

Ubuntu Linux Setup Guide

For Lenovo ThinkPad P15 and P17

*** Official support of Debian 10.7 and later.



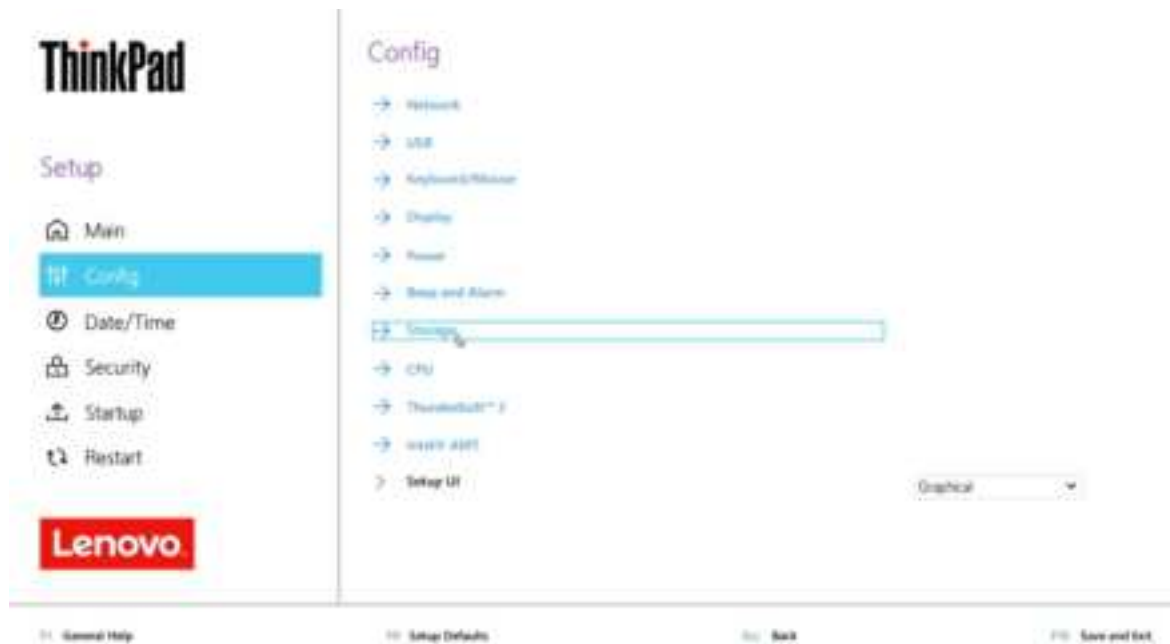
Section 1 – BIOS Setup and Pre-Installation Steps

The first step before installing Linux is to make sure the system BIOS is setup correctly.

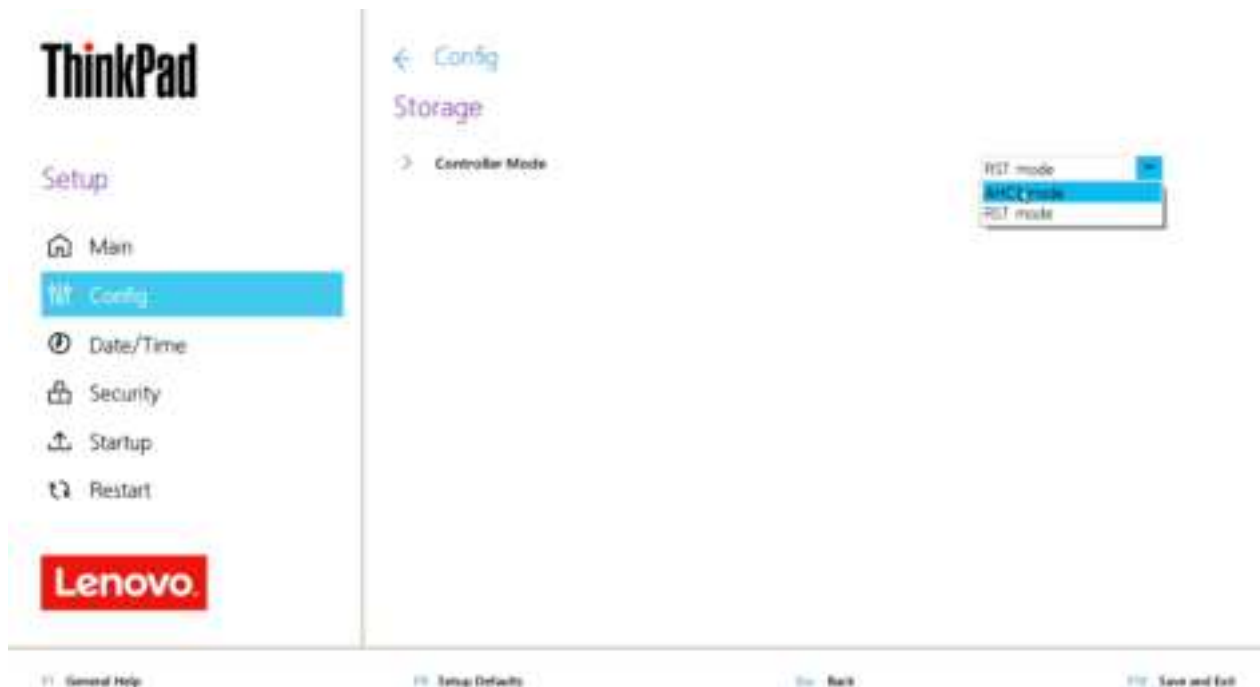
- Boot into BIOS by pressing the function F1 key at the “Lenovo” splash screen.



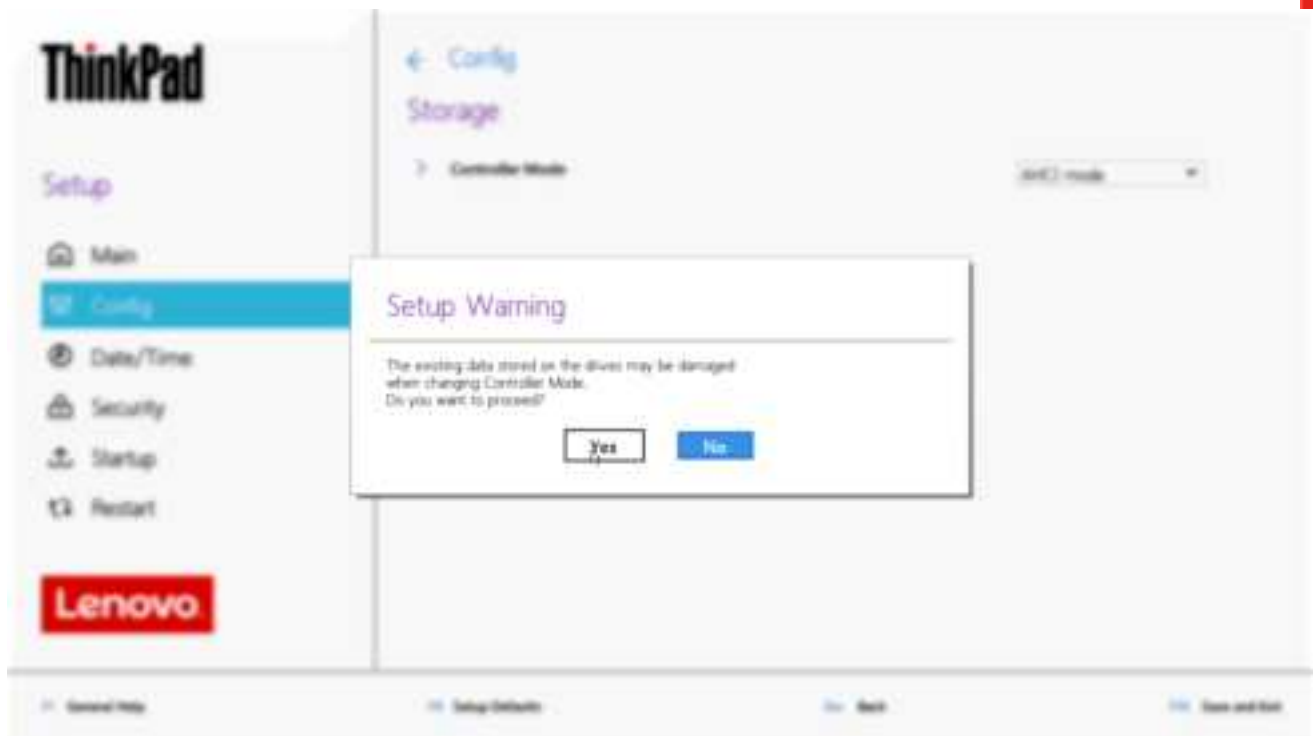
- Tab over to the “Config” menu tab



- Enter the “Storage” category and change the “Controller Mode” to “AHCI mode”



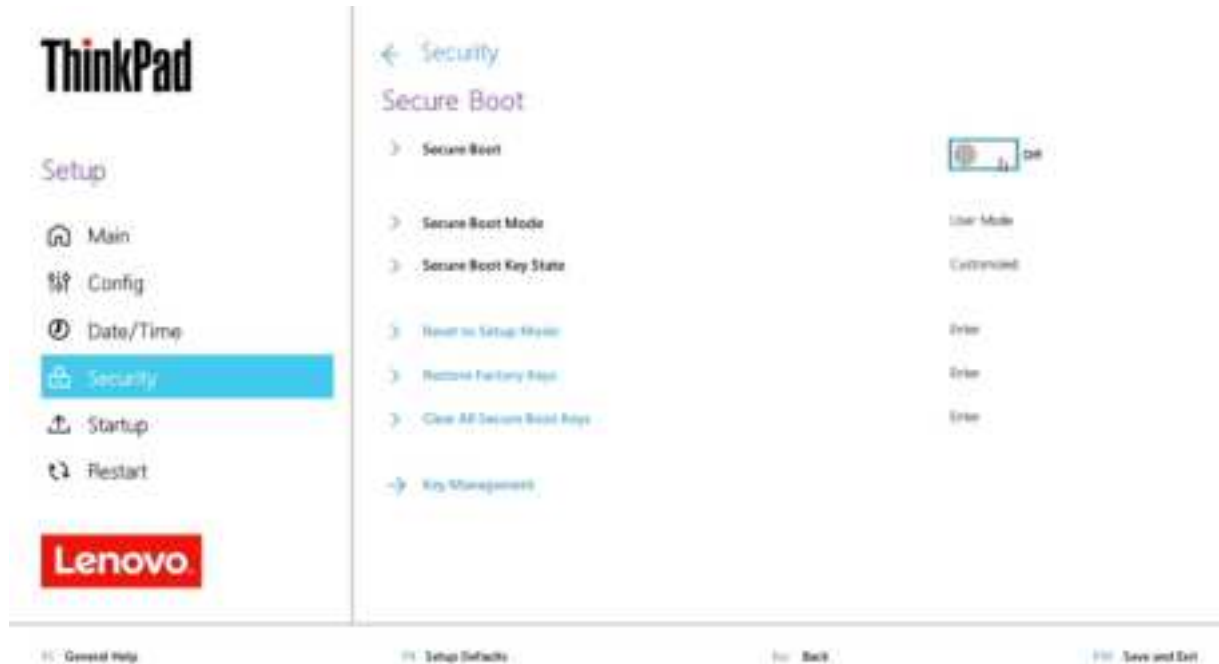
- Select “Yes” to proceed with changing the Controller Mode



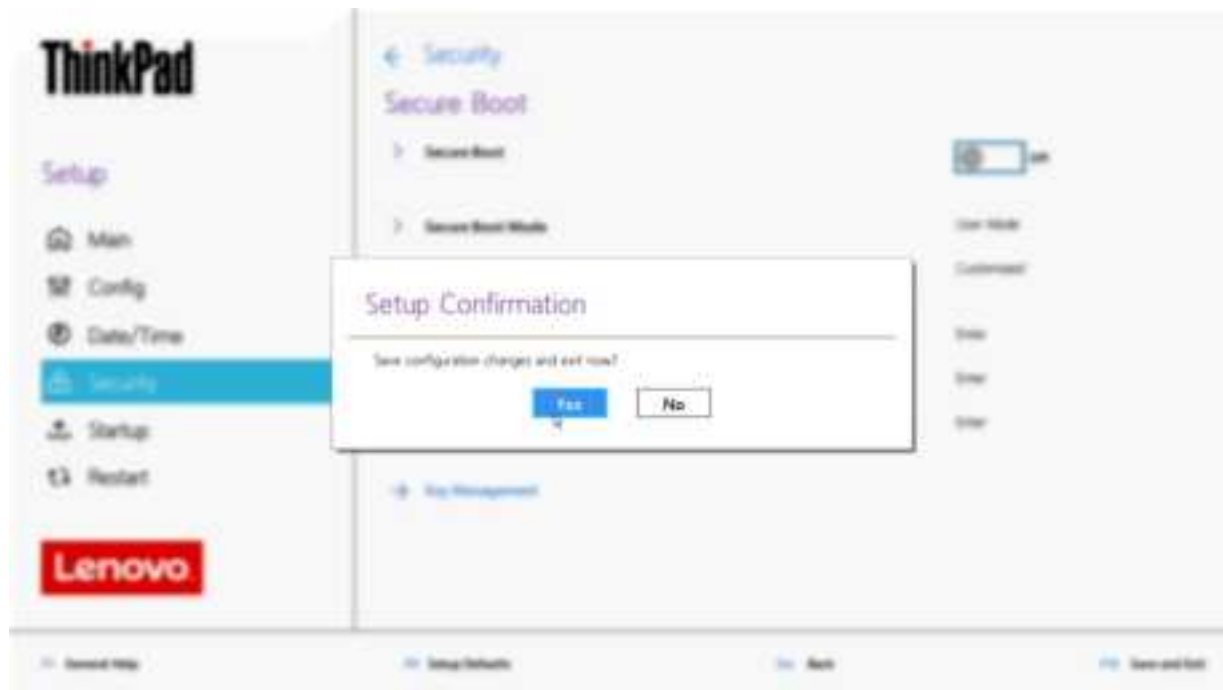
- Tab over to the “Security” menu tab and enter the “Secure Boot” category



- Set "Secure Boot" to "Off"



- Press function F10 key to save and exit BIOS setup.

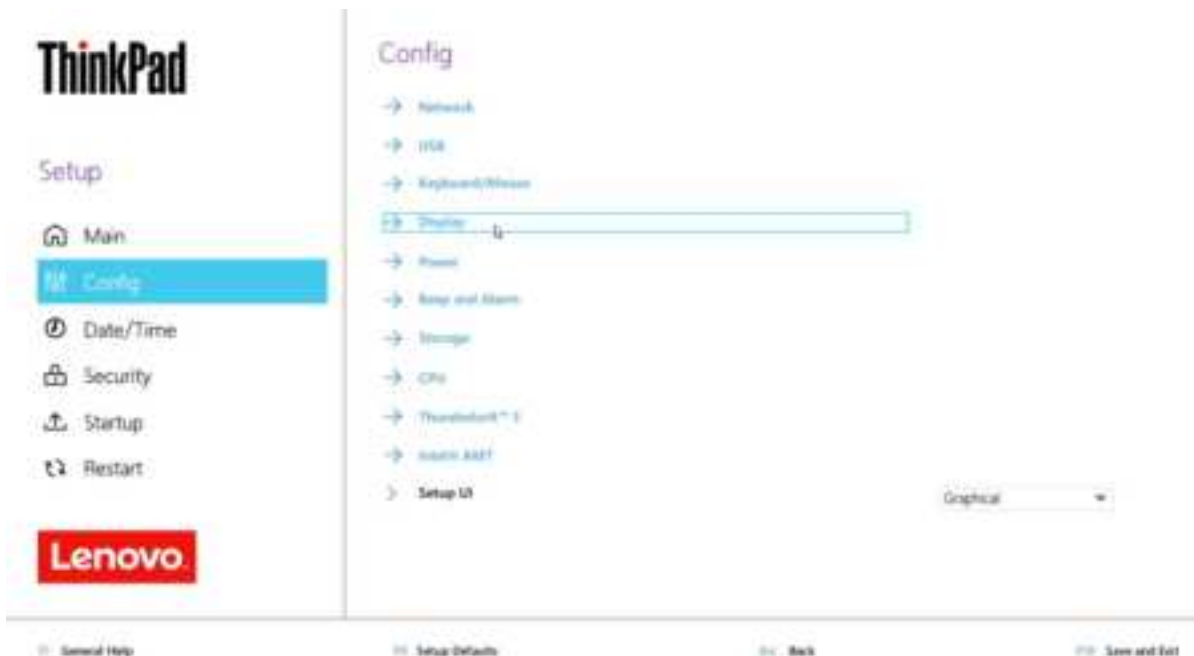




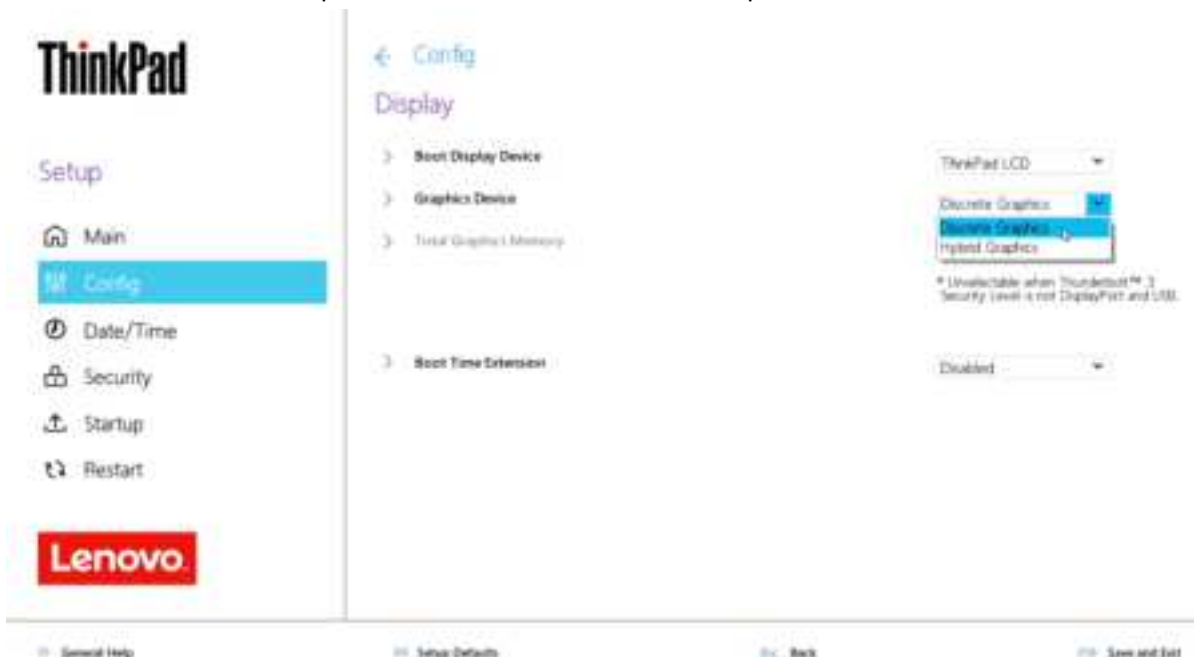
Section 2 – Discrete vs Hybrid Graphics

The Lenovo ThinkPad P15, P17, and P1 Gen 3 systems offer both Nvidia and Intel graphics. “Discrete Graphics” must be used until the Nvidia graphics driver is updated in Section 5.

- Boot into BIOS and tab over to the “Config” menu option, then select the “Display” option.



- Ensure that the “Graphics Device” is set to “Discrete Graphics”.



Section 3 – Installing Debian 10.7

Please refer to the following instructions and screenshots on how to install Debian 10.7 on the Lenovo ThinkPad P15 and P17

- Insert the Ubuntu 10.7 installation media.
- Power on the system and press the F12 function key whenever the following Lenovo splash screen appears.



- Select the Linux bootable installation media from the F12 boot menu list.



- Highlight “Graphical install” from the Debian boot menu and press ‘E’ to edit.



- Select the appropriate language and “Continue”.



- Continue to personalize options.



The Debian installer window titled "Select your location" features a dark blue header with the Debian logo. Below the header, a text box explains that the selected location will set the time zone and help select the system locale. It notes that the list is a shortlist based on the language and suggests choosing "other" if the location is not listed. A scrollable list of countries and territories is shown, with "United States" selected. At the bottom, there are buttons for "Screenshot", "Go Back", and "Continue".

Select your location

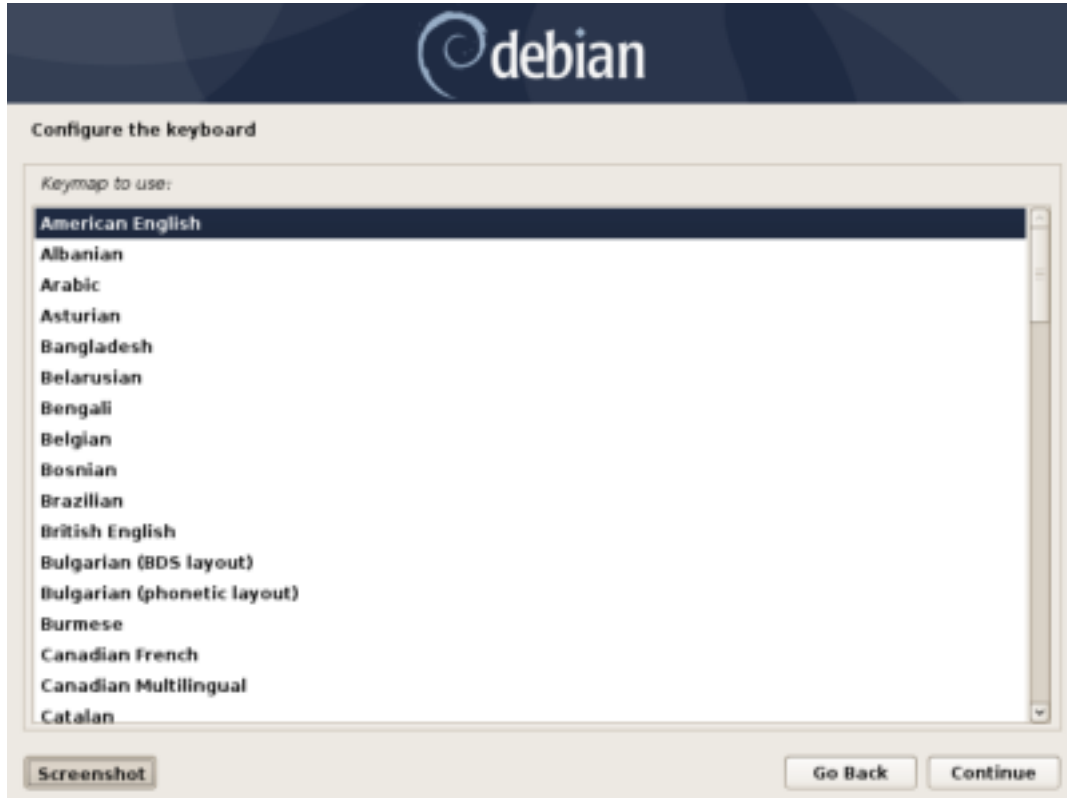
The selected location will be used to set your time zone and also for example to help select the system locale. Normally this should be the country where you live.

This is a shortlist of locations based on the language you selected. Choose "other" if your location is not listed.

Country, territory or area:

- Ireland
- Israel
- New Zealand
- Nigeria
- Philippines
- Seychelles
- Singapore
- South Africa
- United Kingdom
- United States**
- Zambia
- Zimbabwe
- other

Screenshot Go Back Continue



The Debian installer window titled "Configure the keyboard" features a dark blue header with the Debian logo. Below the header, a text box prompts the user to select a keymap. A scrollable list of keymaps is shown, with "American English" selected. At the bottom, there are buttons for "Screenshot", "Go Back", and "Continue".

Configure the keyboard

Keymap to use:

- American English**
- Albanian
- Arabic
- Asturian
- Bangladesh
- Belarusian
- Bengali
- Belgian
- Bosnian
- Brazilian
- British English
- Bulgarian (BDS layout)
- Bulgarian (phonetic layout)
- Burmese
- Canadian French
- Canadian Multilingual
- Catalan

Screenshot Go Back Continue

- Set the desired root password



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Set up users and passwords

You need to set a password for 'root', the system administrative account. A malicious or unqualified user with root access can have disastrous results, so you should take care to choose a root password that is not easy to guess. It should not be a word found in dictionaries, or a word that could be easily associated with you.

A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals.

The root user should not have an empty password. If you leave this empty, the root account will be disabled and the system's initial user account will be given the power to become root using the 'sudo' command.

Note that you will not be able to see the password as you type it.

Root password:

••••••

☐ Show Password in Clear

Please enter the same root password again to verify that you have typed it correctly.

Re-enter password to verify:

••••••

☐ Show Password in Clear

[Screenshot](#) [Go Back](#) [Continue](#)

- Set the desired user name.



debian

Set up users and passwords

A user account will be created for you to use instead of the root account for non-administrative activities.

Please enter the real name of this user. This information will be used for instance as default origin for emails sent by this user as well as any program which displays or uses the user's real name. Your full name is a reasonable choice.

Full name for the new user:

[Screenshot](#) [Go Back](#) [Continue](#)

- Set the password for the user.



Set up users and passwords

A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals.
Choose a password for the new user:

••••••

☐ Show Password in Clear

Please enter the same user password again to verify you have typed it correctly.
Re-enter password to verify:

••••••

☐ Show Password in Clear

Screenshot Go Back Continue

- Choose “Guided – use entire disk” partitioning method.



Partition disks

The installer can guide you through partitioning a disk (using different standard schemes) or, if you prefer, you can do it manually. With guided partitioning you will still have a chance later to review and customise the results.

If you choose guided partitioning for an entire disk, you will next be asked which disk should be used.
Partitioning method:

Guided - use entire disk:

Guided - use entire disk and set up LVM

Guided - use entire disk and set up encrypted LVM

Manual

Screenshot Go Back Continue

- Select the storage device on which to install the operating system.



- Chose "All files in one partition..." as the partitioning scheme.



- Choose to “Finish partitioning and write changes to disk”



- Next select “Yes” to write the changes to the disk.



- Choose “No” when asked to use a network mirror.



- Choose desired software to install.



- Choose the desired default display manager.



- Select “Yes” to install the GRUB boot loader to the master boot record.



- Select the boot disk for boot loader installation.



Section 4 – Update Debian and Prepare Environment

To access a Graphical User Interface, you will need to update your Debian kernel to the latest version and install essential packages.

- Note that a wired network connection is required until the wireless network driver can be installed during Step 6.
- After starting up the system, you should see a flashing cursor on the top left of the screen. Press “ALT + F2” keys to log in.

```
Debian GNU/Linux 10 debian tty2
debian login: _
```

- Edit the sources list to include necessary sources

```
# su
```

```
# sudo nano /etc/apt/sources.list
```

- Comment out the “deb cdrom...: source

```
deb http://deb.debian.org/debian buster-backports main
```

```
deb http://deb.debian.org/debian buster main contrib non-free
```

```
deb-src http://deb.debian.org/debian buster main contrib non-free
```

```

# deb cdrom:[Debian GNU/Linux 10.7.0 "Buster" - Official amd64 DVD Binary-1 20201005-11:17] buster contrib main
# deb cdrom:[Debian GNU/Linux 10.7.0 "Buster" - Official amd64 DVD Binary-1 20201005-11:17] buster contrib main

# Line commented out by installer because it failed to verify:
# deb http://security.debian.org/debian-security buster/updates main contrib
# Line commented out by installer because it failed to verify:
# deb-src http://security.debian.org/debian-security buster/updates main contrib

# buster-updates, previously known as "volatile"
# A network mirror was not selected during install. The following entries
# are provided as examples, but you should amend them as appropriate
# for your mirror of choice.
#
# deb http://deb.debian.org/debian/ buster-updates main contrib
# deb-src http://deb.debian.org/debian/ buster-updates main contrib

deb http://deb.debian.org/debian buster-backports main
deb http://deb.debian.org/debian buster main contrib non-free
deb-src http://deb.debian.org/debian buster main contrib non-free

```

- Update sources

apt-get update

```
root@debian:/home/lenovo# apt-get update
Get:1 http://deb.debian.org/debian buster-backports InRelease [46.7 kB]
Get:2 http://deb.debian.org/debian buster InRelease [121 kB]
Get:3 http://deb.debian.org/debian buster-backports/main amd64 Packages [423 kB]
Get:4 http://deb.debian.org/debian buster-backports/main Translation-en [361 kB]
Get:5 http://deb.debian.org/debian buster/contrib Sources [42.5 kB]
Get:6 http://deb.debian.org/debian buster/non-free Sources [85.6 kB]
Get:7 http://deb.debian.org/debian buster/main Sources [7,842 kB]
Get:8 http://deb.debian.org/debian buster/main amd64 Packages [7,907 kB]
Get:9 http://deb.debian.org/debian buster/main Translation-en [5,971 kB]
Get:10 http://deb.debian.org/debian buster/main amd64 DEP-11 Metadata [3,807 kB]
Get:11 http://deb.debian.org/debian buster/main DEP-11 48x48 Icons [3,770 kB]
Get:12 http://deb.debian.org/debian buster/main DEP-11 64x64 Icons [7,596 kB]
Get:13 http://deb.debian.org/debian buster/contrib amd64 Packages [50.2 kB]
Get:14 http://deb.debian.org/debian buster/contrib Translation-en [44.2 kB]
Get:15 http://deb.debian.org/debian buster/contrib amd64 DEP-11 Metadata [11.5 kB]
Get:16 http://deb.debian.org/debian buster/contrib DEP-11 48x48 Icons [56.4 kB]
Get:17 http://deb.debian.org/debian buster/contrib DEP-11 64x64 Icons [110 kB]
Get:18 http://deb.debian.org/debian buster/non-free amd64 Packages [87.7 kB]
Get:19 http://deb.debian.org/debian buster/non-free Translation-en [88.8 kB]
Get:20 http://deb.debian.org/debian buster/non-free amd64 DEP-11 Metadata [9,096 B]
Get:21 http://deb.debian.org/debian buster/non-free DEP-11 48x48 Icons [3,491 B]
Get:22 http://deb.debian.org/debian buster/non-free DEP-11 64x64 Icons [38.3 kB]
Fetched 38.5 MB in 5s (7,537 kB/s)
Reading package lists... Done
root@debian:/home/lenovo#
```

- Install the following packages

apt-get install 'build essential'

apt-get install linux-headers*

apt -t buster-backports install linux-image-amd64

- This will install kernel 5.9

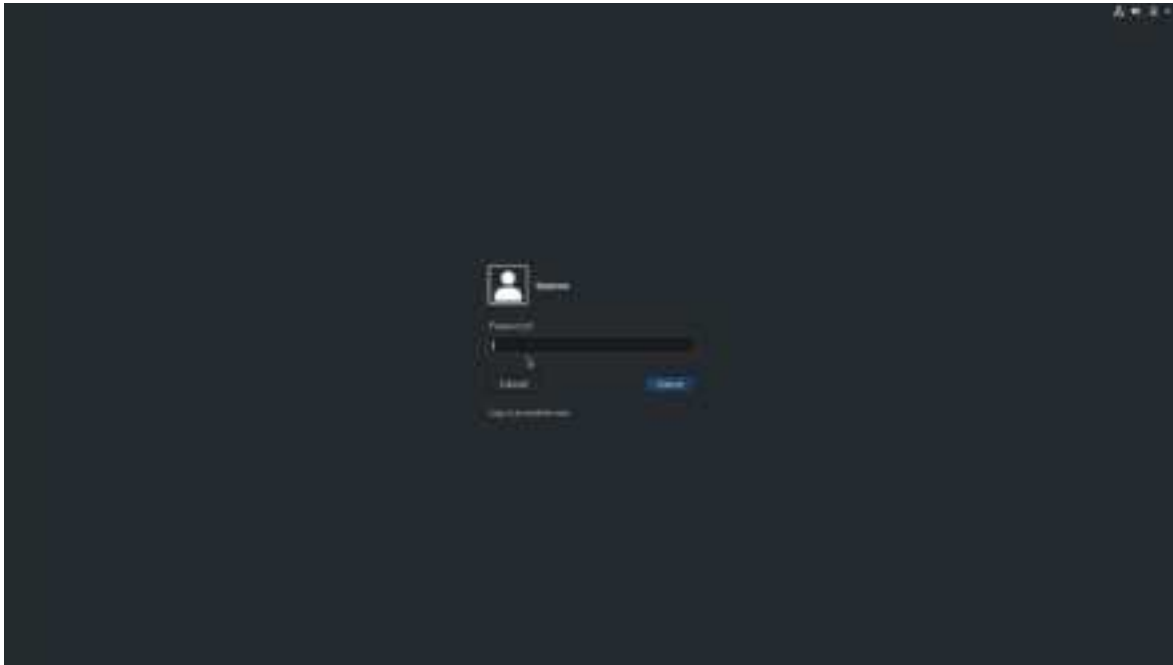
```
Note, selecting linux-headers-5.9.0-0.bpo.5-rt-amd64 for glob 'linux-headers*'
Note, selecting linux-headers-4.19.0-13-rt-amd64 for glob 'linux-headers*'
Note, selecting linux-headers-4.19.0-11-common-rt for glob 'linux-headers*'
Note, selecting linux-headers-powerpc64le for glob 'linux-headers*'
Note, selecting linux-headers-5.9.0-0.bpo.5-common for glob 'linux-headers*'
Note, selecting linux-headers-amd64 for glob 'linux-headers*'
Note, selecting linux-headers-loongson-3 for glob 'linux-headers*'
Note, selecting linux-headers-4.19.0-11-amd64 for glob 'linux-headers*'
Note, selecting linux-headers for glob 'linux-headers*'
Note, selecting linux-headers-4.19.0-13-cloud-amd64 for glob 'linux-headers*'
Note, selecting linux-headers-4.19.0-13-all for glob 'linux-headers*'
Note, selecting linux-headers-4.19.0-13-common for glob 'linux-headers*'
Note, selecting linux-headers-4.19.0-11-all for glob 'linux-headers*'
Note, selecting linux-headers-4.19.0-13-all-amd64 for glob 'linux-headers*'
Note, selecting linux-headers-xtensa for glob 'linux-headers*'
Note, selecting linux-headers-5.9.0-0.bpo.5-cloud-amd64 for glob 'linux-headers*'
Note, selecting linux-headers-cloud-amd64 for glob 'linux-headers*'
Note, selecting linux-headers-mvebu for glob 'linux-headers*'
The following additional packages will be installed:
  linux-compiler-gcc-8-x86 linux-headers-4.19 linux-build-5.9
The following NEW packages will be installed:
  linux-compiler-gcc-8-x86 linux-headers-4.19.0-11-all linux-headers-4.19.0-11-all-amd64 linux-headers-4.19.0-11-amd64
  linux-headers-4.19.0-11-rt-amd64 linux-headers-4.19.0-13-all linux-headers-4.19.0-13-all-amd64 linux-headers-4.19.0-13-amd64
  linux-headers-4.19.0-13-rt-amd64 linux-headers-5.9.0-0.bpo.5-amd64 linux-headers-5.9.0-0.bpo.5-cloud-amd64 linux-headers-5.9.0-0.bpo.5-common
  linux-headers-cloud-amd64 linux-headers-rt-amd64 linux-build-5.9 linux-rt-amd64
0 upgraded, 25 newly installed, 0 to remove and 0 not upgraded.
Need to get 56.8 MB of archives.
After this operation, 317 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://deb.debian.org/debian buster/main amd64 linux-compiler-gcc-8-x86 amd64 4.19.160-2 [498 kB]
Get:2 http://deb.debian.org/debian buster/main amd64 linux-headers-4.19.0-11-common all 4.19.160-1 [8,416 kB]
Get:3 http://deb.debian.org/debian buster/main amd64 linux-build-5.9 amd64 4.19.160-2 [732 kB]
Get:4 http://deb.debian.org/debian buster/main amd64 linux-headers-4.19.0-11-amd64 amd64 4.19.160-1 [999 kB]
Get:5 http://deb.debian.org/debian buster/main amd64 linux-headers-4.19.0-11-cloud-amd64 amd64 4.19.160-1 [724 kB]
Get:6 http://deb.debian.org/debian buster/main amd64 linux-headers-4.19.0-11-common-rt all 4.19.160-1 [5,626 kB]
Get:7 http://deb.debian.org/debian buster/main amd64 linux-headers-4.19.0-11-rt-amd64 amd64 4.19.160-1 [950 kB]
Get:8 http://deb.debian.org/debian buster/main amd64 linux-headers-4.19.0-11-all-amd64 amd64 4.19.160-1 [476 kB]
Get:9 http://deb.debian.org/debian buster/main amd64 linux-headers-4.19.0-11-all amd64 4.19.160-1 [476 kB]
Get:10 http://deb.debian.org/debian buster/main amd64 linux-headers-4.19.0-13-common all 4.19.160-2 [8,441 kB]
25% [10 linux-headers-4.19.0-13-common 2.8% 8/8,441 kB 0%]
```

- Update the initramfs image then reboot the system

```
# sudo update-initramfs -u
```

```
# sudo reboot
```

- After rebooting, the graphical login screen should be visible

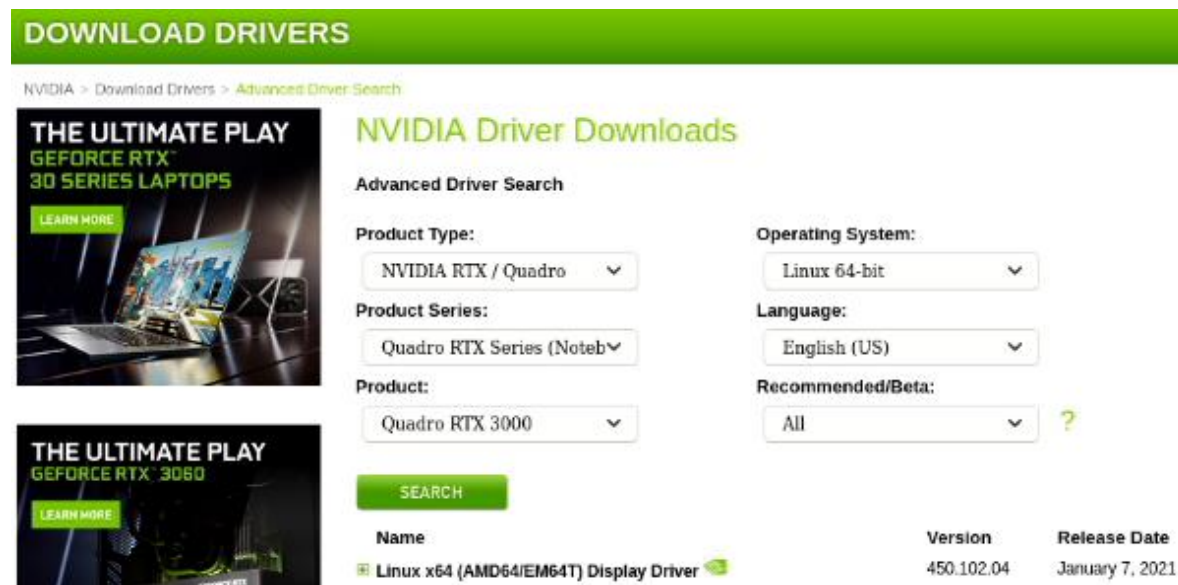


Section 5 – Installing the Nvidia Graphics Driver

In order to get optimal performance out of the Nvidia GPU, it's a good idea to install the Nvidia graphics driver by following the steps below:

- Download the latest Nvidia graphics driver for your system's appropriate Nvidia GPU.

<https://www.nvidia.com/Download/Find.aspx?lang=en-us>



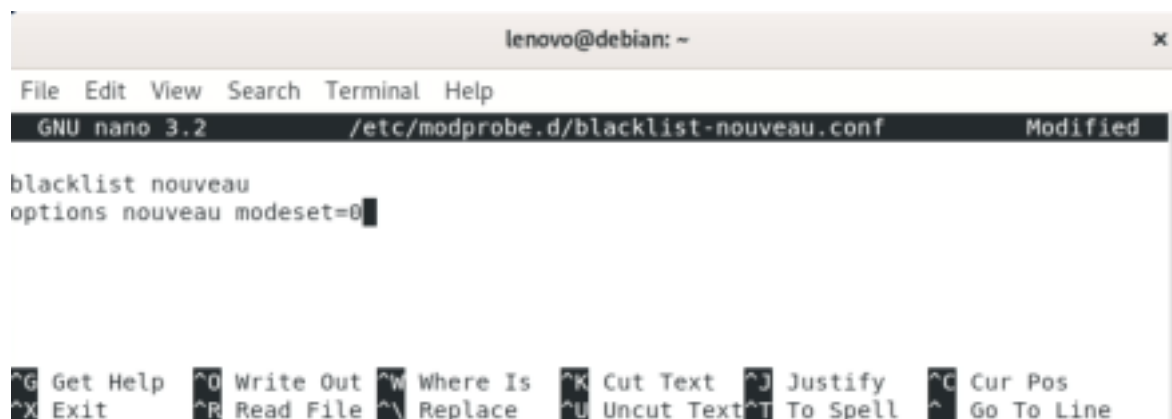
- Use the terminal to blacklist the nouveau graphics driver

```
# su
```

```
# nano /etc/modprobe.d/blacklist-nouveau.conf
```

```
blacklist nouveau
```

```
options nouveau modeset=0
```



- Update the initramfs image then reboot the system

```
# sudo update-initramfs -u
```

```
# sudo reboot
```

- On startup, only a flashing cursor in the top left of the screen should be visible. Access the text login by pressing “CTRL + ALT + F4”

```
Debian GNU/Linux 10 debian tty4
debian login: lenovo
Password:
Last login: Tue Feb  2 14:24:48 EST 2021 on tty2
Linux debian 5.9.0-0.bpo.5-amd64 #1 SMP Debian 5.9.15-1~bpo10+1 (2020-12-31) x86_64

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
lenovo@debian:~$ _
```

- Use the Telinit command to stop all x processes

```
# su
```

```
# sudo telinit 3
```

- Navigate to the file location of the Nvidia driver. If located on a USB driver, follow these steps to access the drive:

```
# mkdir /media/usb
```

```
# sudo fdisk -l
```

- This will list connected storage devices

```
Device            Start       End     Sectors  Size Type
/dev/mvme0n1p1      2048        1050623    1048576  512M EFI System
/dev/mvme0n1p2    1050624    1998407679 1997357056 952.4G Linux filesystem
/dev/mvme0n1p3 1998407680 2000408575    2000896  977M Linux swap

Disk /dev/sda: 119.5 GiB, 128320801792 bytes, 250626566 sectors
Disk model: Flash Drive
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x00000000

Device      Boot Start      End  Sectors  Size Id Type
/dev/sda1   128 250626533 250626406 119.5G  7 HPFS/NTFS/exFAT
root@debian:/home/lenovo# _
```

```
# mount /dev/sda1 /media/usb
```

- Continue to change directory to the driver file location

```
# cd /media/usb
```

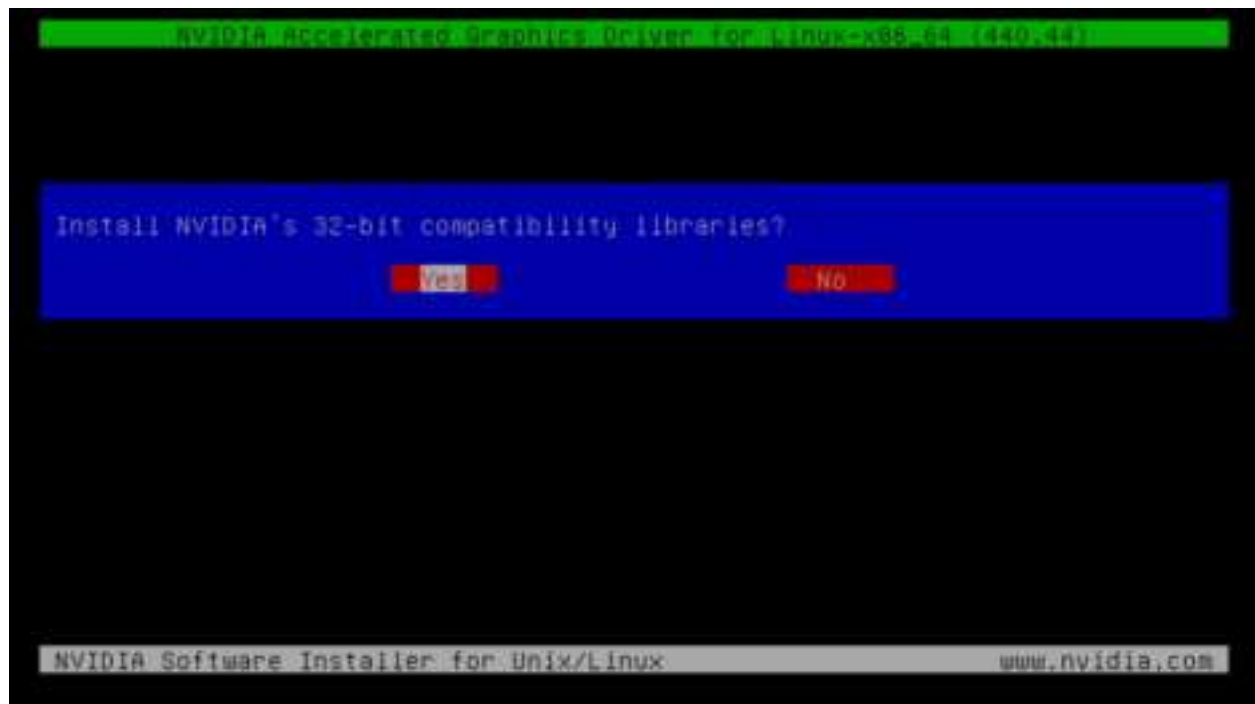
- Make the Nvidia installer an executable then run the executable

```
# chmod +x NVIDIA-Linux-x86-64-*
```

```
# ./NVIDIA-Linux-x86_64*
```

```
root@debian:/media/usb/Linux Install/Debian# chmod +x NVIDIA-Linux-x86_64-450.102.04.run
root@debian:/media/usb/Linux Install/Debian# ./NVIDIA-Linux-x86_64-450.102.04.run
Verifying archive integrity... OK
Uncompressing NVIDIA Accelerated Graphics Driver for Linux-x86_64 450.102.04.....
*****
```

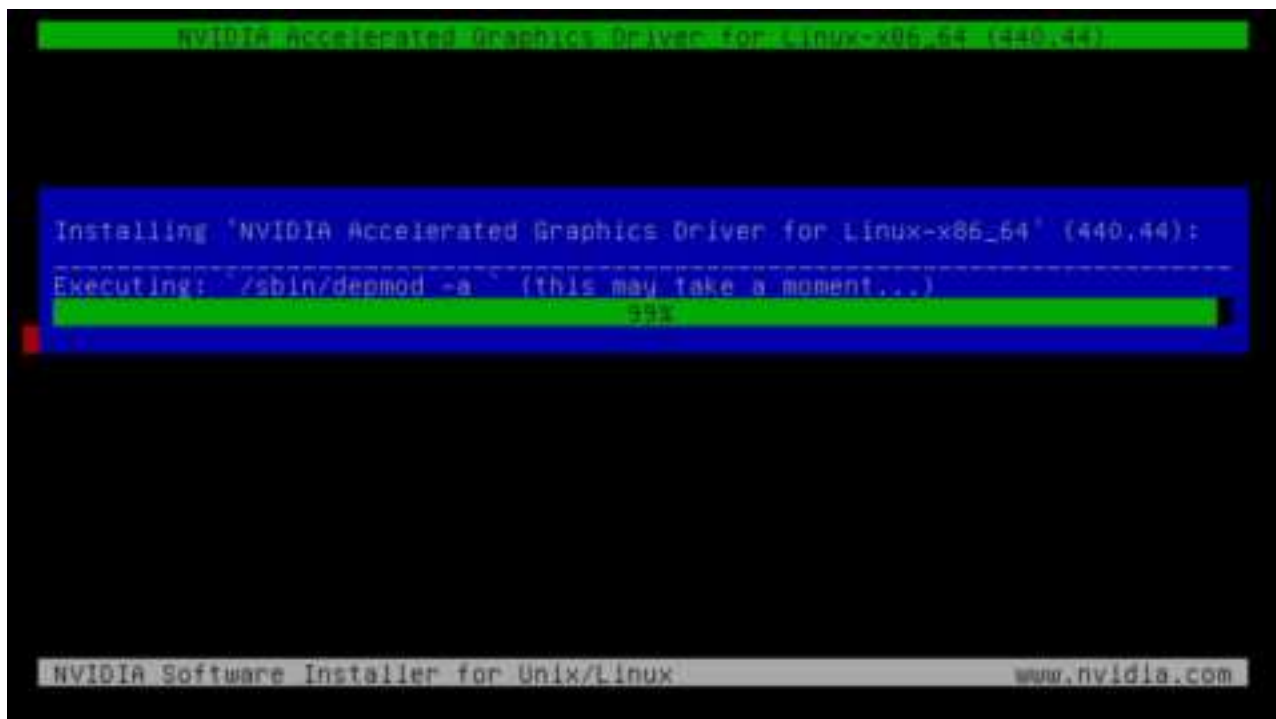
- Optional: Choose whether to install the 32-bit compatibility libraries.



- Select to "Install and overwrite" libglvnd libraries.



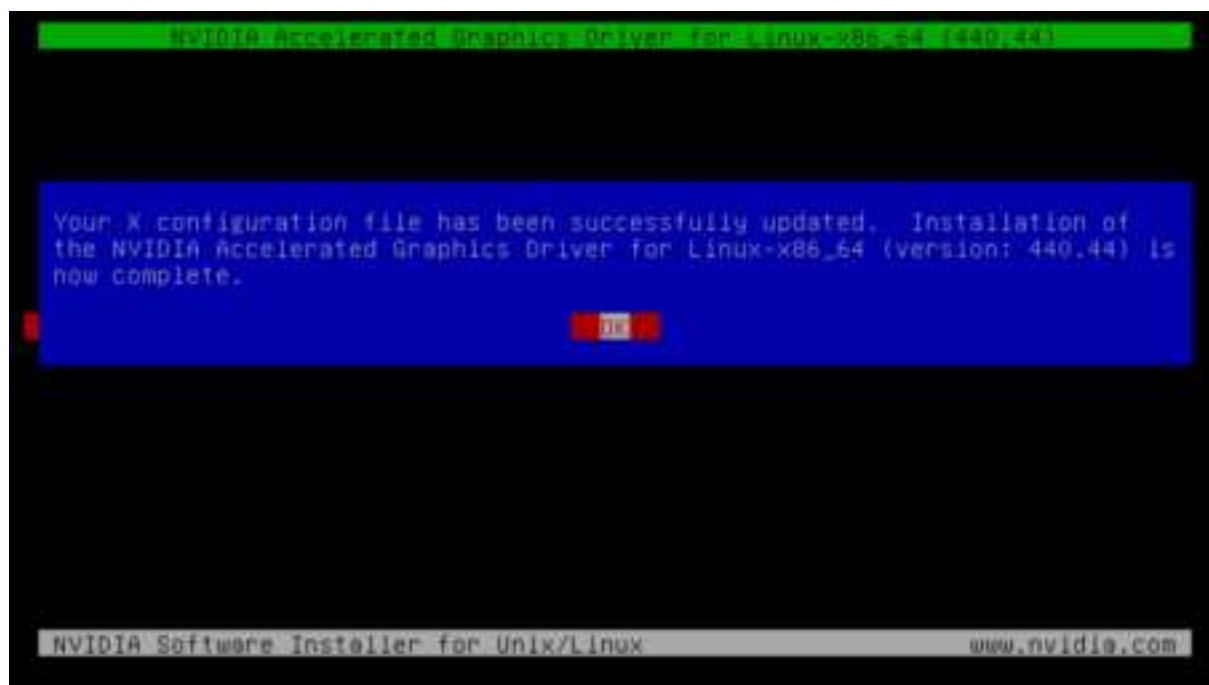
- Nvidia driver installing progress bar may appear.



- Select “Yes” to update the X-configuration file to use the Nvidia X driver.



- Select “OK” to acknowledge the driver installation is complete.



- Execute the following command to verify the Nvidia driver is loaded.

nvidia-smi

```
root@debian:/media/usb/Linux Installs/Debian# nvidia-smi
Tue Feb  2 15:44:27 2021
```

NVIDIA-SMI 450.102.04 Driver Version: 450.102.04 CUDA Version: 11.0									
GPU	Name	Persistence-M	Bus-Id	Disp.A	Volatile	Uncorr.	ECC		
Fan	Temp	Perf	Pwr:Usage/Cap	Memory-Usage	GPU-Util	Compute	M.		
						MIG	M.		
0	Quadro RTX 3000	Off	00000000:01:00.0	Off			N/A		
N/A	53C P0	15W / N/A	0MiB / 5926MiB		0%	Default	N/A		

```

Processes:
  GPU  GI  CI      PID   Type   Process name                      GPU Memory
   ID   ID                                 Usage
=====
No running processes found
root@debian:/media/usb/Linux Installs/Debian#
```

- Reboot the system.

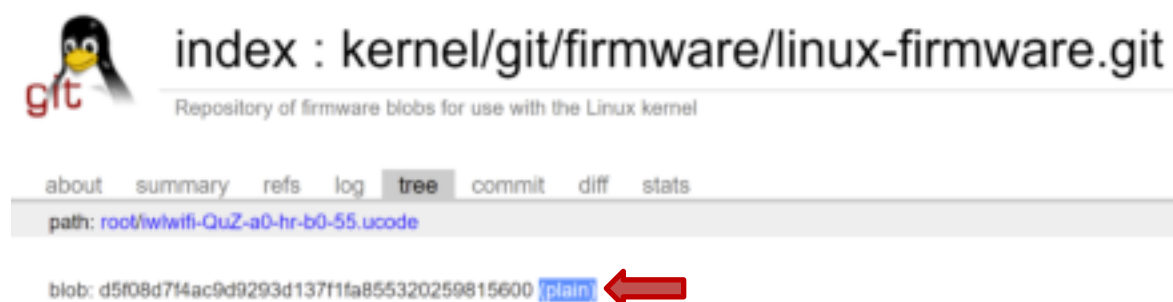
sudo reboot

Section 6 – Wireless Network Driver

The wireless network driver is not native to the Debian 10 kernel, so users will not be able to connect to wireless networks by default. The following steps can be followed to install the Wi-Fi driver on a ThinkPad P15 and P17.

- Download the AX201 Wi-Fi driver from the following link:

<https://git.kernel.org/pub/scm/linux/kernel/git/firmware/linux-firmware.git/tree/iwlwifi-QuZ-a0-hr-b0-55.ucode>



- Using the terminal, copy the Wi-Fi driver from its location to the firmware library

```
# su
```

```
# cd <file location>
```

```
# cp iwlwifi-QuZ-a0-hr-b0-55.ucode /usr/lib/firmware
```

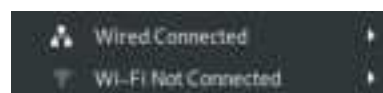


- Update the initramfs image

```
# sudo update-initramfs -u
```

- Reboot the system and ensure that wireless connections are now enabled

```
# sudo reboot
```



Section 7 – Revision History

Version	Date	Authors	Changes/Updates
1.0	2/12/2021	Gregor Linzmeier & Hady Asad	Initial launch release

