

# Debian GNU/Linux Setup Guide

For ThinkPad P53, P73

*\*\*\* Official support of Debian 10.0 and later.*



**debian**

## 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 ‘Restart’ menu tab and set “OS Optimized Defaults” to “Disabled”.



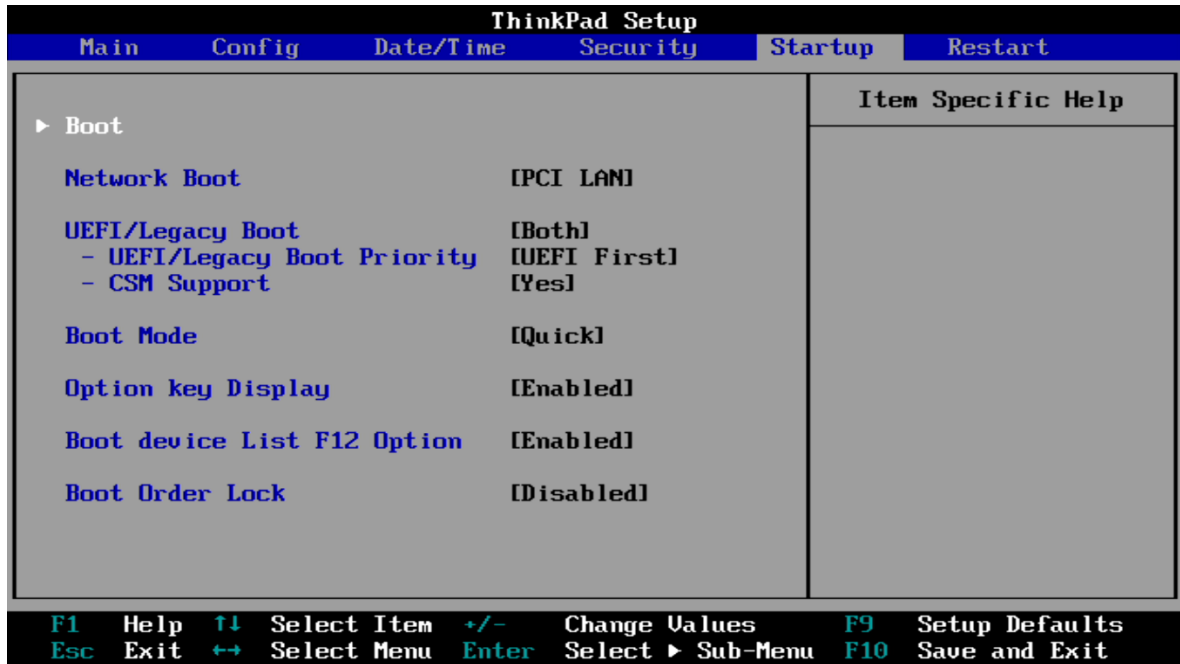
- Switching the “OS Optimized Defaults” settings may give a warning message. Select “Yes” to continue to disable OS Optimized Defaults.

| ThinkPad Setup   |                |  |             |
|--|----------------|--|-------------|
| Main   | Config         | Date/Time  | Security    |
| Exit Saving Changes<br>Exit Discarding Changes   |                | Item Specific Help   |             |
| <b>Attention!</b>  |                |  |             |
| <p>If OS Optimized Defaults is changed to Disabled, the default value of some security settings including Secure Boot, Secure RollBack Prevention and Virtualization features are disabled.<br/>Do you really want to continue?<br/>Select Yes to continue to disable the OS Optimized Defaults. Select No to discontinue the operation.</p> |                |  |             |
| [Yes]  |                | [No]   |             |
|  |                | Boot, Secure RollBack Prevention, and Virtualization features. |             |
| F1   | Help           | ↑↓   | Select Item |
| Esc  | Exit           | ↔  | Select Menu |
| +/-  | Change Values  |  |             |
| Enter  | Select         | ▶  | Sub-Menu    |
| F9   | Setup Defaults |  |             |
| F10  | Save and Exit  |  |             |

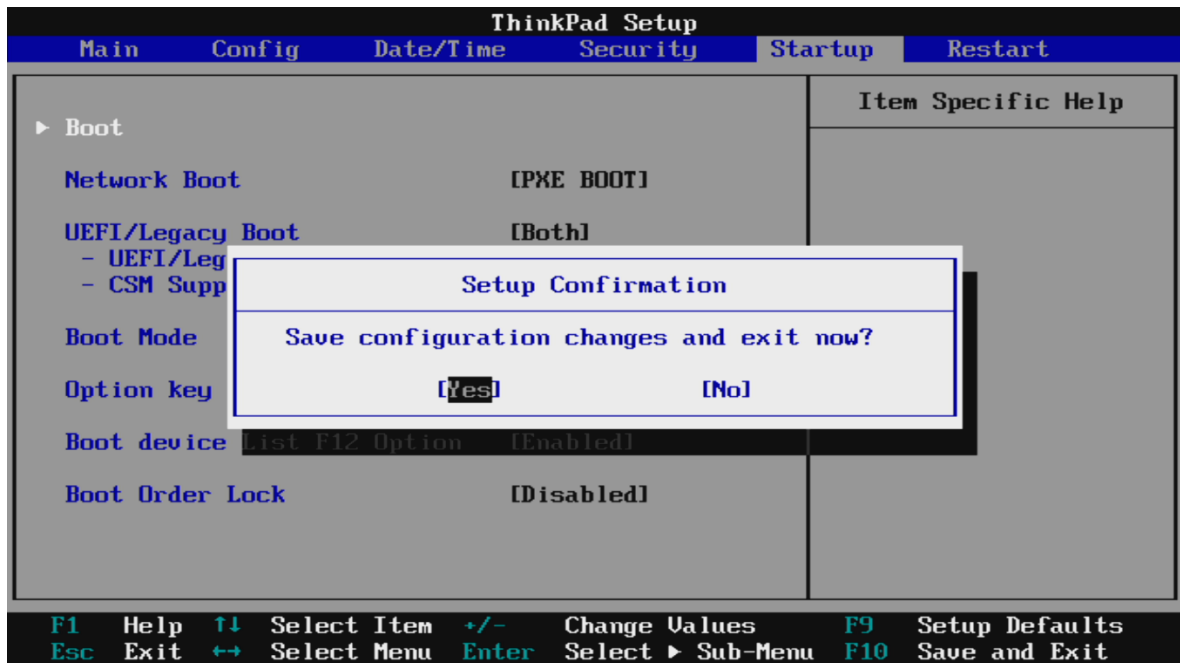
- Tab over to the “Startup” menu tab.

| ThinkPad Setup                    |                |   |             |
|-----------------------------------|----------------|---|-------------|
| Main                              | Config         | Date/Time   | Startup     |
| ▶ Boot                            |                | Item Specific Help                                    |             |
| Network Boot                      |                | [PXE BOOT]  |             |
| UEFI/Legacy Boot<br>- CSM Support |                | [UEFI Only]<br>[No]<br>* Unselectable for Secure Boot |             |
| Boot Mode                         |                | [Quick]   |             |
| Option key Display                |                | [Enabled]   |             |
| Boot device List F12 Option       |                | [Enabled]   |             |
| Boot Order Lock                   |                | [Disabled]  |             |
| F1                                | Help           | ↑↓  | Select Item |
| Esc                               | Exit           | ↔   | Select Menu |
| +/-                               | Change Values  |   |             |
| Enter                             | Select         | ▶   | Sub-Menu    |
| F9                                | Setup Defaults |   |             |
| F10                               | Save and Exit  |   |             |

- Pressing F9 function key will allow Legacy and UEFI bootable devices by setting “UEFI/Legacy Boot” to “Both”; otherwise, it will be an unchangeable setting to “UEFI only”.



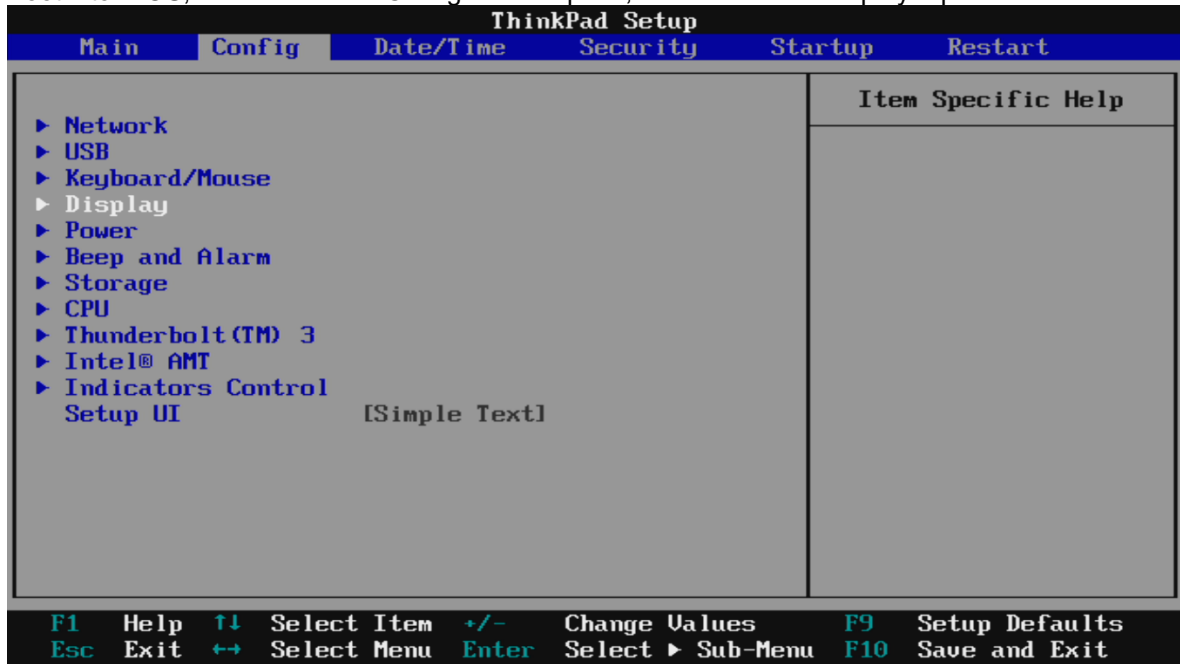
- Press function F10 key to save and exit BIOS setup.



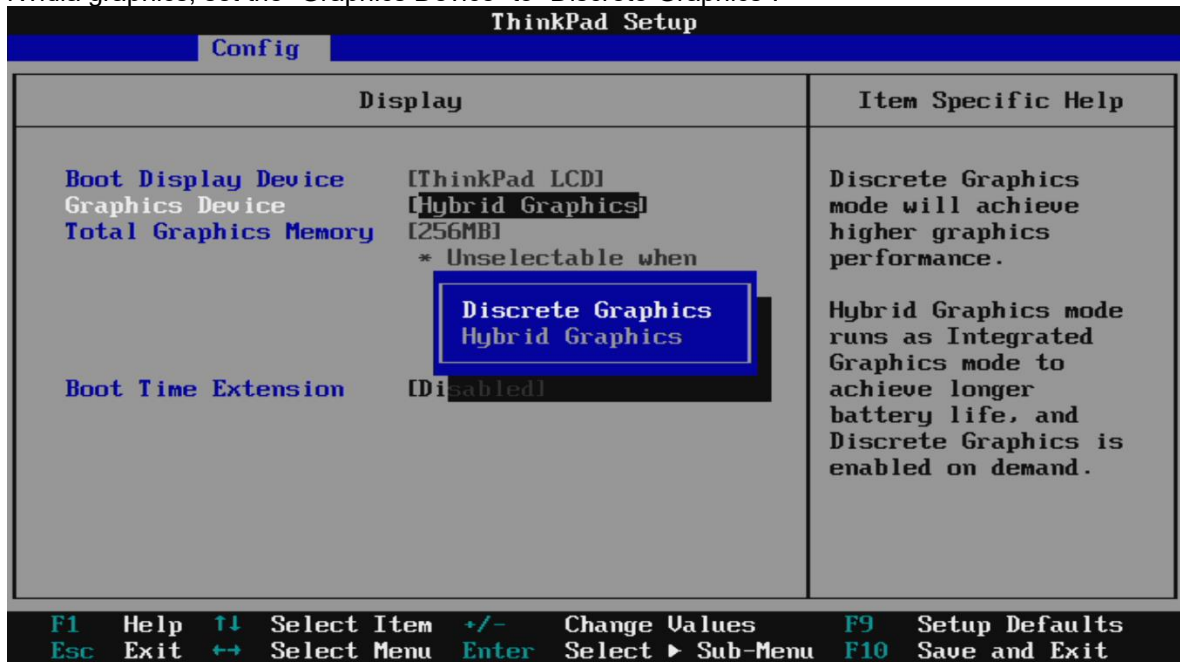
## Section 2 – Discrete vs Hybrid Graphics

The Thinkpad P53 and P73 offer both Nvidia and Intel graphics. To run exclusively Nvidia graphics, use the discrete graphics mode highlighted below.

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



- By default, the “Graphics Device” will likely be set to “Hybrid Graphics”. To run exclusively Nvidia graphics, set the “Graphics Device” to “Discrete Graphics”.



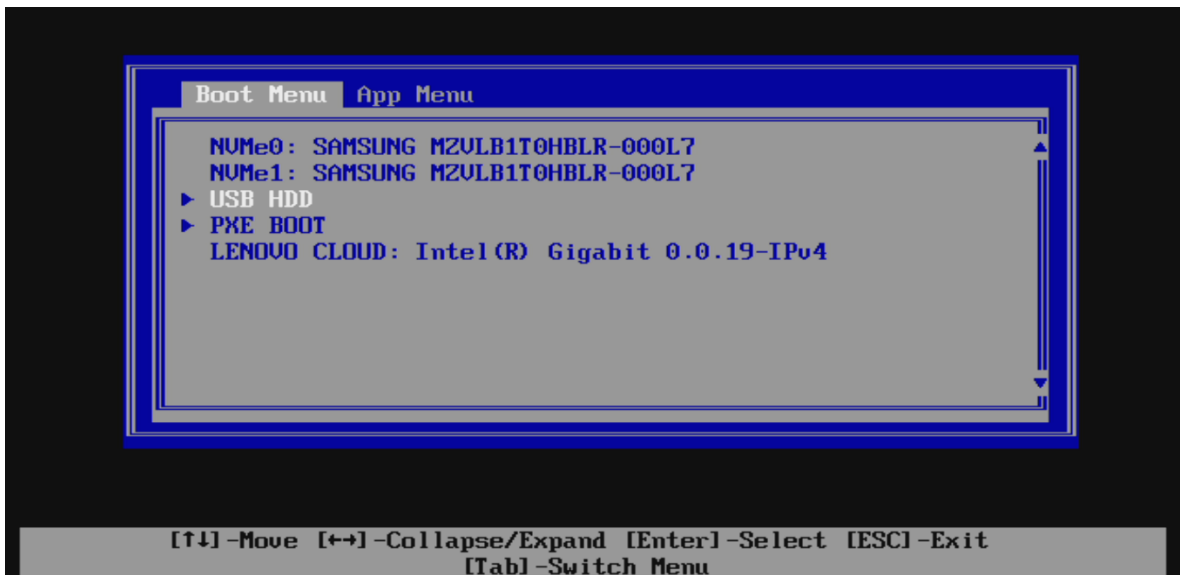
## Section 3 – Installing Debian 10.x

Please refer to the following instructions and screenshots on how to install Debian 10 on the Lenovo Thinkpad P53 and P73.

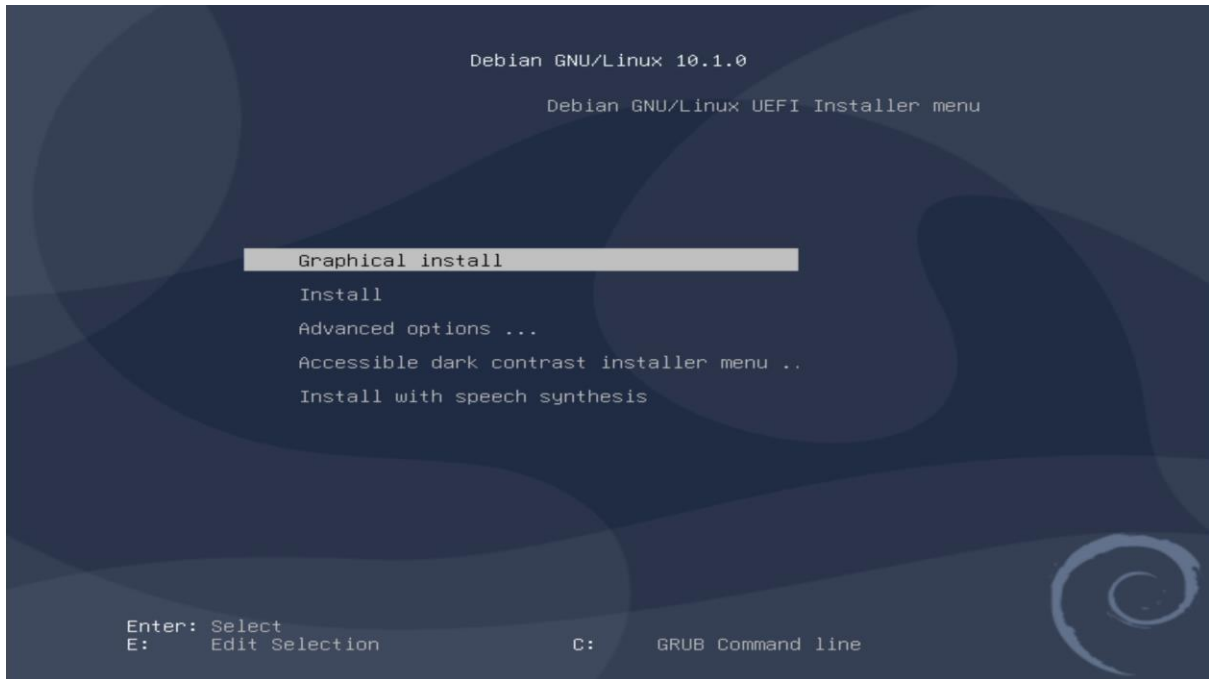
- Insert the Debian 10 installation media (either through USB or CD/DVD).
- Power on the system and press the F12 function key whenever the following Lenovo splash screen appears.



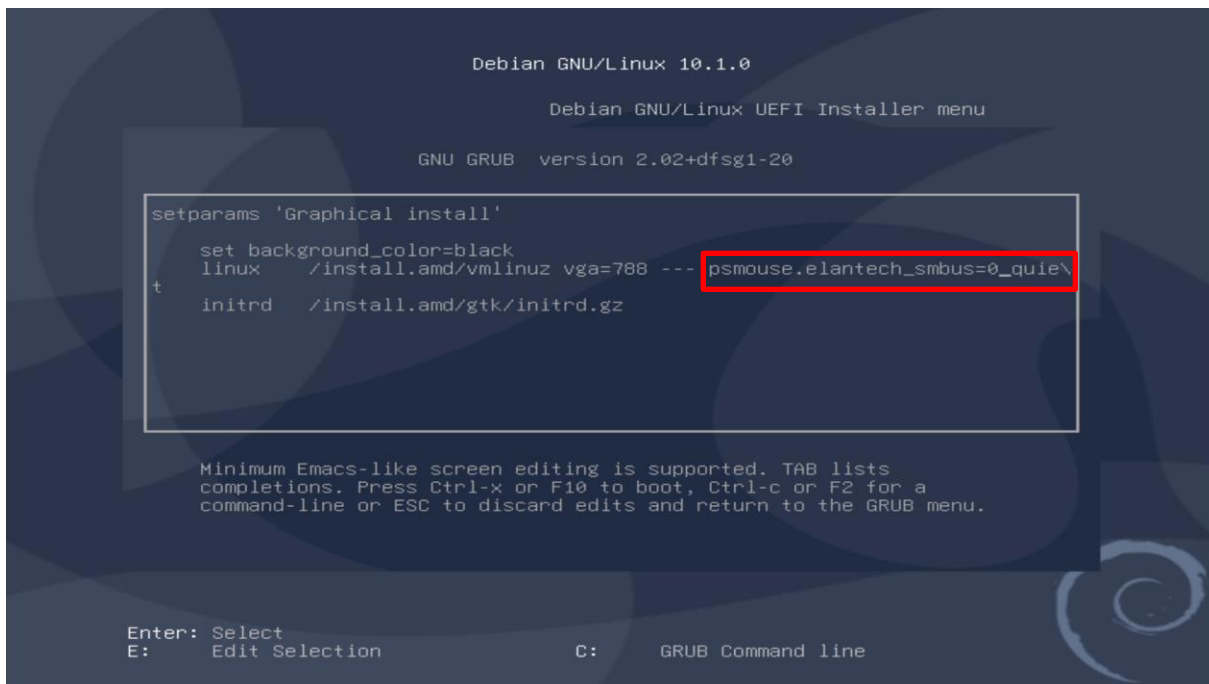
- Select the Linux bootable installation media from the F12 boot menu list.



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



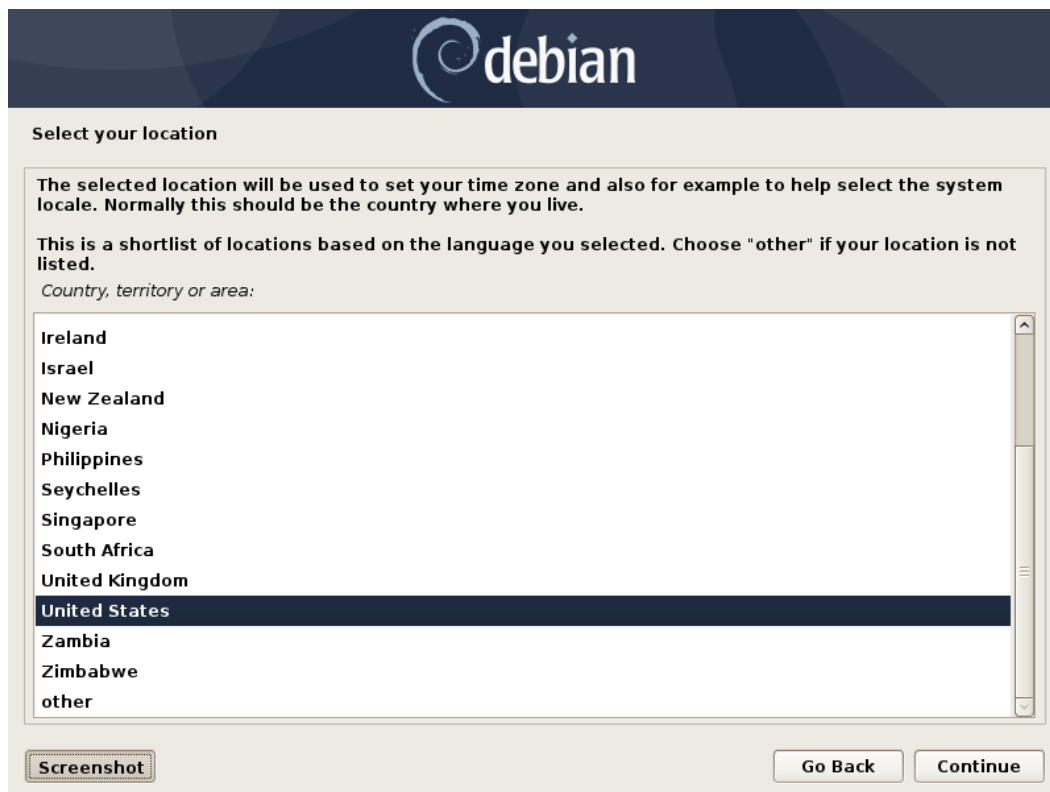
- Add the following line, “`psmouse.elantech_smbus=0`” before “quiet”, then press “Ctrl+x”.



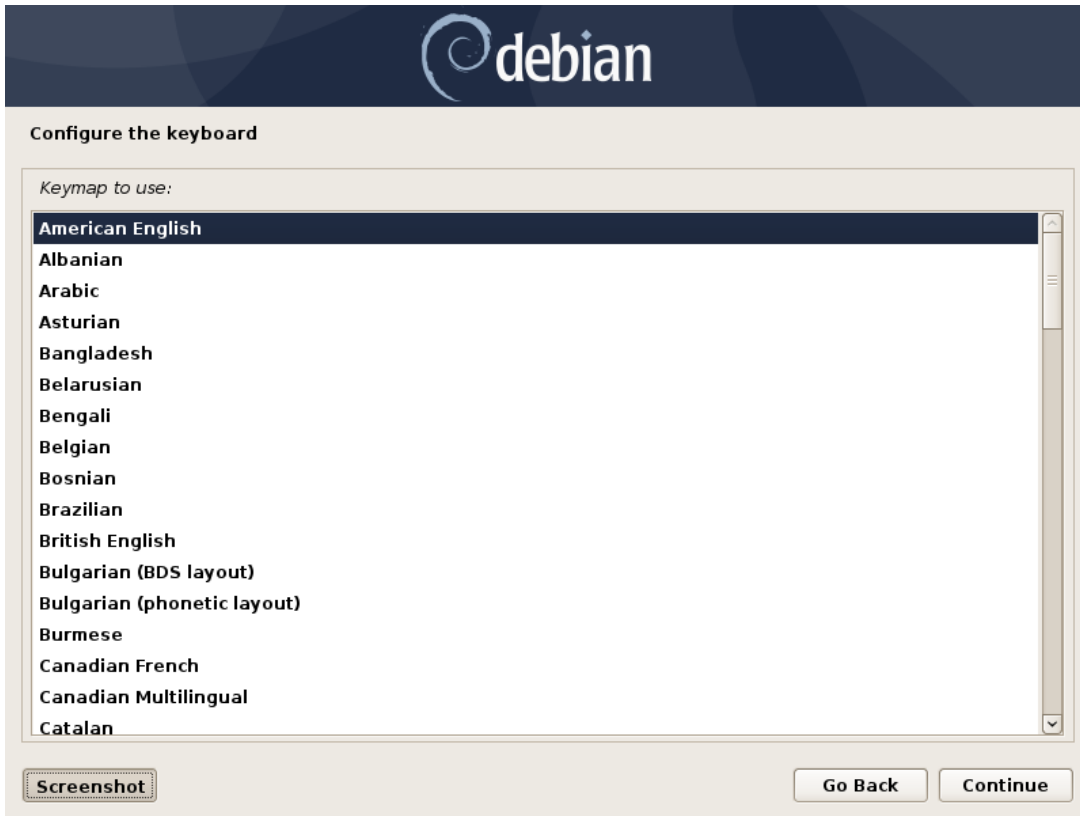
- Select the appropriate language and “Continue”.



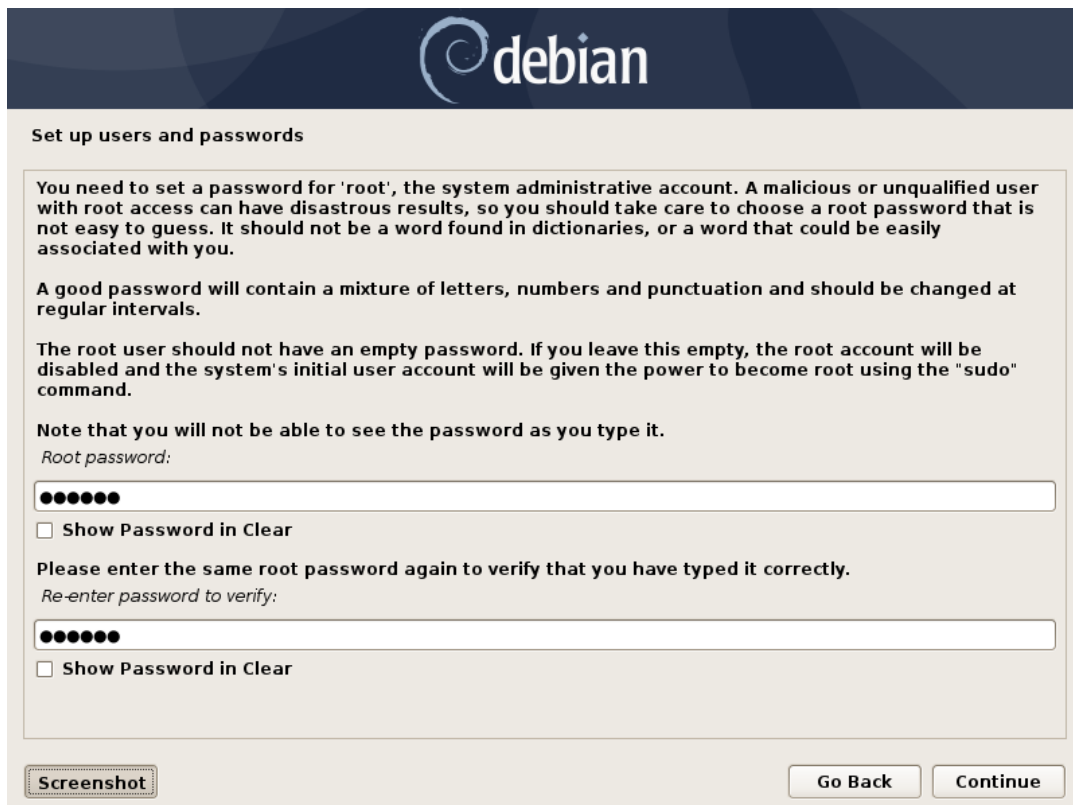
- Continue to personalize options.







- Set the desired root password



- Set the desired user name.



The screenshot shows the 'Set up users and passwords' screen in the Debian installer. At the top is the Debian logo. Below it, the title 'Set up users and passwords' is displayed. A message states: '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.' Below this, the prompt 'Full name for the new user:' is followed by an empty text input field. At the bottom, there are three buttons: 'Screenshot', 'Go Back', and 'Continue'.

- Set the password for the user.

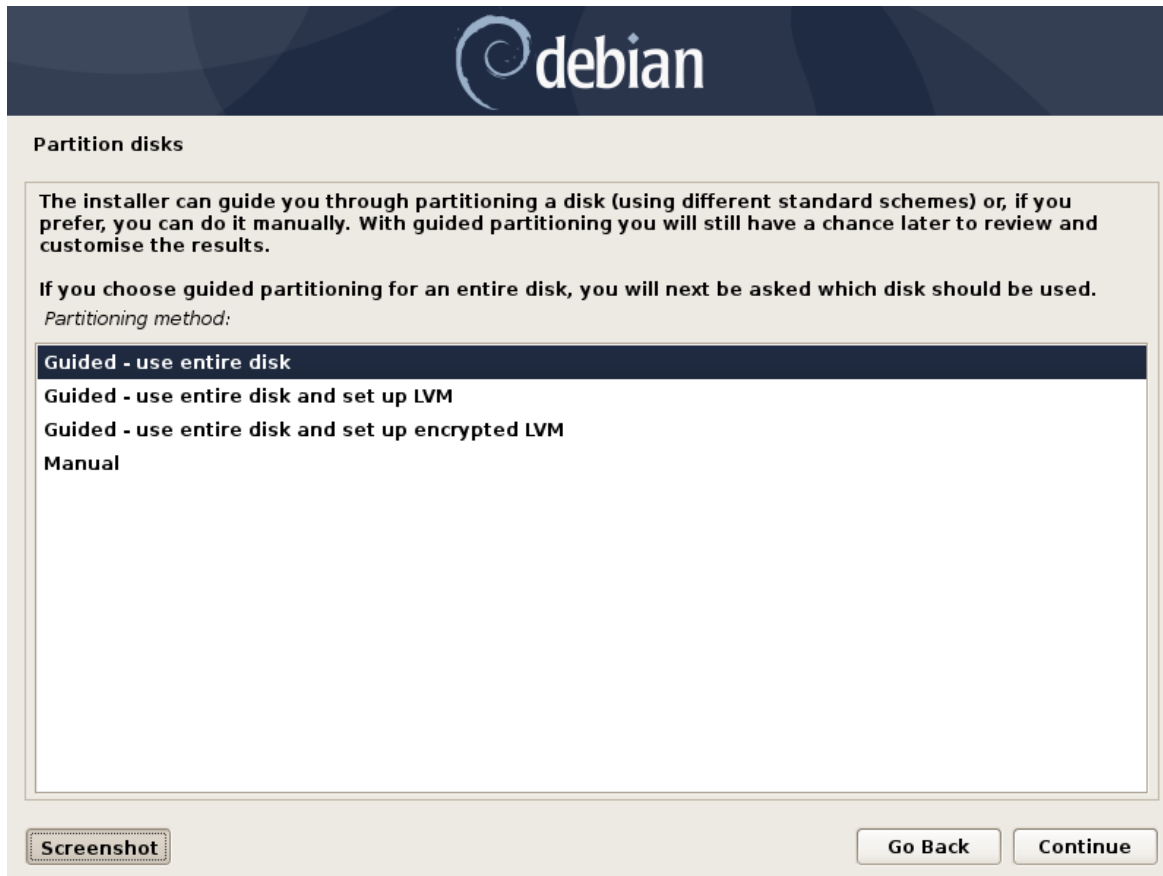


The screenshot shows the 'Set up users and passwords' screen in the Debian installer, specifically the password setting step. At the top is the Debian logo. Below it, the title 'Set up users and passwords' is displayed. A message states: 'A good password will contain a mixture of letters, numbers and punctuation and should be changed at regular intervals. Choose a password for the new user:'. Below this, there is a password input field with seven black dots. Underneath the field is a checkbox labeled 'Show Password in Clear'. Below that, another message states: 'Please enter the same user password again to verify you have typed it correctly. Re-enter password to verify:'. This is followed by a second password input field with seven black dots and another 'Show Password in Clear' checkbox. At the bottom, there are three buttons: 'Screenshot', 'Go Back', and 'Continue'.

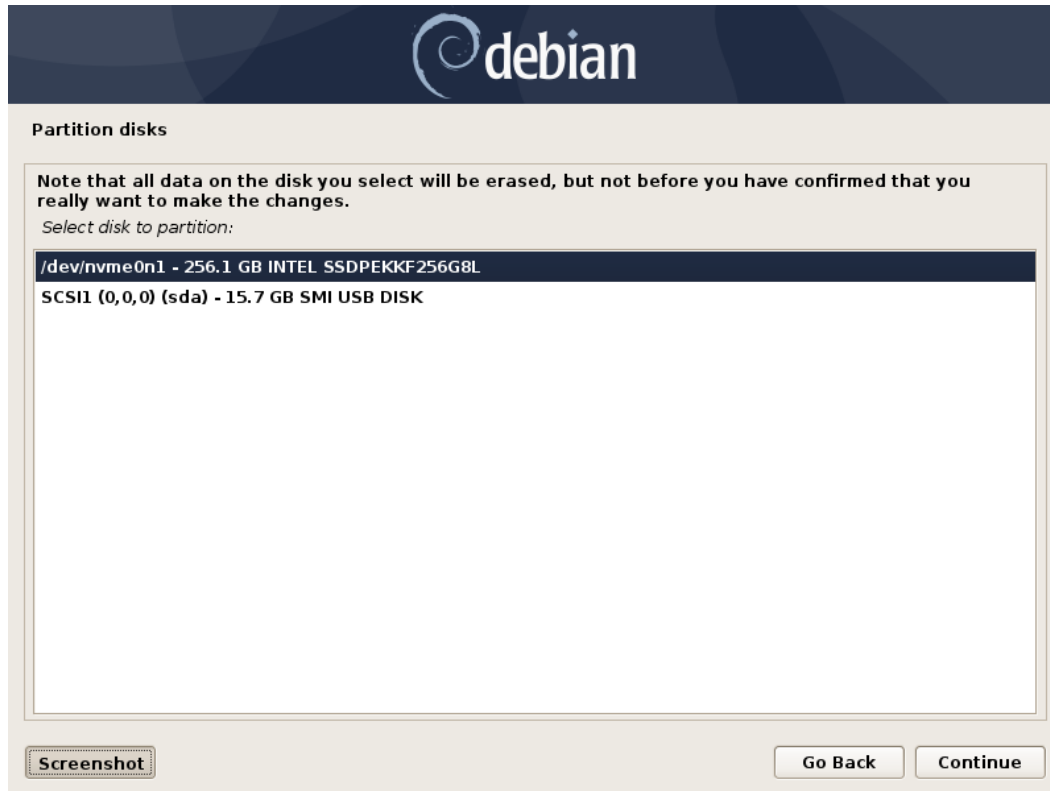
- Select “No” when asked to force UEFI Installation.



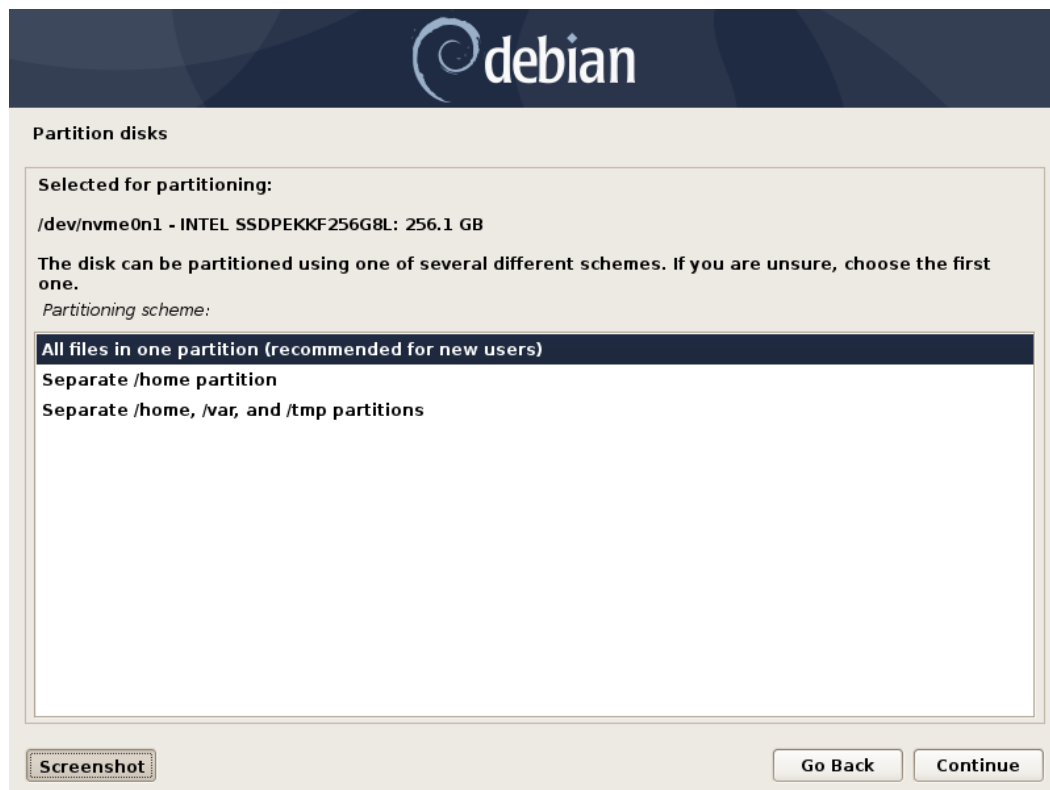
- Choose “Guided – use entire disk” partitioning method.



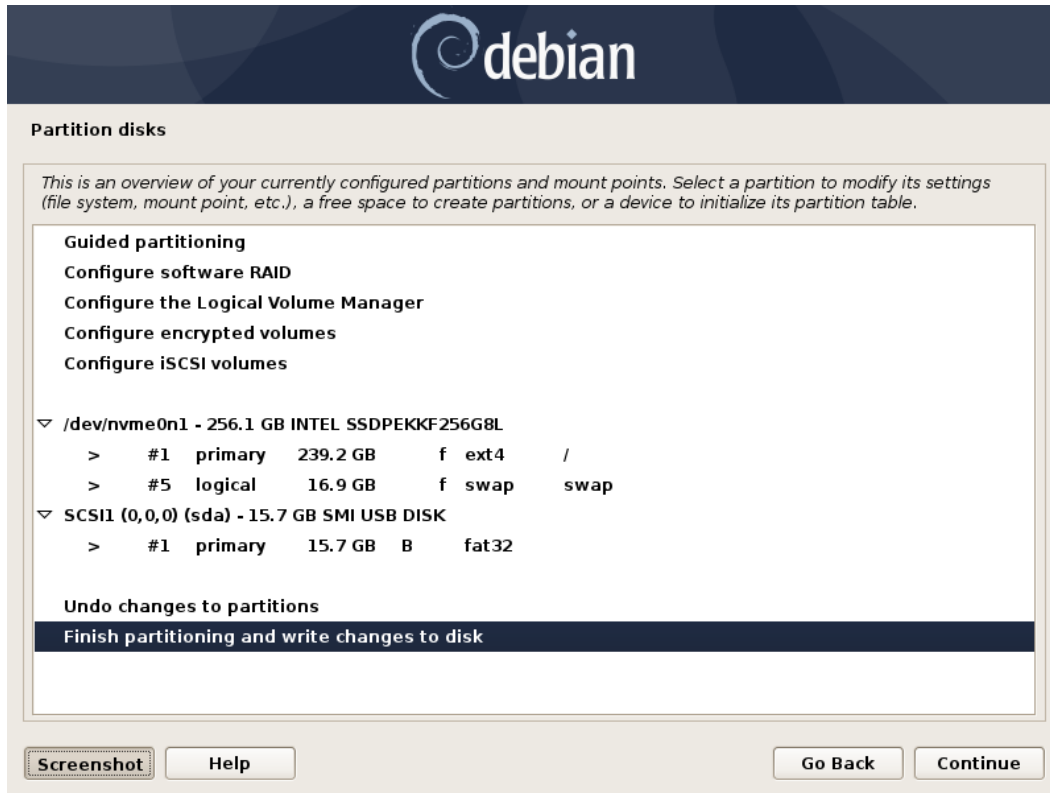
- Select the storage device on which to install the operating system.



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



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



**Partition disks**

*This is an overview of your currently configured partitions and mount points. Select a partition to modify its settings (file system, mount point, etc.), a free space to create partitions, or a device to initialize its partition table.*

**Guided partitioning**

- Configure software RAID
- Configure the Logical Volume Manager
- Configure encrypted volumes
- Configure iSCSI volumes

▼ /dev/nvme0n1 - 256.1 GB INTEL SSDPEKZF256G8L

- > #1 primary 239.2 GB f ext4 /
- > #5 logical 16.9 GB f swap swap

▼ SCSI1 (0,0,0) (sda) - 15.7 GB SMI USB DISK

- > #1 primary 15.7 GB B fat32

**Undo changes to partitions**

**Finish partitioning and write changes to disk**

Screenshot Help Go Back Continue

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



**Partition disks**

**If you continue, the changes listed below will be written to the disks. Otherwise, you will be able to make further changes manually.**

**The partition tables of the following devices are changed:**  
/dev/nvme0n1

**The following partitions are going to be formatted:**  
partition #1 of /dev/nvme0n1 as ext4  
partition #5 of /dev/nvme0n1 as swap

*Write the changes to disks?*

No

Yes

Screenshot Continue

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



**Configure the package manager**

A network mirror can be used to supplement the software that is included on the CD-ROM. This may also make newer versions of software available.

You are installing from a DVD. Even though the DVD contains a large selection of packages, some may be missing. If you have a reasonably good Internet connection, use of a mirror is suggested if you plan to install a graphical desktop environment.

Use a network mirror?

No

Yes

Screenshot

Go Back Continue

- Choose desired software to install.



**Software selection**

At the moment, only the core of the system is installed. To tune the system to your needs, you can choose to install one or more of the following predefined collections of software.

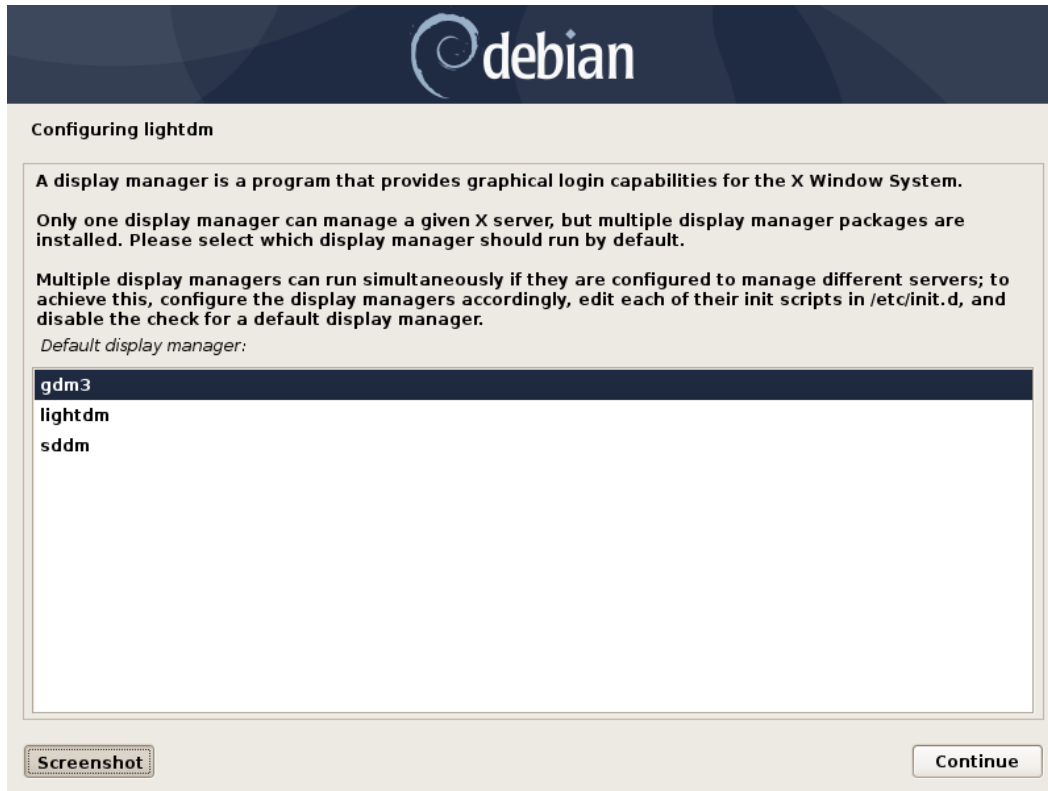
Choose software to install:

- Debian desktop environment
- ... GNOME
- ... Xfce
- ... KDE Plasma
- ... Cinnamon
- ... MATE
- ... LXDE
- ... LXQt
- web server
- print server
- SSH server
- standard system utilities

Screenshot

Continue

- 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.



**Install the GRUB boot loader on a hard disk**

You need to make the newly installed system bootable, by installing the GRUB boot loader on a bootable device. The usual way to do this is to install GRUB on the master boot record of your first hard drive. If you prefer, you can install GRUB elsewhere on the drive, or to another drive, or even to a floppy.

*Device for boot loader installation:*

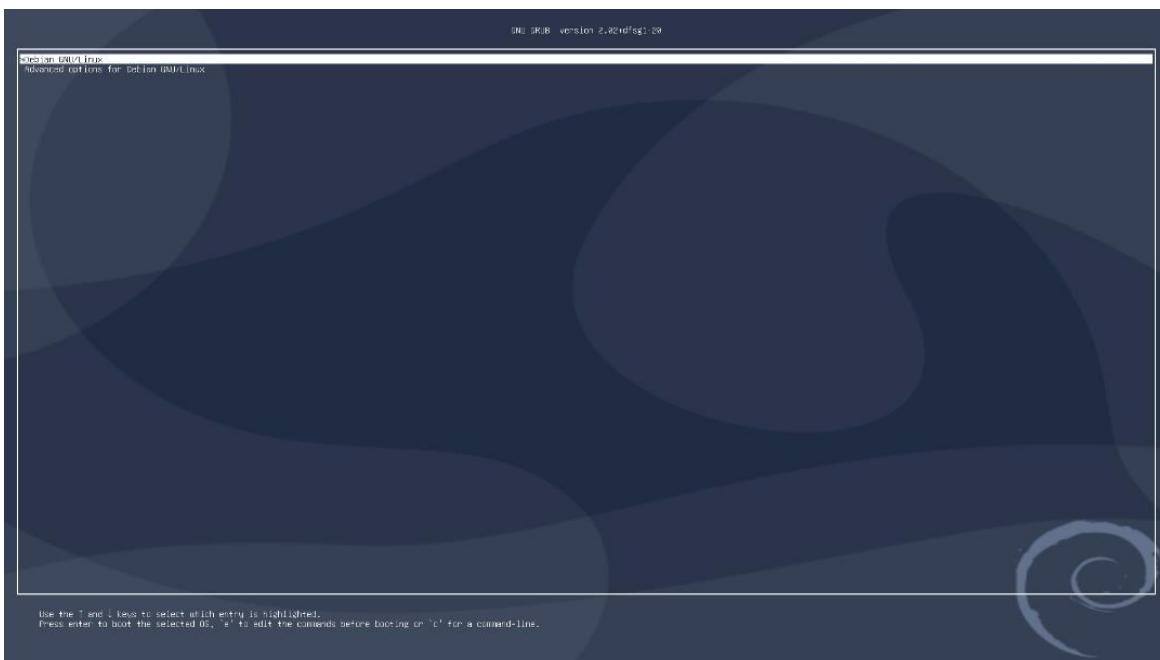
**Enter device manually**

`/dev/nvme0n1 (nvme-INTEL_SSDPEKKF256G8L_BTHP90960KWE256B)`

`/dev/sda (usb-SMI_USB_DISK-0:0)`

**Screenshot** **Go Back** **Continue**

- After reboot highlight “Debian GNU/Linux” from the GRUB boot options and press ‘e’



GNU GRUB version 2.02d(1)~39

Debian GNU/Linux  
Advanced options for Debian GNU/Linux

Use the ↑ and ↓ keys to select which entry is highlighted.  
Press enter to boot the selected OS, 'e' to edit the commands before booting or 'c' for a command-line.



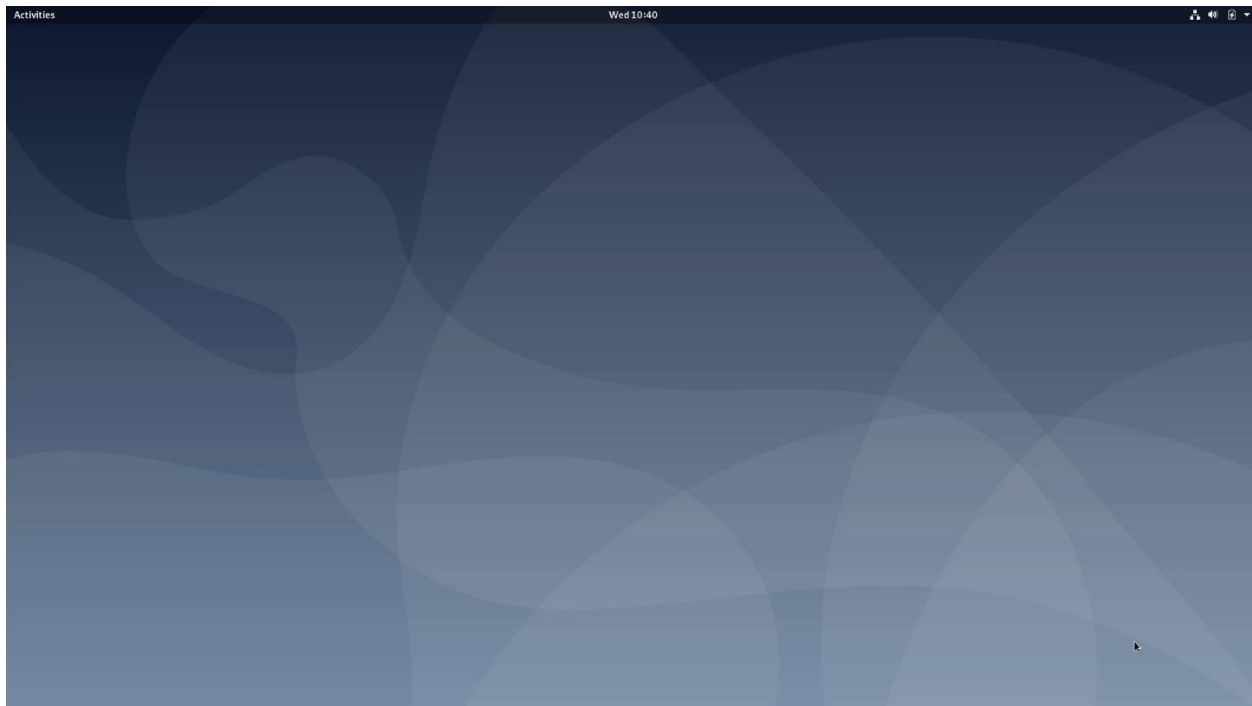
- Add “psmouse.elantech\_smbus=0” before “quiet”, then press “ctrl+x”.

```
GNU GRUB version 2.04+dfsg1-29

bootparams: 'debian GNU/Linux
load_vmlinuz
insmod gzio
if ! ${grub_platform} = x86_32; then insmod xzlib; insmod lzoblib; fi
insmod part_msdos
insmod ext2
if ! ${feature_platform_search_hini} = yes; then
search --no-floppy --fs-uuid --set=root 9E16A0E2-5F1D-477E-B339-2C0872344876
else
search --no-floppy --fs-uuid --set=root 521082e2-5f1d-477e-b339-2c0872344876
fi
echo 'Loading Linux 4.13.0-5-amd64 ...'
linux /boot/vmlinuz-4.13.0-5-amd64 root=UUID=521082e2-5f1d-477e-b339-2c0872344876 ro psmouse.elantech_smbus=0 quiet
echo 'Loading initramfs image ...'
initrd /boot/initrd.img-4.13.0-5-amd64

Minimum Emacs-like screen editing is supported. THE lists capabilities. Press Ctrl-x or F10 to boot, Ctrl-c or F2 for a command-line or ESC to discard edits and return to the GRUB menu.
```

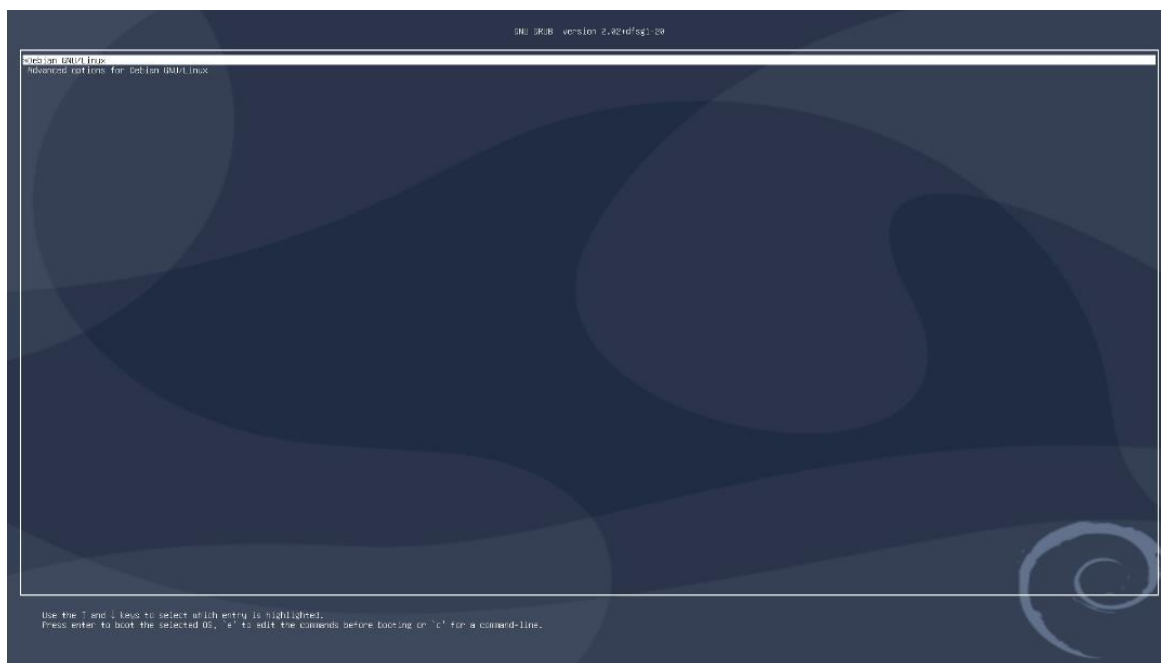
- Log in to the Debian desktop.



## Section 4 – TrackPoint and Touchpad Workaround

The TrackPoint and touchpad driver is not native to the Debian 10 kernel, so users will not be able to use the TrackPoint or touchpad by default. The following method can be used to enable these devices on a ThinkPad P53 and P73.

**Step 1:** Upon startup, highlight “Debian GNU/Linux” from the GRUB boot options and press ‘e’.



**Step 2:** Add “psmouse.elantech\_smbus=0” before “quiet”, then press “ctrl+x”.

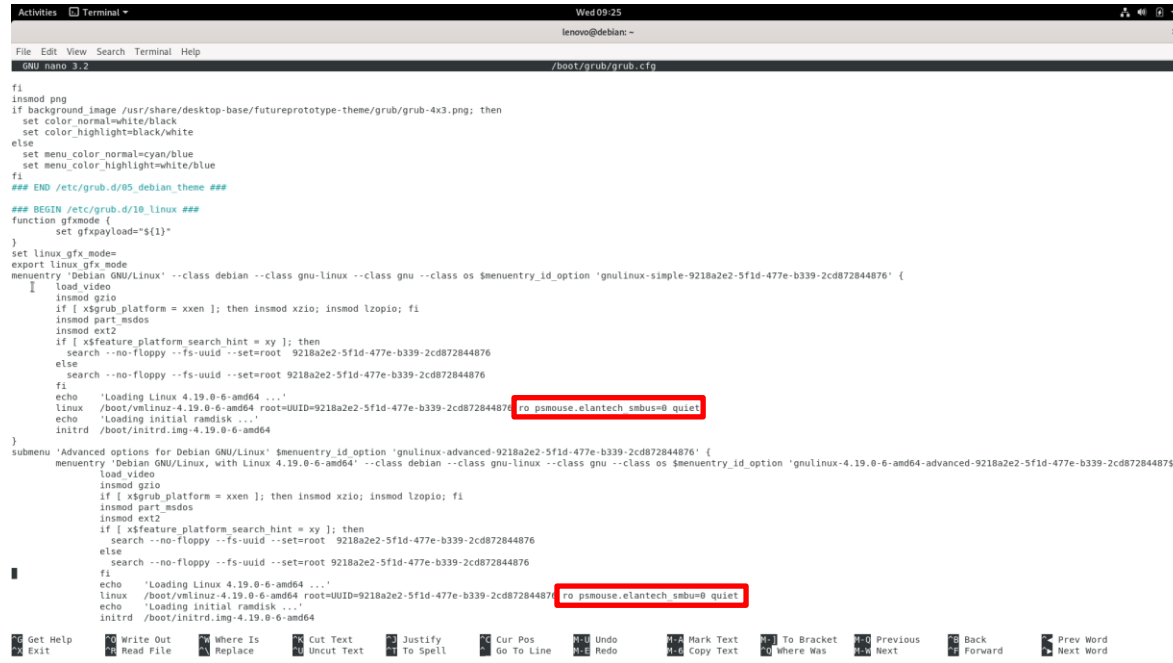


**Step 3:** After booting into Debian edit the grub.cfg file.

```
# su -
```

```
# nano /boot/grub/grub.cfg
```

- Add the line “psmouse.elantech\_smbus=0” at these locations.



```

GNU nano 3.2 /boot/grub/grub.cfg
fi
insmod png
if background_image /usr/share/desktop-base/futureprototype-theme/grub/grub-4x3.png; then
  set color normal=white/black
  set color highlight=black/white
else
  set menu_color_normal=cyan/blue
  set menu_color_highlight=white/blue
fi
### END /etc/grub.d/05_debian_theme ###

### BEGIN /etc/grub.d/10_linux ###
function gfxmode {
  set gfxpayload="${1}"
}
set linux_gfx_mode=
export linux_gfx_mode
menueentry 'Debian GNU/Linux' --class debian --class gnu-linux --class gnu --class os $menuentry_id_option 'gnulinux-simple-9218a2e2-5f1d-477e-b339-2cd872844876' {
  load_video
  insmod gzio
  if [ x$grub_platform = xxen ]; then insmod xzio; insmod lzopio; fi
  insmod part_msdos
  insmod ext2
  if [ x$feature_platform_search_hint = xy ]; then
    search --no-floppy --fs-uuid --set=root 9218a2e2-5f1d-477e-b339-2cd872844876
  else
    search --no-floppy --fs-uuid --set=root 9218a2e2-5f1d-477e-b339-2cd872844876
  fi
  echo 'Loading Linux 4.19.0-6-amd64 ...'
  linux /boot/vmlinuz-4.19.0-6-amd64 root=UUID=9218a2e2-5f1d-477e-b339-2cd872844876 ro psmouse.elantech_smbus=0 quiet
  echo 'Loading initial ramdisk ...'
  initrd /boot/initrd.img-4.19.0-6-amd64
}
submenu 'Advanced options for Debian GNU/Linux' $menuentry_id_option 'gnulinux-advanced-9218a2e2-5f1d-477e-b339-2cd872844876' {
  menueentry 'Debian GNU/Linux, with Linux 4.19.0-6-amd64' --class debian --class gnu-linux --class gnu --class os $menuentry_id_option 'gnulinux-4.19.0-6-amd64-advanced-9218a2e2-5f1d-477e-b339-2cd872844876' {
    load_video
    insmod gzio
    if [ x$grub_platform = xxen ]; then insmod xzio; insmod lzopio; fi
    insmod part_msdos
    insmod ext2
    if [ x$feature_platform_search_hint = xy ]; then
      search --no-floppy --fs-uuid --set=root 9218a2e2-5f1d-477e-b339-2cd872844876
    else
      search --no-floppy --fs-uuid --set=root 9218a2e2-5f1d-477e-b339-2cd872844876
    fi
    echo 'Loading Linux 4.19.0-6-amd64 ...'
    linux /boot/vmlinuz-4.19.0-6-amd64 root=UUID=9218a2e2-5f1d-477e-b339-2cd872844876 ro psmouse.elantech_smbus=0 quiet
    echo 'Loading initial ramdisk ...'
    initrd /boot/initrd.img-4.19.0-6-amd64
  }
}

```

- Press “ctrl + x” and save the file.

**Step 4:** Reboot the system and now the TrackPoint and touchpad should work as expected.

## Section 5 – 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 methods can be used to enable the wireless network on a ThinkPad P53 and P73.

**Option 1:** Update the *iw/wifi* module:

**Step 1:** Make sure you are connected to a network via a wired LAN connection

**Step 2:** Update the sources as follows:

# su -

# nano /etc/apt/sources.list

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

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

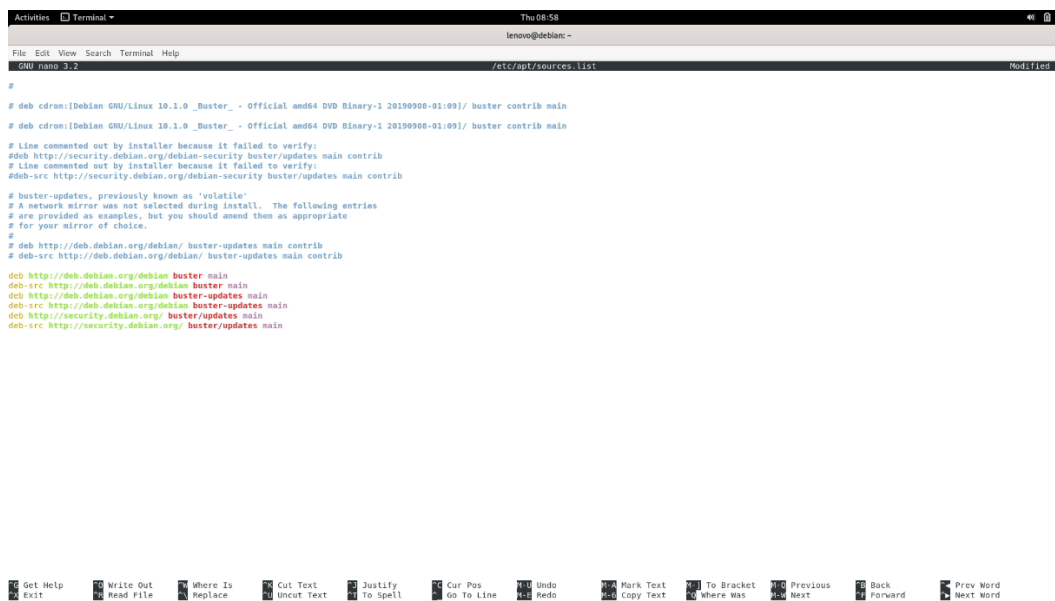
```
deb-src http://deb.debian.org/debian buster main
```

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

```
deb-src http://deb.debian.org/debian buster-updates main
```

```
deb http://security.debian.org/ buster/updates main
```

```
deb-src http://security.debian.org/ buster/updates main
```



```

#
# deb cdrom:[Debian GNU/Linux 10.1.0_Buster_ - Official amd64 DVD Binary-1 20190906-01:09]/ buster contrib main
# deb cdrom:[Debian GNU/Linux 10.1.0_Buster_ - Official amd64 DVD Binary-1 20190906-01:09]/ 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 main
deb-src http://deb.debian.org/debian buster main
deb http://deb.debian.org/debian buster-updates main
deb-src http://deb.debian.org/debian buster-updates main
deb http://security.debian.org/ buster/updates main
deb-src http://security.debian.org/ buster/updates main

```

**Step 3:** Update the sources.list file

```
# apt-get update
```

**Step 4:** Install the development tools package

```
# apt install git build-essential
```

**Step 5:** Install linux kernel headers package

```
# apt install linux-headers-$(uname -r)
```

**Step 6:** Install the *iwlwifi* package.

```
# git clone https://git.kernel.org/pub/scm/linux/kernel/git/iwlwifi/backport-iwlwifi.git
# cd backport-iwlwifi/
# make defconfig-iwlwifi-public
# sed -i 's/CPTCFG_IWLMMV_VENDOR_CMDS=y/# CPTCFG_IWLMMV_VENDOR_CMDS is not set/' .config
# make -j4
# make install
```

**Step 7:** Install the Intel Wireless Driver

```
# wget https://wireless.wiki.kernel.org/\_media/en/users/drivers/iwlwifi/iwlwifi-cc-46.3cfab8da.0.tgz
# tar xzf iwlwifi*
# cd iwlwifi*/
# cp iwlwifi*/lib/firmware/
# cp LICENSE*/lib/firmware/
# modprobe iwlwifi
# reboot now
```

- When the system boots back up the wireless network should be enabled.

**Option 2:** Update the Linux kernel to 5.0:

```
# apt install linux-oem-osp1 linux-firmware
```

---

## Section 6 – Installing the Nvidia Graphics Driver

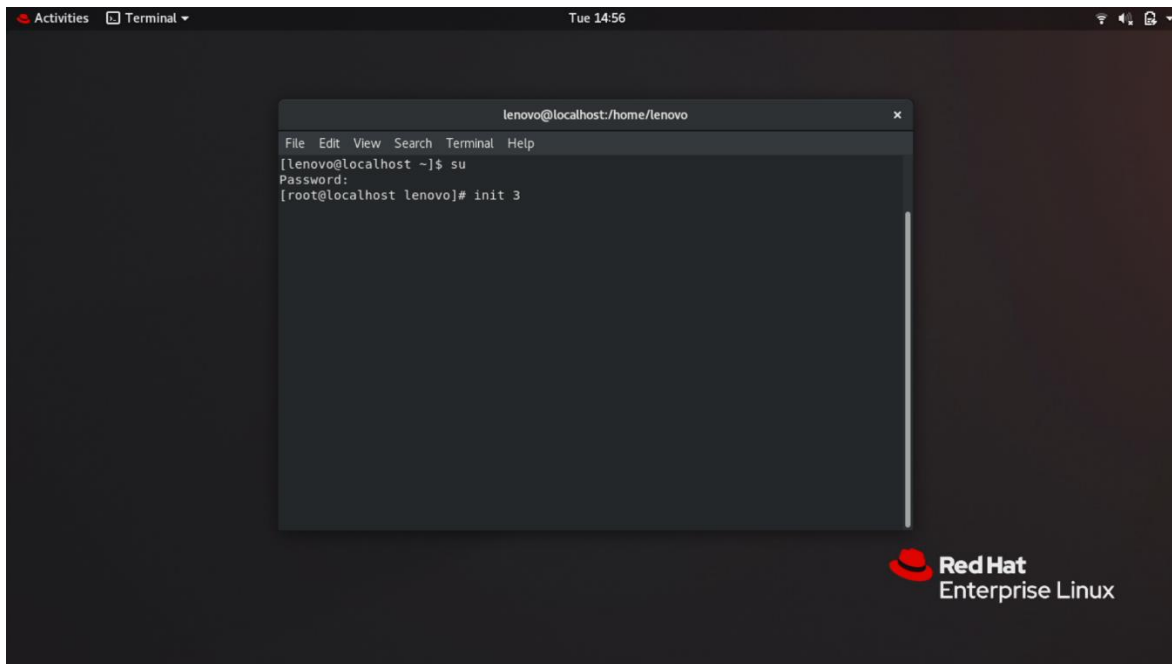
In order to get optimal performance out of the Nvidia GPU, it's a good idea to install the Nvidia graphics driver.

To install the latest Nvidia graphics driver, follow the steps below:

**Step 1:** Download the latest Nvidia graphics driver for the appropriate Nvidia GPU from [nvidia.com/drivers](https://www.nvidia.com/drivers).

**Step 2:** Open a terminal window and stop x-windows.

# init 3



**Step 3:** Login and browse to the directory location to where the Nvidia driver installer is.

```
Debian GNU/Linux 10 debian tty1

debian login: lenovo
Password:
Last login: Wed Dec 18 13:53:01 EST 2019 on tty1
Linux debian 4.19.0-6-amd64 #1 SMP Debian 4.19.67-2 (2019-08-28) 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:~$ cd /home/lenovo/Downloads
lenovo@debian:~/Downloads$ _
```

**Step 4:** Make the Nvidia installer an executable.

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

```
Debian GNU/Linux 10 debian tty1

debian login: lenovo
Password:
Last login: Wed Dec 18 13:53:01 EST 2019 on tty1
Linux debian 4.19.0-6-amd64 #1 SMP Debian 4.19.67-2 (2019-08-28) 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:~$ cd /home/lenovo/Downloads
lenovo@debian:~/Downloads$ chmod +x NVIDIA-Linux-x86_64-440.44.run
lenovo@debian:~/Downloads$ _
```

**Step 5:** Run the Nvidia driver executable as root.

```
# su -
```

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

```
lenovo@debian:~/Downloads$ su
Password:
root@debian:/home/lenovo/Downloads# ./NVIDIA-Linux-x86_64-440.44.run _
```

**Step 6:** Optional: Choose whether to install the 32-bit compatibility libraries.

```
NVIDIA Accelerated Graphics Driver for Linux-x86_64 (440.44)

Install NVIDIA's 32-bit compatibility libraries?
  Yes  No

NVIDIA Software Installer for Unix/Linux www.nvidia.com
```



**Step 7:** Select to “Install and overwrite” libglvnd libraries.

```
NVIDIA Accelerated Graphics Driver for Linux-x86_64 (440.44)

An incomplete installation of libglvnd was found. All of the essential
libglvnd libraries are present, but one or more optional components are
missing. Do you want to install a full copy of libglvnd? This will overwrite
any existing libglvnd libraries.

Don't install  Install and overw  Abort installation.

NVIDIA Software Installer for Unix/Linux          www.nvidia.com
```

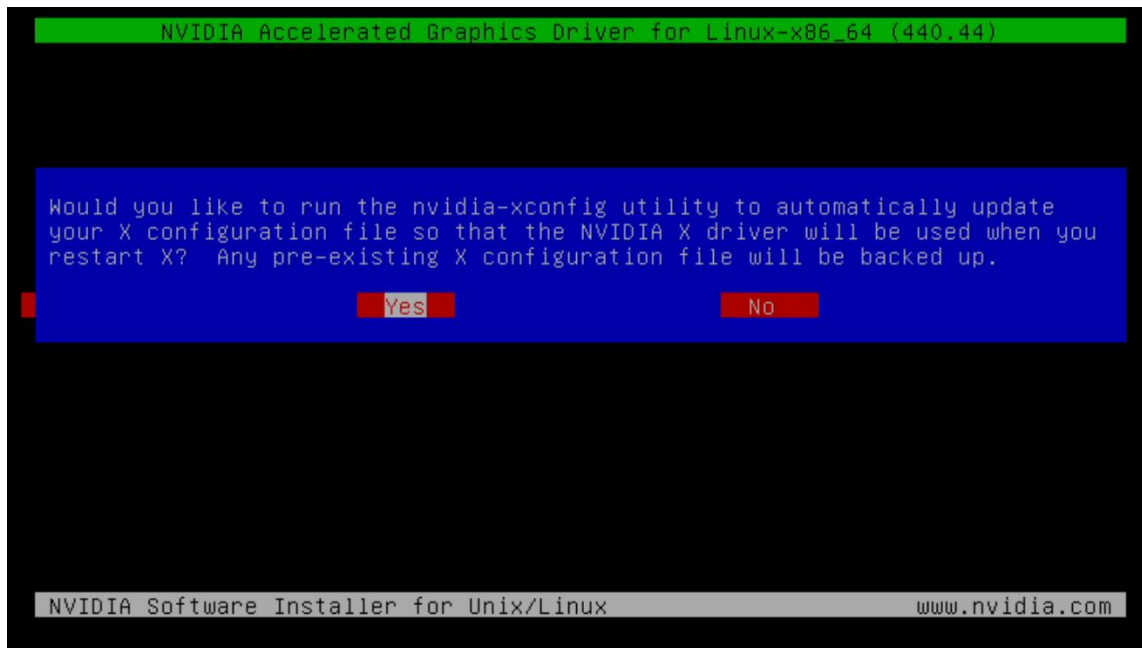
**Step 8:** Nvidia driver installing progress bar may appear.

```
NVIDIA Accelerated Graphics Driver for Linux-x86_64 (440.44)

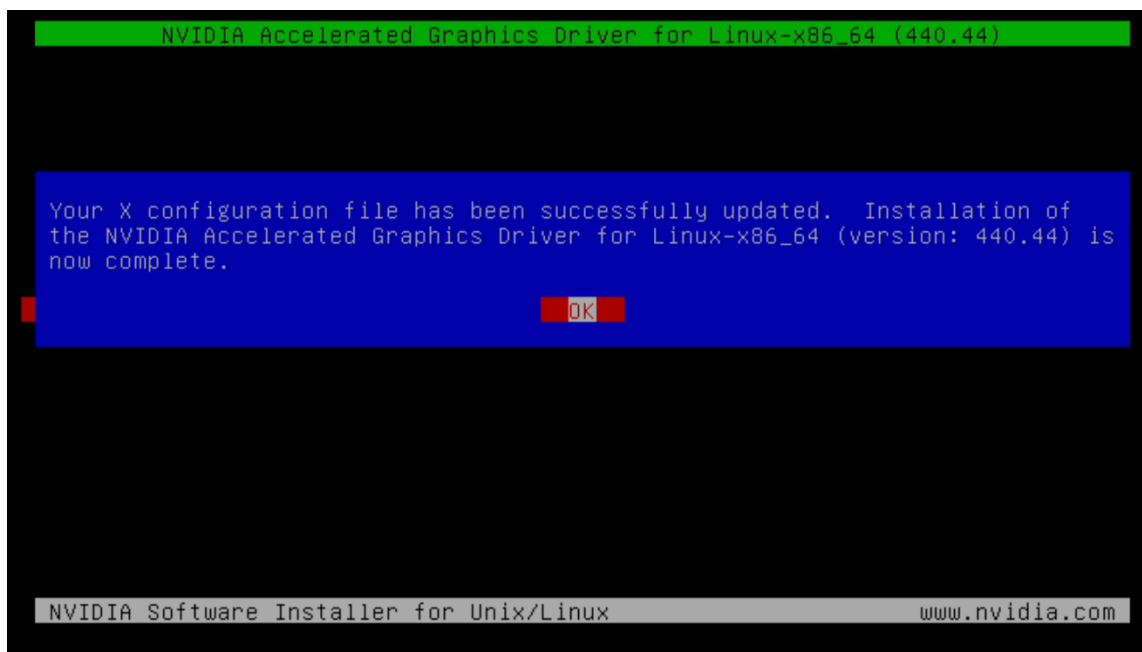
Installing 'NVIDIA Accelerated Graphics Driver for Linux-x86_64' (440.44):
-----
Executing: ` /sbin/depmod -a ` (this may take a moment...)
99%

NVIDIA Software Installer for Unix/Linux          www.nvidia.com
```

**Step 9:** Select “Yes” to update the X-configuration file to use the Nvidia X driver.



**Step 10:** Select “OK” to acknowledge the driver installation is complete.



**Step 11:** Execute the following command to verify the Nvidia driver is loaded.

```
# nvidia-smi
```

**Step 12:** Reboot the system.

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## Section 7 – Revision History

| Version | Date       | Author    | Changes/Updates        |
|---------|------------|-----------|------------------------|
| 1.0     | 12/20/2019 | Hady Asad | Initial launch release |