_LEVEL=3. If you have 4 cores, export CONCURRENCY_LEVEL=5.

To check cores of processor you can use cat command as shown below.

```
# cat /proc/cpuinfo
```

Sample Output

```
Sample Output
processor      : 0
vendor_id     : GenuineIntel
cpu family    : 6
model         : 69
model name    : Intel(R) Core(TM) i3-4005U CPU @ 1.70GHz
stepping      : 1
microcode     : 0x17
cpu MHz       : 799.996
cache size    : 3072 KB
physical id   : 0
siblings      : 4
core id       : 0
cpu cores     : 2
apicid        : 0
initial apicid : 0
fpu           : yes
fpu_exception : yes
cpuid level   : 13
wp            : yes
```

You see above output, I have 2 cores, so we will export 3 cores as shown below.

```
# export CONCURRENCY_LEVEL=3
```

Setting correct **CONCURRENCY_LEVEL** will speed up the kernel compilation time.

```
# fakeroot make-kpkg --append-to-version "-tecminkernel" --revision "1"
--initrd kernel_image kernel_headers
```

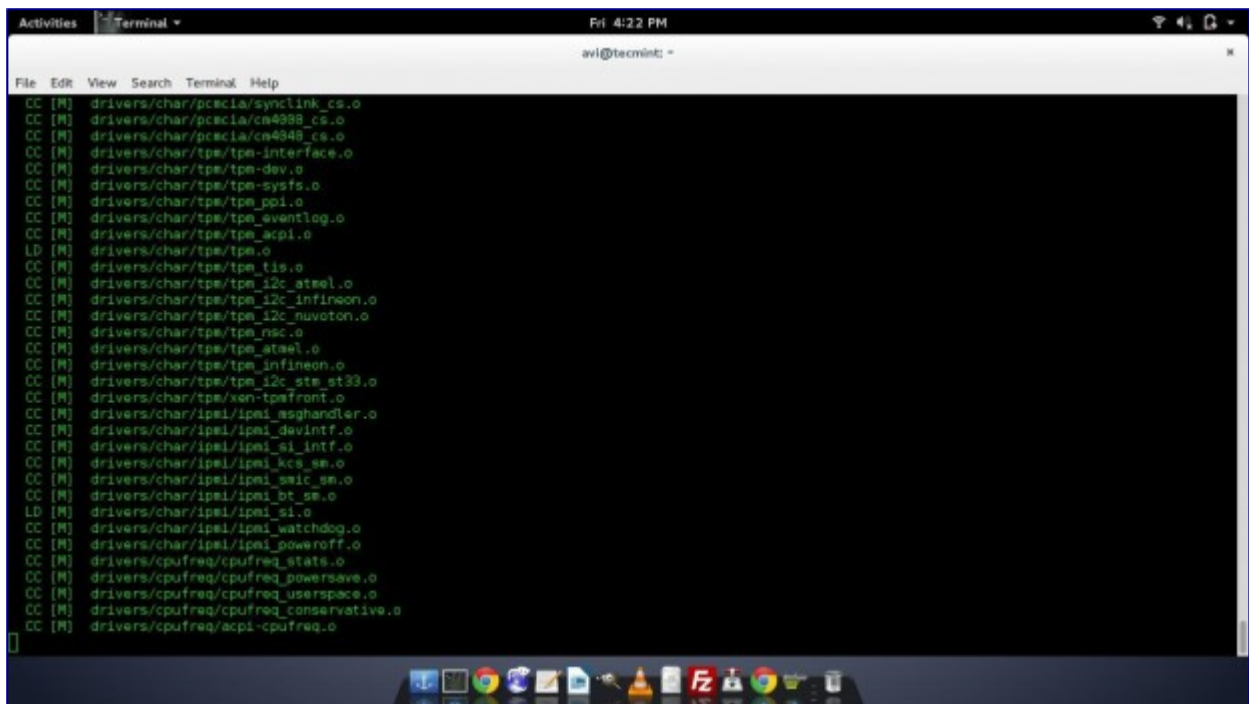
Here ‘**tecminkernel**’ is the kernel build name, it can be anything ranging from your name, your host name, your pet name or anything else.

```
Activities Terminal Fri 3:15 PM
avi@tecmini: ~
File Edit View Search Terminal Help
Aborting.
root@tecmini:~/home/avi/Downloads/linux-3.16# fakeroot make-kpkg --append-to-version "-tecminikernel" --revision "1" --initrd kernel_image kernel_headers
===== making target debian/stamp/conf/minimal_debian [new prereqs: ]=====
This is kernel package version 13.014.
test -d debian || mkdir debian
test ! -e stamp-building || rm -f stamp-building
install -p -m 755 /usr/share/kernel-package/rules debian/rules
for file in ChangeLog Control Control.bin96 config templates.in rules; do
    cp -f /usr/share/kernel-package/$file ./debian/;
done
cp: cannot stat '/usr/share/kernel-package/ChangeLog': No such file or directory
for dir in Config docs examples ruleset scripts pkg po; do
    cp -af /usr/share/kernel-package/$dir ./debian/;
done
test -f debian/control || sed -e 's=/V/3.16.0-tecminikernel/g' \
    -e 's=/0/1/g' -e 's=/A/and64/g' \
    -e 's=/SA//g' \
    -e 's=/I//g' \
    -e 's=/CV/3.16/g' \
    -e 's=/M/Unknown Kernel Package Maintainer <unknown@unconfigured.in.etc.kernel-pkg.conf>/g' \
    -e 's=/ST/linux/g' -e 's=/B/x86_64/g' \
    -e 's=/R//g' /usr/share/kernel-package/Control > debian/control
test -f debian/changelog || sed -e 's=/V/3.16.0-tecminikernel/g' \
    -e 's=/0/1/g' -e 's=/A/and64/g' \
    -e 's=/ST/linux/g' -e 's=/B/x86_64/g' \
    -e 's=/M/Unknown Kernel Package Maintainer <unknown@unconfigured.in.etc.kernel-pkg.conf>/g' \
    /usr/share/kernel-package/changelog > debian/changelog
chmod 0644 debian/control debian/changelog
test -d ./debian/stamp || mkdir debian/stamp
make -f debian/rules debian/stamp/conf/kernel-conf
make[1]: Entering directory '/home/avi/Downloads/linux-3.16'
```

Building Linux Kernel

```
Activities Terminal Fri 3:17 PM
avi@tecmini: ~
File Edit View Search Terminal Help
CC drivers/char/app/and64-app.o
CC drivers/char/app/intel-app.o
CC drivers/char/app/intel-gtt.o
CC drivers/char/app/sis-app.o
CC drivers/char/app/via-app.o
LD drivers/char/app/built-in.o
LD drivers/char/nv_random/built-in.o
LD drivers/char/mwave/built-in.o
LD drivers/char/pcscia/built-in.o
LD drivers/char/tps/built-in.o
LD drivers/char/built-in.o
LD drivers/char/ipsi/built-in.o
CC drivers/clk/clk-devres.o
CC drivers/clk/clkdev.o
CC drivers/clk/clk.o
CC drivers/clk/clk-divider.o
CC drivers/clk/clk-fixed-factor.o
CC drivers/clk/clk-fixed-rate.o
CC drivers/clk/clk-gate.o
CC drivers/clk/clk-mux.o
CC drivers/clk/clk-composite.o
CC drivers/clk/clk-fractional-divider.o
CC drivers/clk/x86/clk-lpt.o
LD drivers/clk/x86/clk-x86-lps.o
LD drivers/clk/x86/built-in.o
LD drivers/clk/built-in.o
LD drivers/clocksource/acpi_pm.o
CC drivers/clocksource/i8253.o
LD drivers/clocksource/built-in.o
CC drivers/connector/cn_queue.o
CC drivers/connector/connector.o
LD drivers/connector/cn.o
CC drivers/connector/cn_proc.o
```

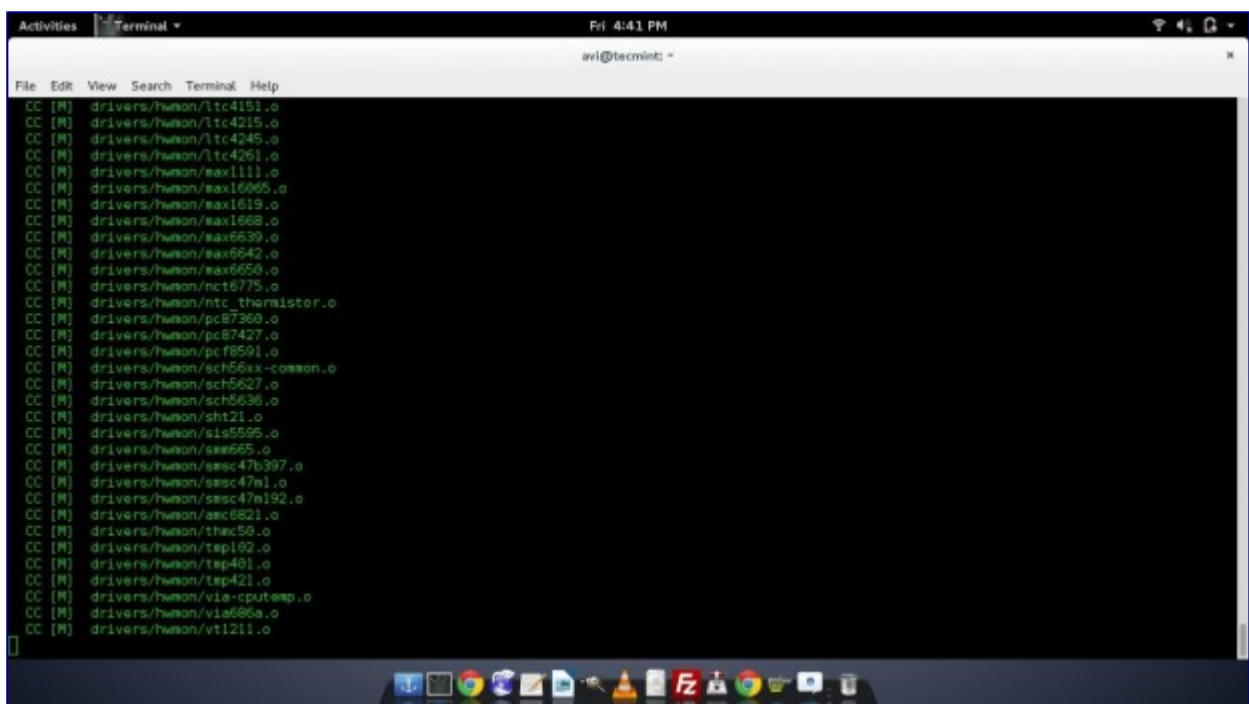
Linux Kernel Compilation



A terminal window titled 'Terminal' with a menu bar (File, Edit, View, Search, Terminal, Help) and a status bar (Fri 4:22 PM, avi@tecmint: ~). The terminal displays a list of kernel modules being compiled, each preceded by 'CC [M]' and followed by a file path. The modules listed are:

```
CC [M] drivers/char/pcscia/synclink_cs.o
CC [M] drivers/char/pcscia/cn4988_cs.o
CC [M] drivers/char/pcscia/cn4948_cs.o
CC [M] drivers/char/tps/tps-interface.o
CC [M] drivers/char/tps/tps-dev.o
CC [M] drivers/char/tps/tps-sysfs.o
CC [M] drivers/char/tps/tps_poi.o
CC [M] drivers/char/tps/tps_eventlog.o
CC [M] drivers/char/tps/tps_acpi.o
LD [M] drivers/char/tps/tps.o
CC [M] drivers/char/tps/tps_tis.o
CC [M] drivers/char/tps/tps_i2c_atmel.o
CC [M] drivers/char/tps/tps_i2c_infineon.o
CC [M] drivers/char/tps/tps_i2c_nuvoton.o
CC [M] drivers/char/tps/tps_nsc.o
CC [M] drivers/char/tps/tps_atmel.o
CC [M] drivers/char/tps/tps_infineon.o
CC [M] drivers/char/tps/tps_i2c_stm32.o
CC [M] drivers/char/tps/xen-tpsfrofi.o
CC [M] drivers/char/tpm/tpm_acpi.o
CC [M] drivers/char/tpm/tpm_devintf.o
CC [M] drivers/char/tpm/tpm_si_intf.o
CC [M] drivers/char/tpm/tpm_kcs_se.o
CC [M] drivers/char/tpm/tpm_smic_se.o
CC [M] drivers/char/tpm/tpm_bt_se.o
LD [M] drivers/char/tpm/tpm.o
CC [M] drivers/char/tpm/tpm_watchdog.o
CC [M] drivers/char/tpm/tpm_poweroff.o
CC [M] drivers/cpufreq/cpufreq_stats.o
CC [M] drivers/cpufreq/cpufreq_powersave.o
CC [M] drivers/cpufreq/cpufreq_userspace.o
CC [M] drivers/cpufreq/cpufreq_conservative.o
CC [M] drivers/cpufreq/acpi-cpufreq.o
```

Kernel Compilation Process



A terminal window titled 'Terminal' with a menu bar (File, Edit, View, Search, Terminal, Help) and a status bar (Fri 4:41 PM, avi@tecmint: ~). The terminal displays a list of kernel modules being compiled, each preceded by 'CC [M]' and followed by a file path. The modules listed are:

```
CC [M] drivers/hwmon/hwmon1.o
CC [M] drivers/hwmon/hwmon2.o
CC [M] drivers/hwmon/hwmon3.o
CC [M] drivers/hwmon/hwmon4.o
CC [M] drivers/hwmon/hwmon5.o
CC [M] drivers/hwmon/hwmon6.o
CC [M] drivers/hwmon/hwmon7.o
CC [M] drivers/hwmon/hwmon8.o
CC [M] drivers/hwmon/hwmon9.o
CC [M] drivers/hwmon/hwmon10.o
CC [M] drivers/hwmon/hwmon11.o
CC [M] drivers/hwmon/hwmon12.o
CC [M] drivers/hwmon/hwmon13.o
CC [M] drivers/hwmon/hwmon14.o
CC [M] drivers/hwmon/hwmon15.o
CC [M] drivers/hwmon/hwmon16.o
CC [M] drivers/hwmon/hwmon17.o
CC [M] drivers/hwmon/hwmon18.o
CC [M] drivers/hwmon/hwmon19.o
CC [M] drivers/hwmon/hwmon20.o
CC [M] drivers/hwmon/hwmon21.o
CC [M] drivers/hwmon/hwmon22.o
CC [M] drivers/hwmon/hwmon23.o
CC [M] drivers/hwmon/hwmon24.o
CC [M] drivers/hwmon/hwmon25.o
CC [M] drivers/hwmon/hwmon26.o
CC [M] drivers/hwmon/hwmon27.o
CC [M] drivers/hwmon/hwmon28.o
CC [M] drivers/hwmon/hwmon29.o
CC [M] drivers/hwmon/hwmon30.o
CC [M] drivers/hwmon/hwmon31.o
CC [M] drivers/hwmon/hwmon32.o
CC [M] drivers/hwmon/hwmon33.o
CC [M] drivers/hwmon/hwmon34.o
CC [M] drivers/hwmon/hwmon35.o
CC [M] drivers/hwmon/hwmon36.o
CC [M] drivers/hwmon/hwmon37.o
CC [M] drivers/hwmon/hwmon38.o
CC [M] drivers/hwmon/hwmon39.o
CC [M] drivers/hwmon/hwmon40.o
CC [M] drivers/hwmon/hwmon41.o
CC [M] drivers/hwmon/hwmon42.o
CC [M] drivers/hwmon/hwmon43.o
CC [M] drivers/hwmon/hwmon44.o
CC [M] drivers/hwmon/hwmon45.o
CC [M] drivers/hwmon/hwmon46.o
CC [M] drivers/hwmon/hwmon47.o
CC [M] drivers/hwmon/hwmon48.o
CC [M] drivers/hwmon/hwmon49.o
CC [M] drivers/hwmon/hwmon50.o
CC [M] drivers/hwmon/hwmon51.o
CC [M] drivers/hwmon/hwmon52.o
CC [M] drivers/hwmon/hwmon53.o
CC [M] drivers/hwmon/hwmon54.o
CC [M] drivers/hwmon/hwmon55.o
CC [M] drivers/hwmon/hwmon56.o
CC [M] drivers/hwmon/hwmon57.o
CC [M] drivers/hwmon/hwmon58.o
CC [M] drivers/hwmon/hwmon59.o
CC [M] drivers/hwmon/hwmon60.o
CC [M] drivers/hwmon/hwmon61.o
CC [M] drivers/hwmon/hwmon62.o
CC [M] drivers/hwmon/hwmon63.o
CC [M] drivers/hwmon/hwmon64.o
CC [M] drivers/hwmon/hwmon65.o
CC [M] drivers/hwmon/hwmon66.o
CC [M] drivers/hwmon/hwmon67.o
CC [M] drivers/hwmon/hwmon68.o
CC [M] drivers/hwmon/hwmon69.o
CC [M] drivers/hwmon/hwmon70.o
CC [M] drivers/hwmon/hwmon71.o
CC [M] drivers/hwmon/hwmon72.o
CC [M] drivers/hwmon/hwmon73.o
CC [M] drivers/hwmon/hwmon74.o
CC [M] drivers/hwmon/hwmon75.o
CC [M] drivers/hwmon/hwmon76.o
CC [M] drivers/hwmon/hwmon77.o
CC [M] drivers/hwmon/hwmon78.o
CC [M] drivers/hwmon/hwmon79.o
CC [M] drivers/hwmon/hwmon80.o
CC [M] drivers/hwmon/hwmon81.o
CC [M] drivers/hwmon/hwmon82.o
CC [M] drivers/hwmon/hwmon83.o
CC [M] drivers/hwmon/hwmon84.o
CC [M] drivers/hwmon/hwmon85.o
CC [M] drivers/hwmon/hwmon86.o
CC [M] drivers/hwmon/hwmon87.o
CC [M] drivers/hwmon/hwmon88.o
CC [M] drivers/hwmon/hwmon89.o
CC [M] drivers/hwmon/hwmon90.o
CC [M] drivers/hwmon/hwmon91.o
CC [M] drivers/hwmon/hwmon92.o
CC [M] drivers/hwmon/hwmon93.o
CC [M] drivers/hwmon/hwmon94.o
CC [M] drivers/hwmon/hwmon95.o
CC [M] drivers/hwmon/hwmon96.o
CC [M] drivers/hwmon/hwmon97.o
CC [M] drivers/hwmon/hwmon98.o
CC [M] drivers/hwmon/hwmon99.o
CC [M] drivers/hwmon/hwmon100.o
```

Kernel Compilation Continues

Kernel compilation takes a lot of time depending upon the modules being compiled and the processing power of the machine. Till the time it is compiling look at some of the FAQs of kernel compilation.

Frequently Asked Questions

Q1. My kernel is being compiled for a long time. Is it Normal.

Answer : YUP! It is normal. It depends upon your module selection and machine power.

Q2. If I interrupt the kernel while it was compiling, Do I need to start all over again?

Answer : Yup! There is no other way.

Q3. The compiled files can be used on different system to update kernel?

Answer : Yes! The compiled kernel file we will be getting can be used to update other kernel of Debian

machine of same architecture, with the fact that some of your hardware may not work, if it is different on your

other machine.

Q4. Will you be hosting your compiled File?

Answer : Yes! You can download it from the bottom of this page, but we don't guarantee all your hardware

will work. It is recommended to compile your kernel if you are not that lazy.

Q5. Do I have packages like fakeroot and ncurses5-dev in my repository?

Answer : Don't ask me. You have the same resource I am having.

Q6. Will I able to boot into last kernel, after I install the latest kernel.

Answer : Yes you can boot into last kernel, if you have not removed them (see remove unused kernel), by

selecting Advanced option from the Boot Menu.

Q7. I am facing problem in updating kernel. Will you assist me? Is it chargeable?

Answer : We can help you through technical aspects of kernel compilation and installation and its not

chargeable, however you can donate, if you find our work Genuine and worth.

Q8. My company facing Problem in updating Kernel. Will your team assist us? Is it Chargeable?

Answer : Yes! It comes under our service and is chargeable, which is very nominal and competitive. You

may drop a mail to us and we will contact you, if You are interested.

That's the end of FAQ, let me move with compilation process. After successful compilation of kernel, it creates two file (Debian package), one directory 'above' of our present working Directory.

Our current working directory is.

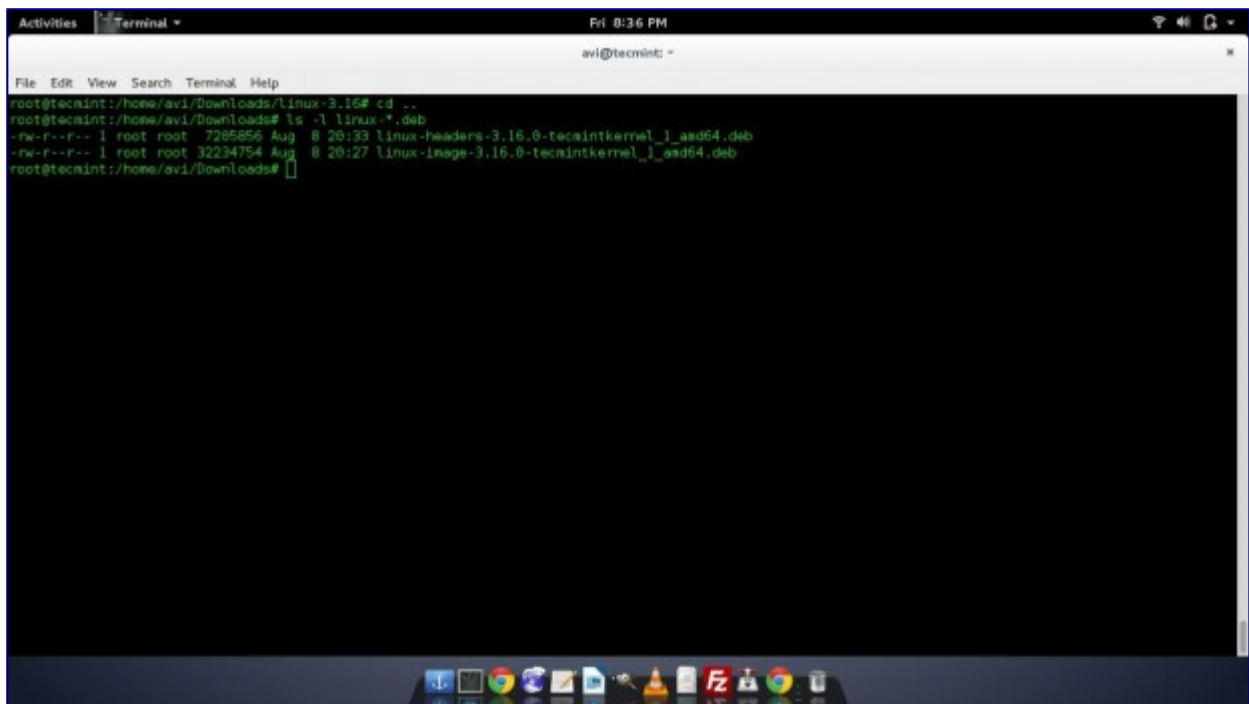
```
/home/avi/Downloads/linux-3.16/
```

Debian packages are created at.

```
/home/avi/Downloads
```

To verify it, run the following commands.

```
# cd ..  
# ls -l linux-*.deb
```

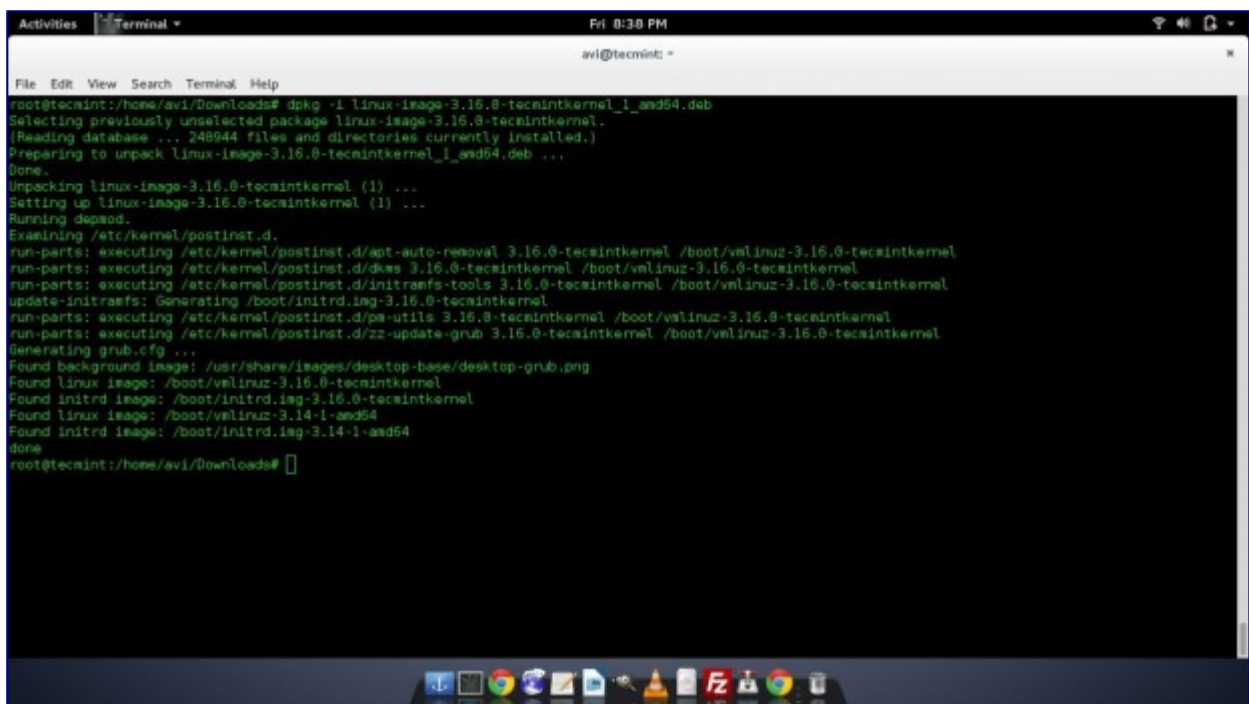
A terminal window titled 'Terminal' with a menu bar (File, Edit, View, Search, Terminal, Help) and a status bar (Fri 8:36 PM, avi@tecmint: ~). The terminal shows the user navigating to the Downloads directory and listing files. The output shows two files: 'linux-headers-3.16.0-tecmintkernel_1_amd64.deb' and 'linux-image-3.16.0-tecmintkernel_1_amd64.deb'.

```
root@tecmint:/home/avi/Downloads/linux-3.16# cd ..
root@tecmint:/home/avi/Downloads# ls -l linux-*.deb
-rw-r--r-- 1 root root 7285856 Aug  8 20:33 linux-headers-3.16.0-tecmintkernel_1_amd64.deb
-rw-r--r-- 1 root root 32234754 Aug  8 20:27 linux-image-3.16.0-tecmintkernel_1_amd64.deb
root@tecmint:/home/avi/Downloads#
```

Verify Kernel Packages

Next, run the Linux image file so created.

```
# dpkg -i linux-image-3.16.0-tecmintkernel_1_amd64.deb
```

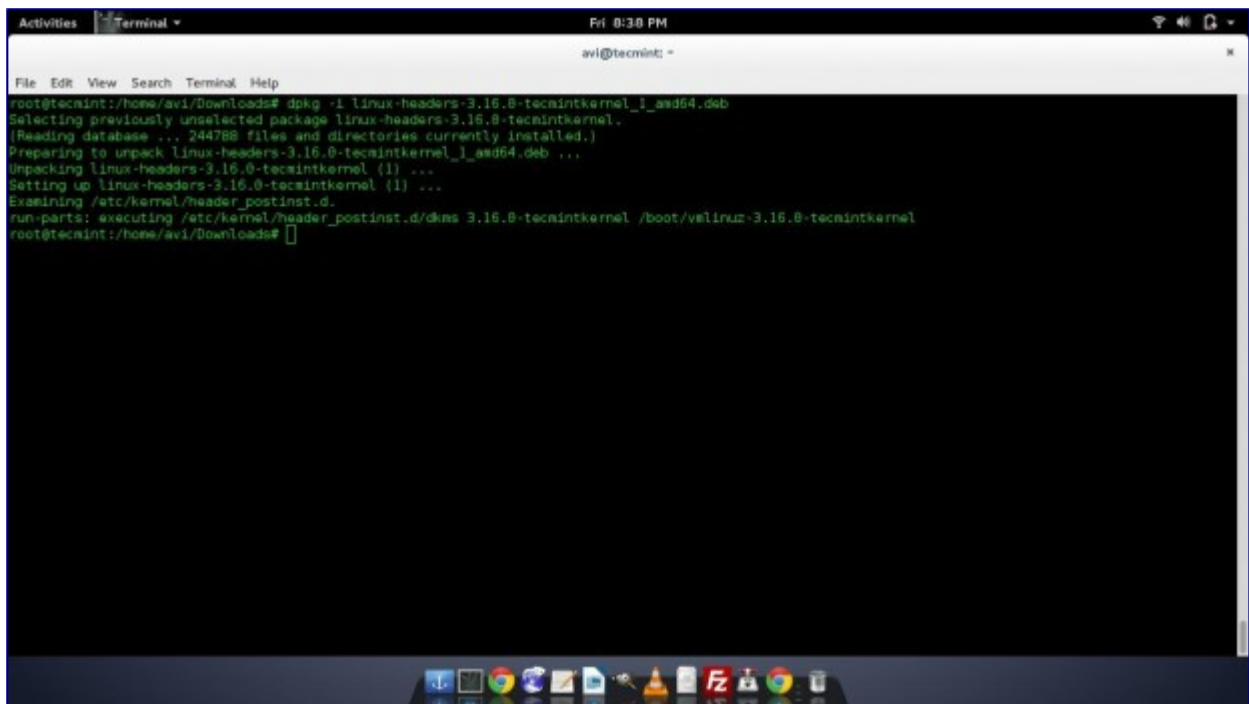
A terminal window titled 'Terminal' with a menu bar (File, Edit, View, Search, Terminal, Help) and a status bar (Fri 8:38 PM, avi@tecmint: ~). The terminal shows the user running the command to install the kernel image. The output shows the package being selected, the database being read, and the package being unpacked. It also shows the postinst script being run, which includes setting up the kernel, running dpkg, and generating the initrd image.

```
root@tecmint:/home/avi/Downloads# dpkg -i linux-image-3.16.0-tecmintkernel_1_amd64.deb
Selecting previously unselected package linux-image-3.16.0-tecmintkernel_1
(Reading database ... 248944 files and directories currently installed.)
Preparing to unpack linux-image-3.16.0-tecmintkernel_1_amd64.deb ...
Done.
Unpacking linux-image-3.16.0-tecmintkernel (1) ...
Setting up linux-image-3.16.0-tecmintkernel (1) ...
Running dpkg.
Examining /etc/kernel/postinst.d.
run-parts: executing /etc/kernel/postinst.d/apt-auto-removal 3.16.0-tecmintkernel /boot/vmlinuz-3.16.0-tecmintkernel
run-parts: executing /etc/kernel/postinst.d/dkms 3.16.0-tecmintkernel /boot/vmlinuz-3.16.0-tecmintkernel
run-parts: executing /etc/kernel/postinst.d/initramfs-tools 3.16.0-tecmintkernel /boot/vmlinuz-3.16.0-tecmintkernel
update-initramfs: Generating /boot/initrd.img-3.16.0-tecmintkernel
run-parts: executing /etc/kernel/postinst.d/ps-utils 3.16.0-tecmintkernel /boot/vmlinuz-3.16.0-tecmintkernel
run-parts: executing /etc/kernel/postinst.d/zz-update-grub 3.16.0-tecmintkernel /boot/vmlinuz-3.16.0-tecmintkernel
Generating grub.cfg ...
Found background image: /usr/share/images/desktop-base/desktop-grub.png
Found linux image: /boot/vmlinuz-3.16.0-tecmintkernel
Found initrd image: /boot/initrd.img-3.16.0-tecmintkernel
Found linux image: /boot/vmlinuz-3.14-1-amd64
Found initrd image: /boot/initrd.img-3.14-1-amd64
done
root@tecmint:/home/avi/Downloads#
```

Install Kernel Image

Run the Linux header file so created.

```
# dpkg -i linux-headers-3.16.0-tecmintkernel_1_amd64.deb
```

```
Activities Terminal Fri 8:30 PM avi@tecmint: ~
File Edit View Search Terminal Help
root@tecmint:/home/avi/Downloads# dpkg -i linux-headers-3.16.0-tecmintkernel_1_asd64.deb
Selecting previously unselected package linux-headers-3.16.0-tecmintkernel.
(Reading database ... 244788 files and directories currently installed.)
Preparing to unpack linux-headers-3.16.0-tecmintkernel_1_asd64.deb ...
Unpacking linux-headers-3.16.0-tecmintkernel (1) ...
Setting up linux-headers-3.16.0-tecmintkernel (1) ...
Examining /etc/kernel/header_postinst.d.
run-parts: executing /etc/kernel/header_postinst.d/dkms 3.16.0-tecmintkernel /boot/vmlinuz-3.16.0-tecmintkernel
root@tecmint:/home/avi/Downloads#
```

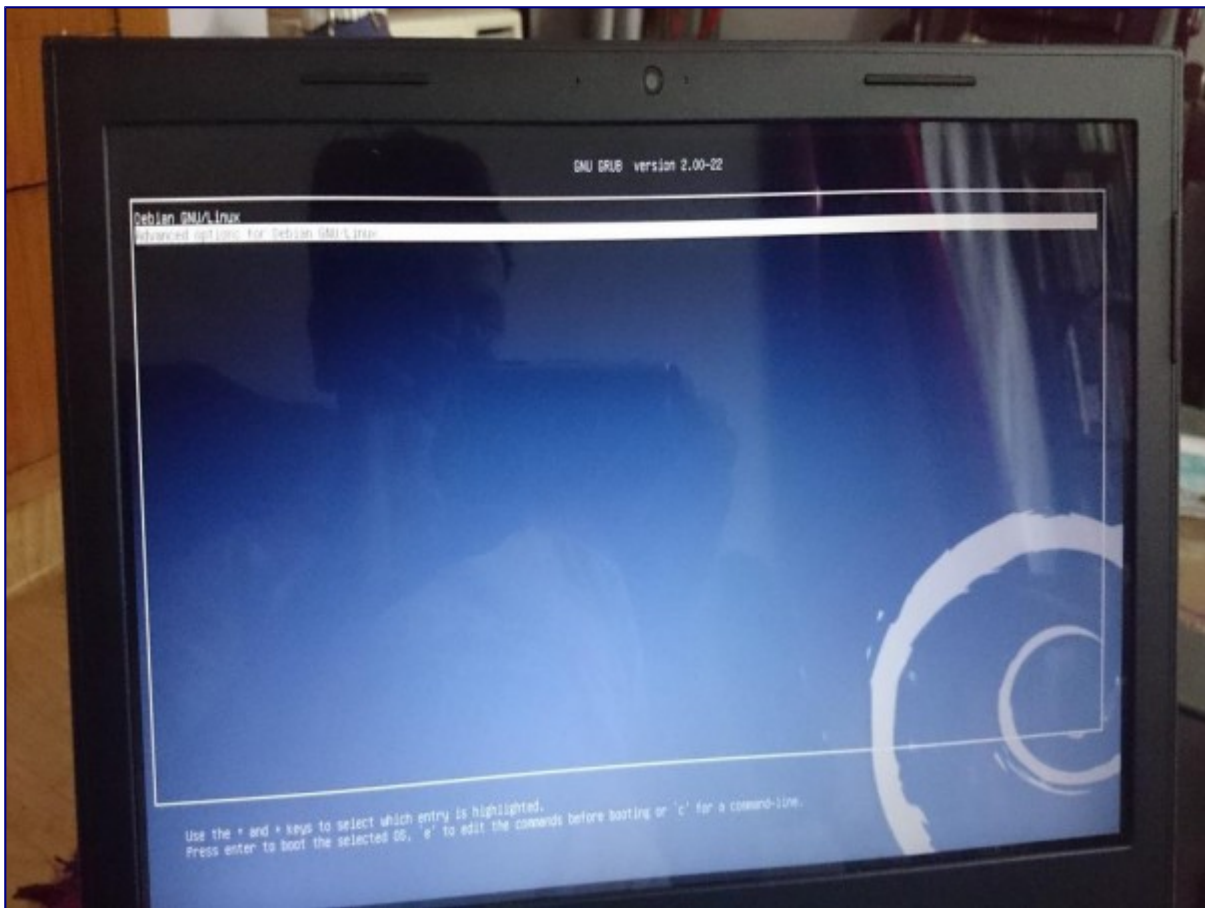
Install Kernel Headers

All done! We have successfully build, compiled and installed Latest Linux Kernel 3.16 on Debian with all other dependencies. Moreover Debian package managed to update bootloader (GRUB/LILO), automatically. It's time to reboot and test the latest kernel.

Please sure to notice any error message you might get during booting. It is important to understand that error to solve them, if any.

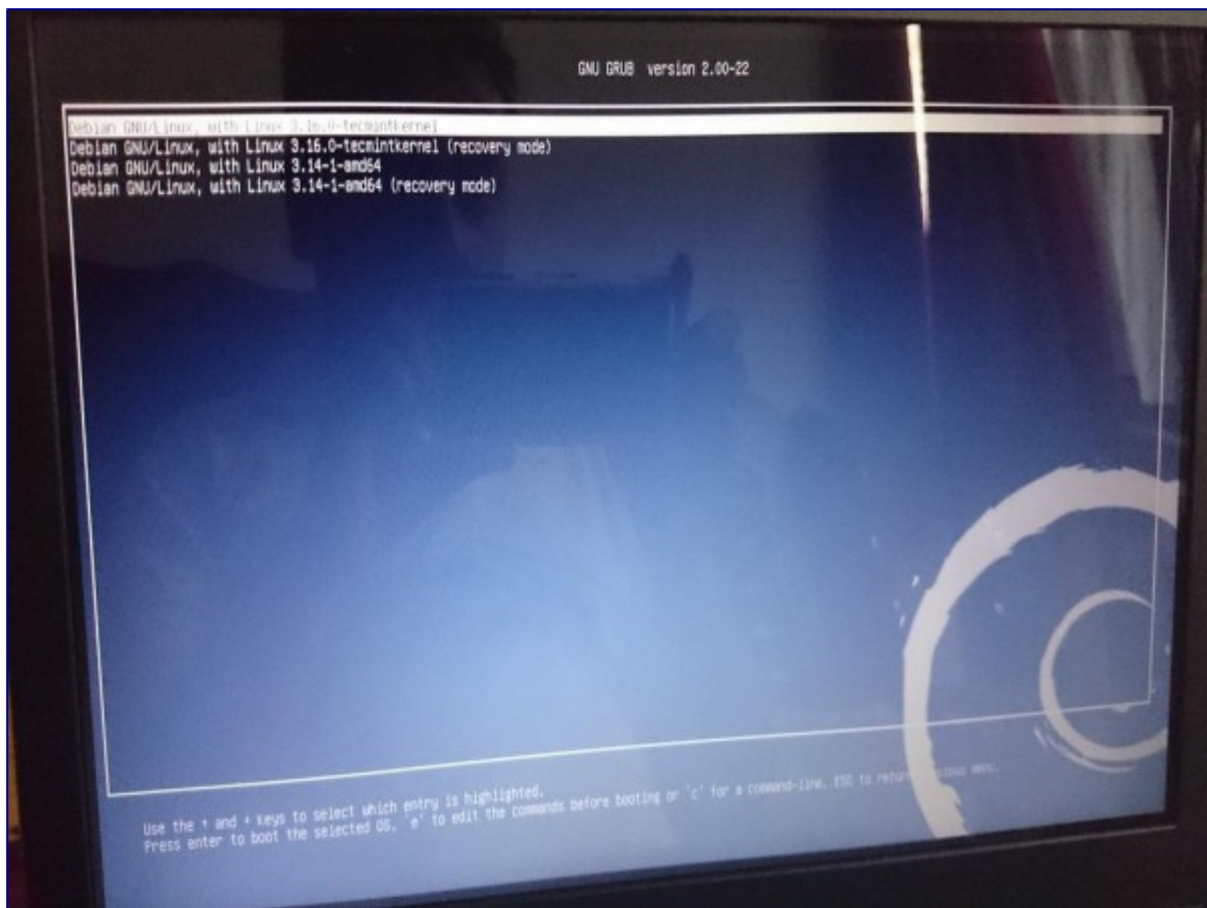
reboot

As soon as Debian starts again, click on '**Advanced option**' to see a list of available and installed kernels.



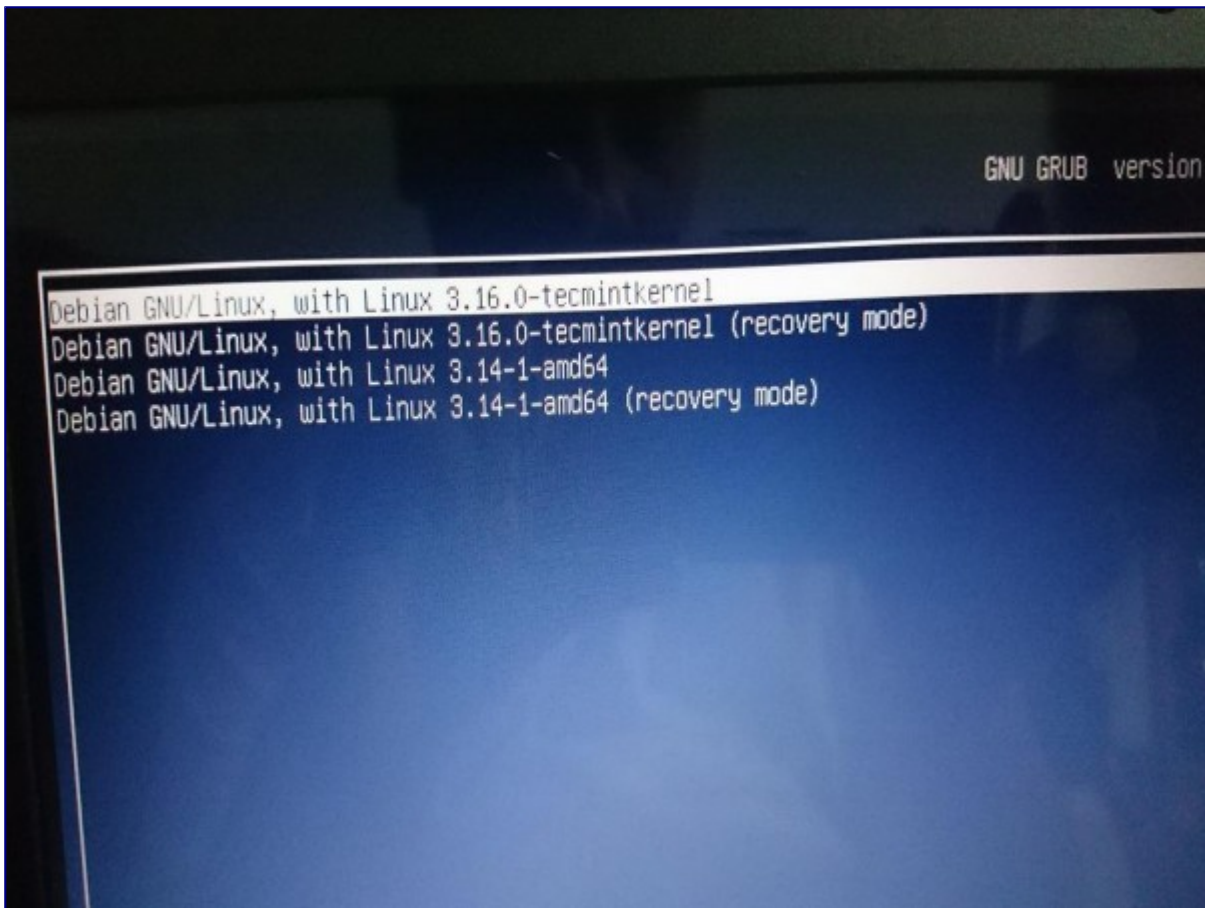
Kernel Boot Advance Options

See a list of installed kernels.



List Installed Kernels

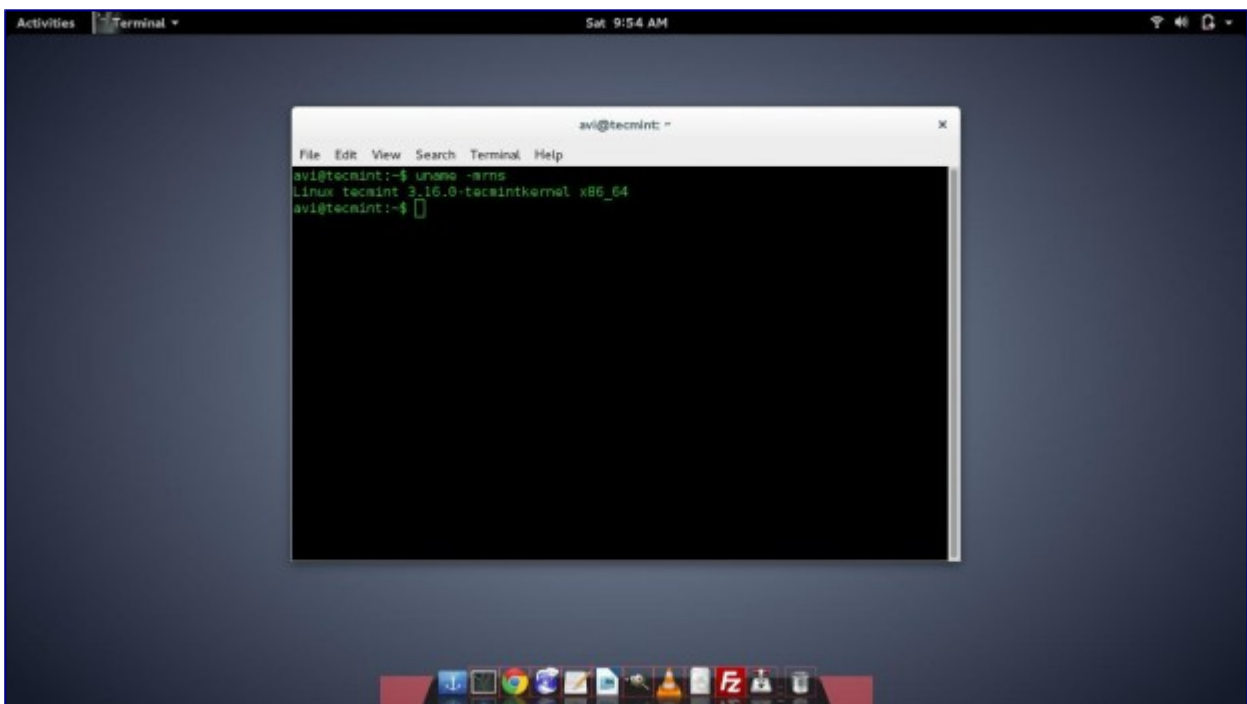
Select latest compiled Kernel (i.e. 3.16) to boot.



Boot Installed Kernel

Check kernel version.

```
# uname -mrns
```



Verify New Kernel Version

The latest one, installed now is set to boot, automatically and you need not choose it every time from advanced boot options.

Step 6: Install Pre-Compiled Kernel 3.16

For those who don't want to compile kernel of their own on Debian (x86_64) and wants to use the pre-compiled kernel that we build in this tutorial, they can download it from the link below. This kernel may not work for some of the hardware you may be having.

1. [linux-image-3.16.0-tecmint.com kernel 1 amd64.deb](#)
2. [linux-headers-3.16.0-tecmint.com kernel 1 amd64.deb](#)

Next, install pre-compiled kernel using following command.

```
# dpkg -i linux-image-3.16.0-tecmint.com_kernel_amd64.deb
# dpkg -i linux-headers-3.16.0-tecmint.com_kernel_amd64.deb
```

The unused kernel can be removed from the system using command.

```
# apt-get remove linux-image-(unused_version_number)
```

Caution: You should remove old kernel after testing Latest kernel thoroughly. Don't take a decision in hurry. You should proceed only if you know what you are doing.

If you did something wrong in removing the kernel you want, or removed the kernel you were not supposed to, your system will be in a stage you can't work upon.

After uninstalling an unused kernel you may get a message like.

1. The link /vmlinuz is a damaged link.
2. Removing symbolic link vmlinuz.
3. You may need to re-run your boot loader[grub].
4. The link /initrd.img is a damaged link.
5. Removing symbolic link initrd.img .
6. You may need to re-run your boot loader[grub].

This is normal and you need not to worry. Just update your GRUB using the following command.

```
# /usr/sbin/update-grub
```

You may need to update your **/etc/kernel-img.conf** file and disable '**do_symlinks**', to disable these messages. If you are able to reboot and login again, there is no problem.

That's all for now. I will be here again with another interesting article. Till then stay tuned and connected to Tecmint. Don't forget to provide us with your valuable feedback in the comment section below. Also tell us your experience when you encounter Kernel compilation and installation.

Read Also :

1. [Install Kernel 3.16 in Ubuntu](#)
2. [Compile and Install Kernel 3.12 in Debian Linux](#)

Share

+

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7



If You Appreciate What We Do Here On TecMint, You Should Consider:

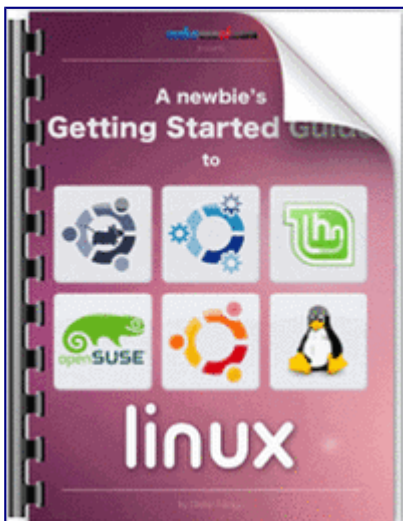
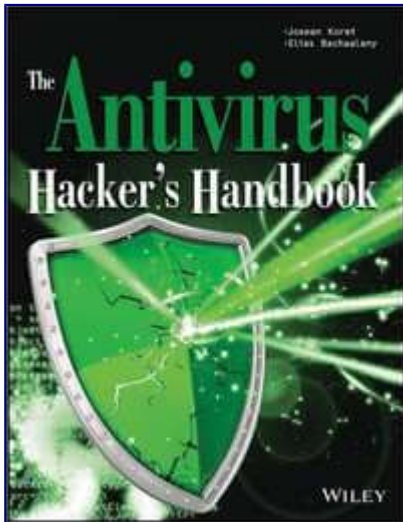
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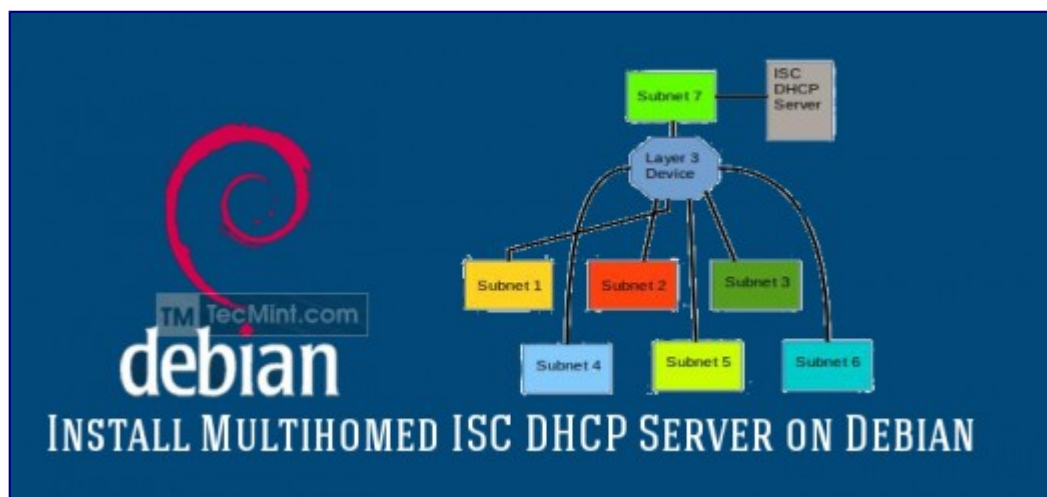
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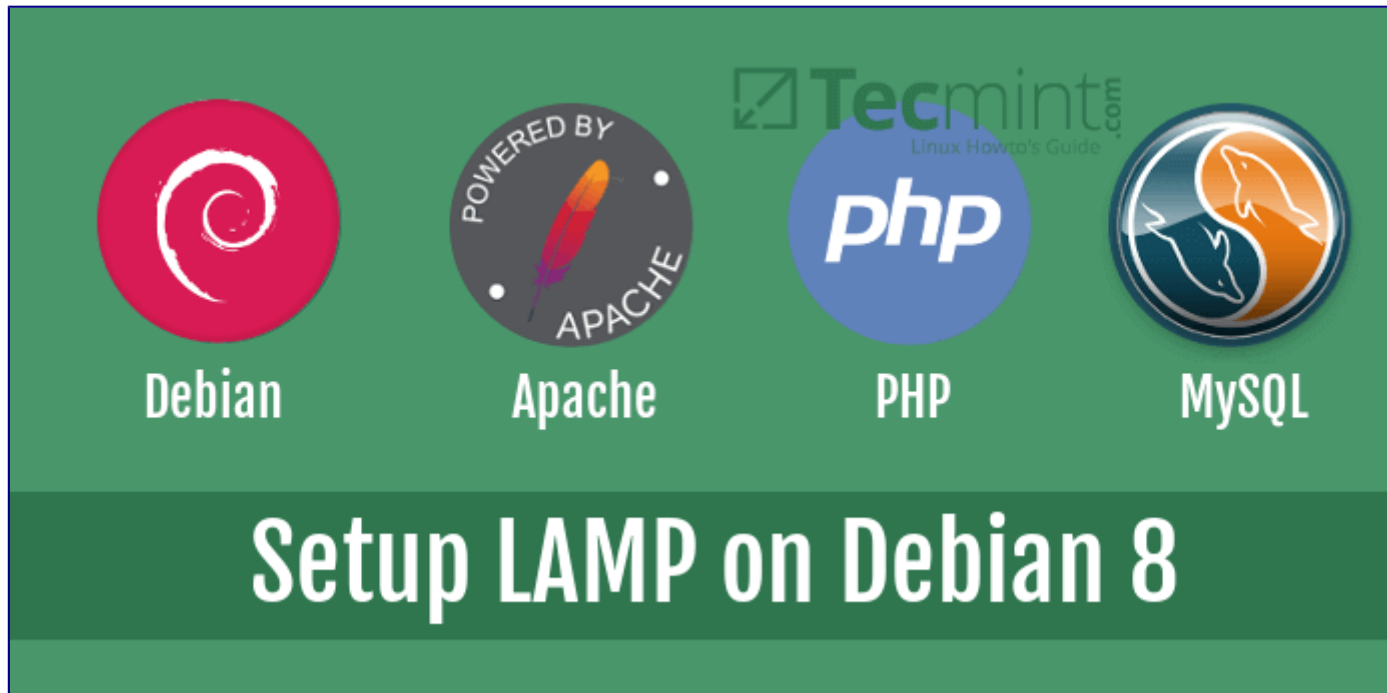
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8 Apr, 2015

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[0](#)

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29 Aug, 2016

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1.

Alon Or

[December 22, 2015 at 5:09 pm](#)

Why just not do a dist-upgrade?, it's so simple:
just answer Y every time.

```
apt-get update  
apt-get upgrade
```

nano /etc/apt/sources.list replace every lenny with squeeze , ctrl+x, Y,enter.

apt-get update

apt-get upgrade

apt-get dist-upgrade

reboot

But why stay there?, now you can go to Debian 7 (wheezy) then to Debian 8.2 (jessie) by following the same instructions , just replace the name of the distro on your sourcelist.

I wasn't able to go directly from 6 to 8.

If you have trouble with "public key is not available" then follow instructions from here:

<http://stackoverflow.com/questions/1139127/how-to-trust-a-apt-repository-debian-apt-get-update-error-public-key-is-not-av>

Enjoy.

[Reply](#)

2. *MLSPRWR*

[December 10, 2015 at 8:53 am](#)

Thanks Buddy! I just tried the 3rd time to compile my kernel with no success.. Best Guide I found on this topic..

[Reply](#)

3. *Ostap*

[March 24, 2015 at 1:36 pm](#)

Just want to say thank you, this article saved me quite a few hours of research and was really helpful.

[Reply](#)

• *Avishek Kumar*

[March 25, 2015 at 1:59 pm](#)

Happy to know @ostap, that the writing was useful for you.

[Reply](#)

•

4. *Joshua*

[March 12, 2015 at 1:27 pm](#)

Why I got this error? Can you help me? Please..

```
root@debian:/home# gpg --recv-key 00411886
gpg: requesting key 00411886 from hkp server keys.gnupg.net
gpg: keyserver timed out
gpg: keyserver receive failed: keyserver error
```

[Reply](#)

- *Avishek Kumar*

[March 25, 2015 at 1:59 pm](#)

Check your DNS settings.

[Reply](#)

-

5. *CyrIng*

[January 7, 2015 at 2:56 am](#)

Nice article however, as a programmer, I recommend Arch Linux to stay up to date.

Using AUR, upgrading a kernel from sources is a piece of cake.

yaourt , an extension of pacman (the Arch package manager) makes seen even easier .

For instace to update the full system, kernel included if a new release is available , enter:

pacman -Syu

yaourt -Syu --aur

<http://www.archlinux.org> where everything starts !

Last but not least: Arch is a rolling release. You install it once !

I did format my ssd partition in 2008 and do a full system upgrade once a week or month;
thus I still have any last release of my favorite software

Regards

[Reply](#)

- *Avishek Kumar*
[March 25, 2015 at 2:01 pm](#)
Agree @ Crying
This tutorial is in general and carried out on debian.
Thanks for your feedback
[Reply](#)

- 6. *IndiaK*
[November 15, 2014 at 1:46 am](#)
I'm doing this tutorial for 3.14 but i got this error:
"user@pc:~/Downloads/linux-3.14\$ cp /boot/config-`uname -r` .config
cp: cannot stat `/boot/config-uname -r`: No such file or directory"
How can i fix this?
[Reply](#)

- *Aren*
[December 26, 2014 at 4:27 pm](#)
use "cp /boot/config-`uname -r`* .config" instead
[Reply](#)

- *Avishek Kumar*
[March 25, 2015 at 2:02 pm](#)
Agreed @ Indiak and@ Aren
[Reply](#)
-

7. *Jim*

[September 24, 2014 at 11:50 pm](#)

When I get to step four, I don't have a linux 3.16 directory to go to, I just have a tar file. Also, when I put in `cp /boot/config-'uname -r' .config` it either says missing destination file operand after or no such file or directory. Lastly make menuconfig throws an error no rule to make target 'menuconfig'. stop.

[Reply](#)

- *Jim*

[September 25, 2014 at 12:55 am](#)

I figured out the issue and now compiling the kernel.

[Reply](#)

- *Jim*

[September 25, 2014 at 4:06 am](#)

After compiling the kernel and trying to install it I get Error! Bad return status for module build on kernel.

[Reply](#)

-

8. *Prasad*

[August 12, 2014 at 8:45 pm](#)

Hi all,

Gr8 document. but I want to suggest to start with README file from kernel tarball good documentation of kernel.org good to start with kernel compilation.

Thanks for sharing.

[Reply](#)

- *Avishek Kumar*

[August 18, 2014 at 4:09 pm](#)

Thanks @ Prasad.

[Reply](#)

-

9. [Yoyo](#)

[August 10, 2014 at 5:18 pm](#)

Very nice tutto :)

Thanks

[Reply](#)

- *Avishek Kumar*

[August 12, 2014 at 11:43 am](#)

Thanks @ Yoyo for the recognition.

[Reply](#)

-

10. [jeremy anderson](#)

[August 10, 2014 at 1:10 am](#)

hello all.

i happen to have a debian kernel compilation guide as well. its a little more technical and far more concise then this one so here is a link: <http://dcos.net/projects/debian-kernel-building.text>

[Reply](#)

- 11.

Got something to say? Join the discussion.

Comment

Name *

Email *

Website

☐ Notify me of followup comments via e-mail. You can also [subscribe](#) without commenting.

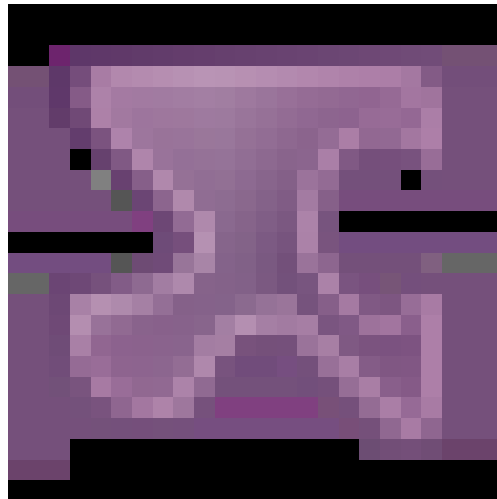
I TecMint :

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