Debian GNU/Linux Setup Guide

For ThinkPad P1 Gen 2

*** *Official support of Debian 10.0 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 'Restart' menu tab and set "OS Optimized Defaults" to "Disabled".
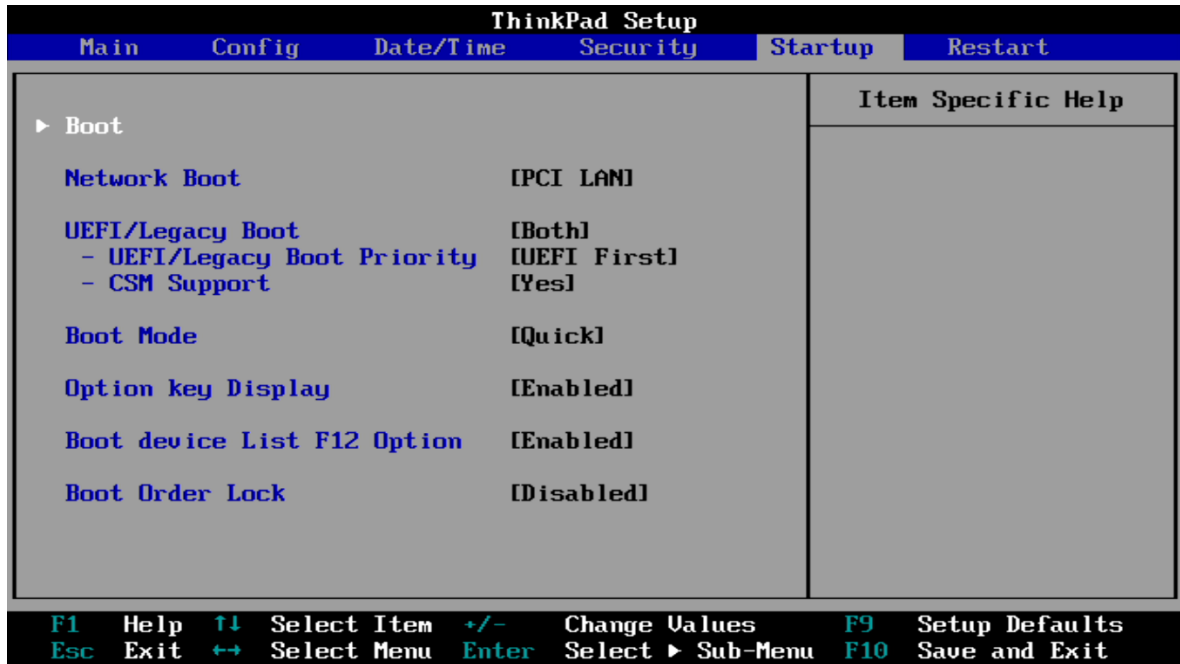
- Switching the "OS Optimized Defaults" settings may give a warning message. Select "Yes" to continue to disable OS Optimized Defaults.

```
                        ThinkPad Setup
     Main     Config     Date/Time     Security     Startup     Restart

                                              Item Specific Help

     Exit Saving Changes
     Exit Discarding Changes
   ┌─────────────────────── Attention! ───────────────────────┐
   │                                                           │
   │     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.
   │              Do you really want to continue?
   │     Select Yes to continue to disable the OS Optimized Defaults.Select No  to
   │                   discontinue the operation.
   │
   │              [Yes]                        [No]
   └───────────────────────────────────────────────────────────┘
                                              Boot, Secure RollBack
                                              Prevention, and
                                              Virtualization
                                              features.

   F1   Help   ↑↓  Select Item  +/-   Change Values    F9   Setup Defaults
   Esc  Exit   ↔   Select Menu   Enter Select ▶ Sub-Menu  F10  Save and Exit
```
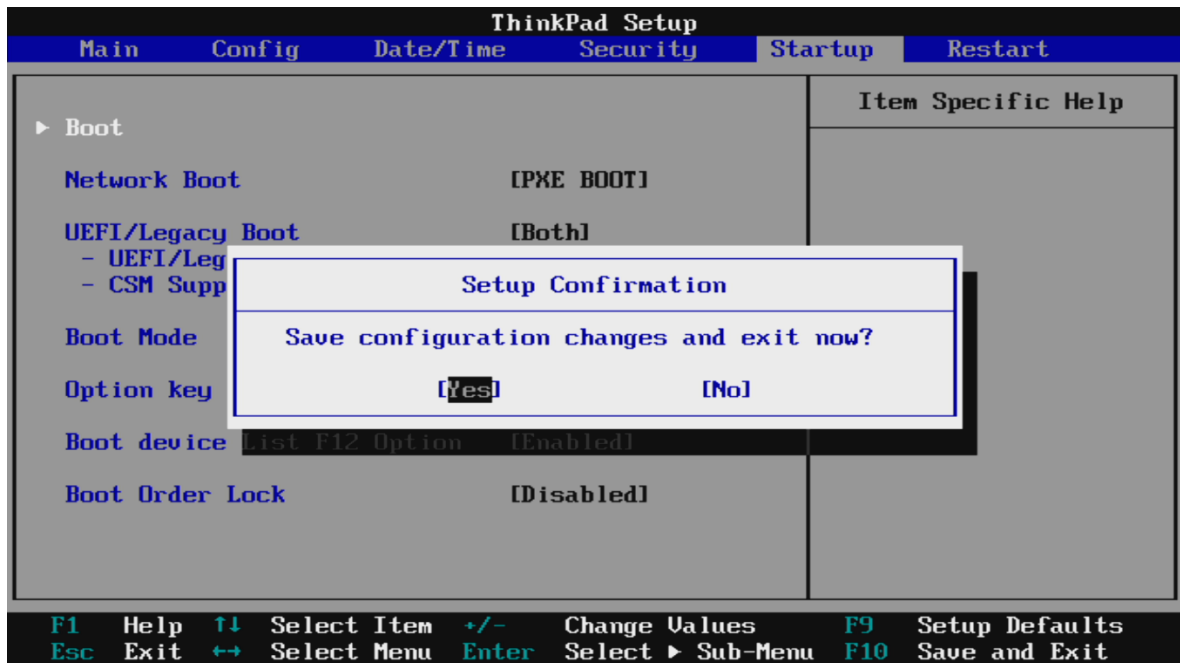
- Tab over to the "Startup" menu tab.

```
                        ThinkPad Setup
     Main     Config     Date/Time     Security     Startup     Restart

                                              Item Specific Help

   ▶ Boot

     Network Boot            [PXE BOOT]

     UEFI/Legacy Boot        [UEFI Only]
       - CSM Support         [No]
                             * 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  +/-   Change Values    F9   Setup Defaults
   Esc  Exit   ↔   Select Menu   Enter Select ▶ Sub-Menu  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".
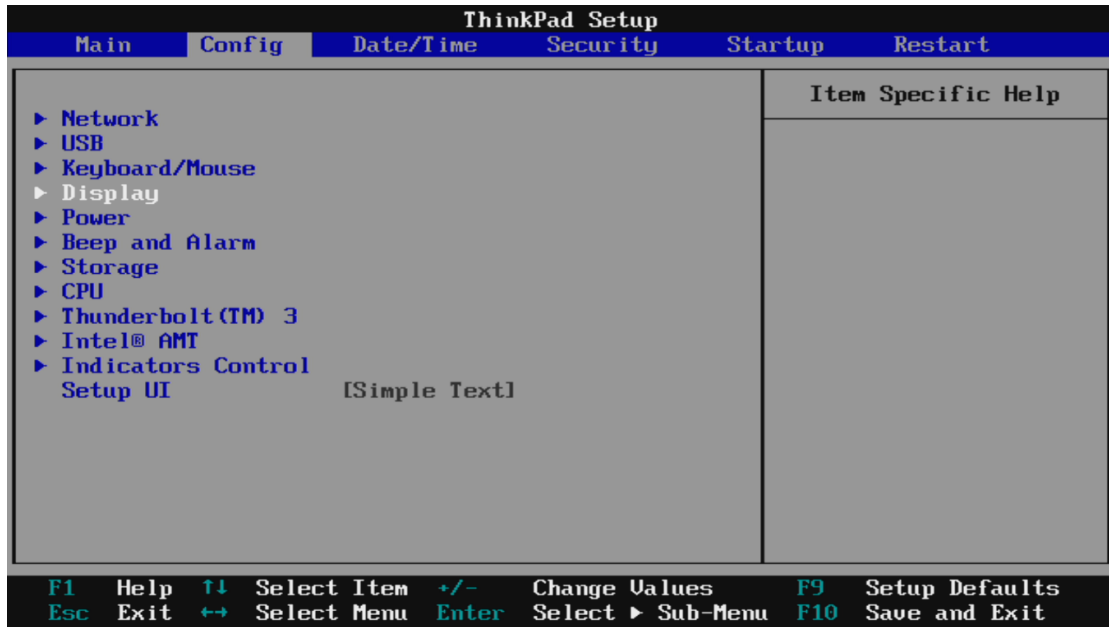
```
                        ThinkPad Setup
     Main      Config     Date/Time     Security    Startup     Restart

                                                      Item Specific Help
  ▶ Boot

    Network Boot                    [PCI LAN]

    UEFI/Legacy Boot                [Both]
      - UEFI/Legacy Boot Priority   [UEFI First]
      - CSM Support                 [Yes]

    Boot Mode                       [Quick]

    Option key Display              [Enabled]

    Boot device List F12 Option     [Enabled]

    Boot Order Lock                 [Disabled]



   F1   Help   ↑↓  Select Item  +/-    Change Values     F9   Setup Defaults
   Esc  Exit   ↔   Select Menu  Enter  Select ▶ Sub-Menu F10  Save and Exit
```

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

```
                        ThinkPad Setup
     Main      Config     Date/Time     Security    Startup     Restart

                                                      Item Specific Help
  ▶ Boot

    Network Boot                    [PXE BOOT]

    UEFI/Legacy Boot                [Both]
      - UEFI/Leg
      - CSM Supp ┌────────────────────────────────────────────┐
               │          Setup Confirmation                │
    Boot Mode  │                                            │
               │  Save configuration changes and exit now?  │
    Option key │                                            │
               │          [Yes]            [No]             │
    Boot device└────────────────────────────────────────────┘
                List F12 Option   [Enabled]

    Boot Order Lock                 [Disabled]



   F1   Help   ↑↓  Select Item  +/-    Change Values     F9   Setup Defaults
   Esc  Exit   ↔   Select Menu  Enter  Select ▶ Sub-Menu F10  Save and Exit
```

Section 2 – Discrete vs Hybrid Graphics

The Thinkpad P1 Gen 2 offers both Nvidia and Intel graphics. To run exclusively Nvidia graphics, use the discrete graphics mode highlighted below. **Note:** Before attempting to install Debian 10, the P1 Gen 2 must be set to Hybrid Mode until the Nvidia graphics driver can be installed.

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

```
                      ThinkPad Setup
    Main      Config      Date/Time      Security      Startup      Restart

                                                    Item Specific Help
     ▶ Network
     ▶ USB
     ▶ Keyboard/Mouse
     ▶ Display
     ▶ Power
     ▶ Beep and Alarm
     ▶ Storage
     ▶ CPU
     ▶ Thunderbolt(TM) 3
     ▶ Intel® AMT
     ▶ Indicators Control
       Setup UI          [Simple Text]




    F1    Help   ↑↓  Select Item   +/-    Change Values    F9   Setup Defaults
    Esc   Exit   ←→  Select Menu   Enter  Select ▶ Sub-Menu F10  Save and Exit
```

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

```
                      ThinkPad Setup
              Config

                    Display                         Item Specific Help

    Boot Display Device    [ThinkPad LCD]           Discrete Graphics
    Graphics Device        [Hybrid Graphics]        mode will achieve
    Total Graphics Memory  [256MB]                  higher graphics
                           * Unselectable when      performance.

                           ┌──────────────────┐     Hybrid Graphics mode
                           │ Discrete Graphics│     runs as Integrated
                           │ Hybrid Graphics  │     Graphics mode to
                           └──────────────────┘     achieve longer
    Boot Time Extension    [Disabled]               battery life, and
                                                    Discrete Graphics is
                                                    enabled on demand.




    F1    Help   ↑↓  Select Item   +/-    Change Values    F9   Setup Defaults
    Esc   Exit   ←→  Select Menu   Enter  Select ▶ Sub-Menu F10  Save and Exit
```

Section 3 – Installing Debian 10.x

Please refer to the following instructions and screenshots on how to install Debian 10 on the Lenovo Thinkpad P1 Gen 2.

- 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.
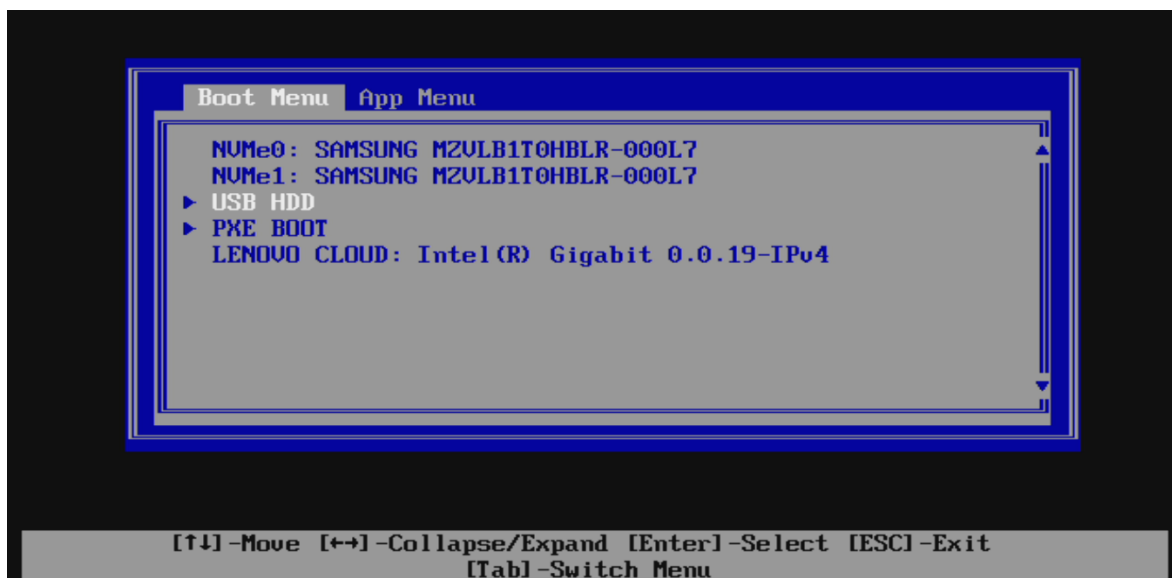
- Select "Graphical install" from the Debian boot menu to begin setup.
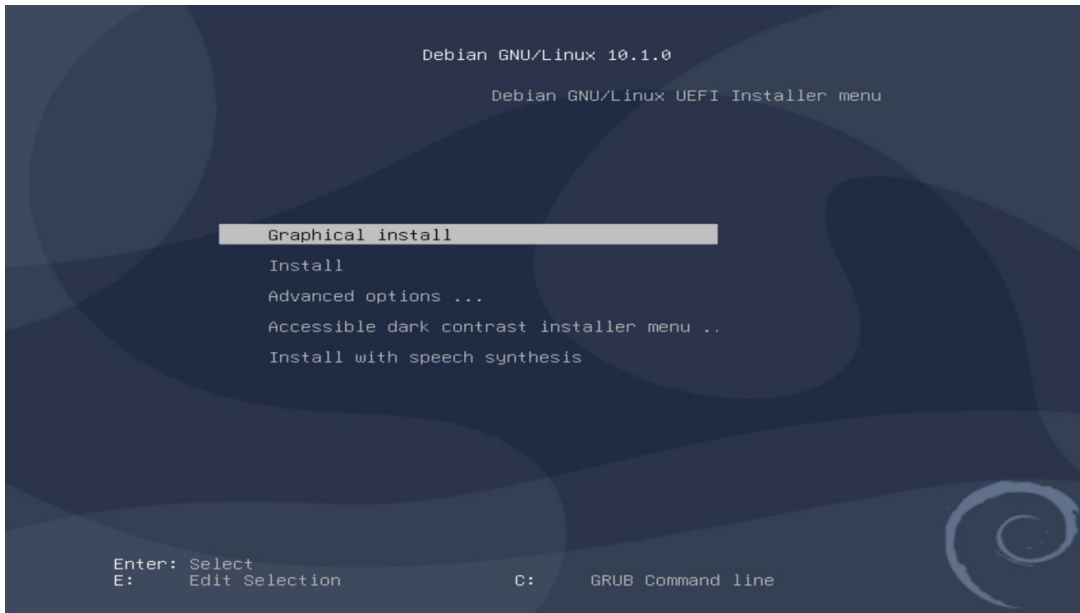
- The Touchpad may not be usable until the setup is complete, and the system boots up. In this case the TrackPoint must be used during setup.

- Select the appropriate language and "Continue".

- Continue to personalize options.

- Set the desired root password

- Set the desired user name.

- Set the password for the user.

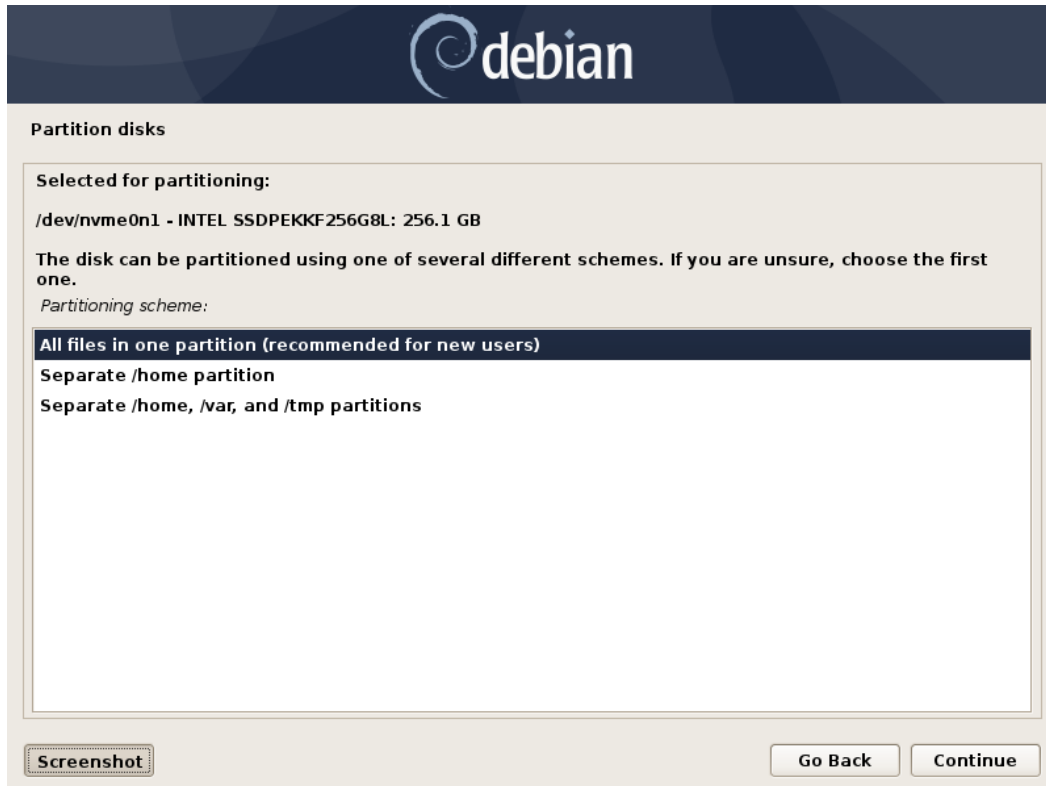- Select "No" when asked to force UEFI Installation.

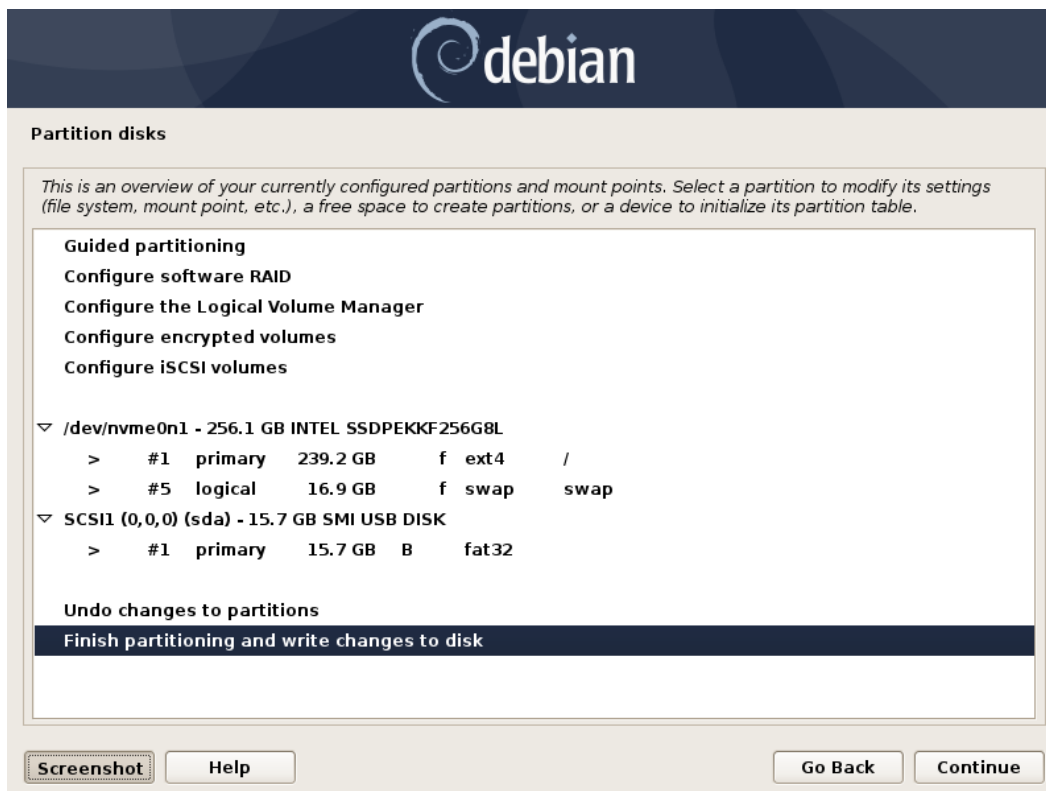- Choose "Guided – use entire disk" partitioning method.
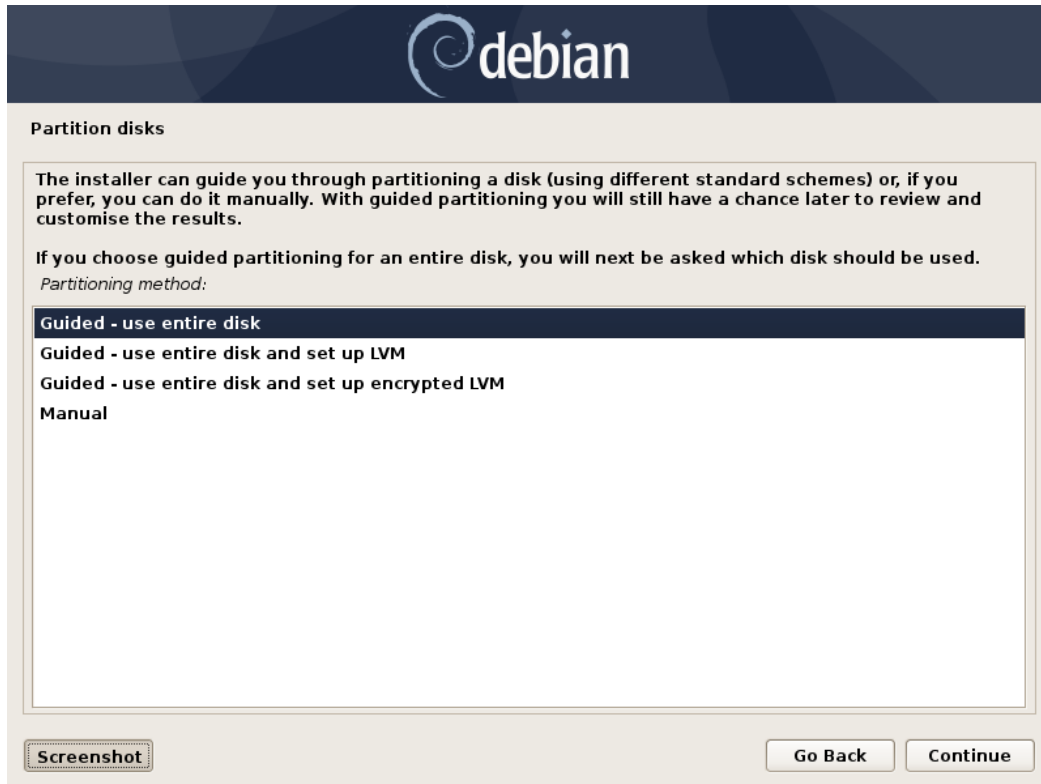
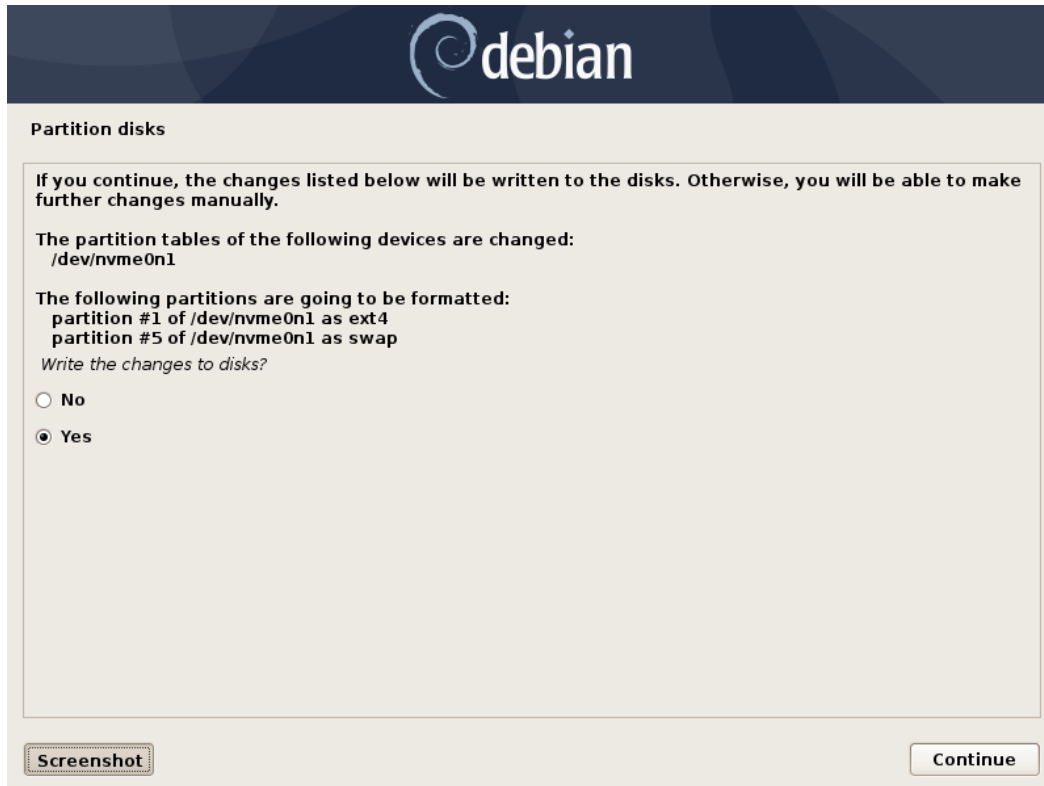- Select the storage device on which to install the operating system.
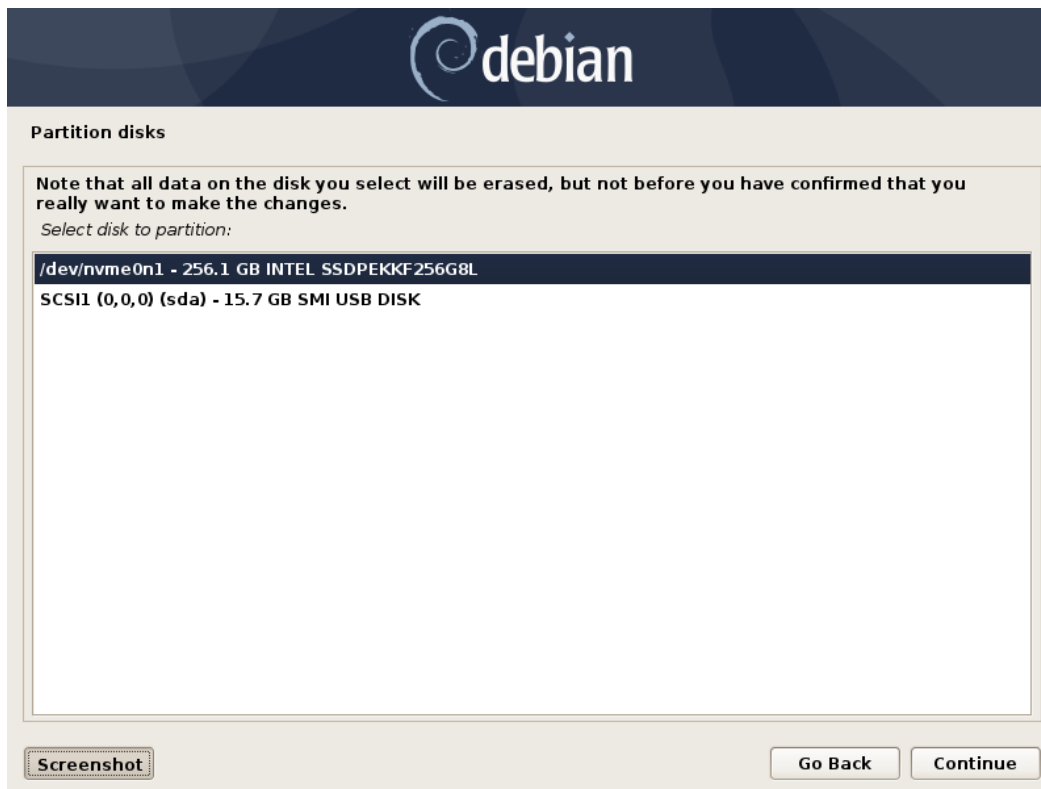
- Chose "All files in one partition…" as the partitioning scheme.

- Choose to "Finish partitioning and write changes to disk"

- 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 – 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 P1 Gen 2.
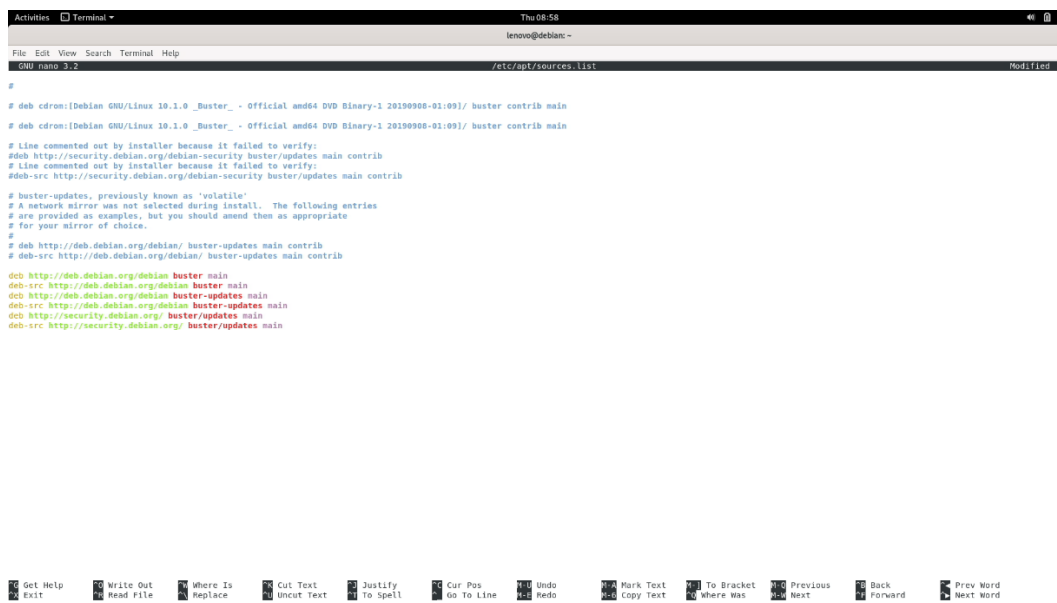
Option 1: Update the *iwlwifi* module:

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*

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_IWLMVM_VENDOR_CMDS=y/# CPTCFG_IWLMVM_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 zxf 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 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.

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

Step 2: Open a terminal window and blacklist the nouveau driver.

su -

bash -c "echo blacklist nouveau > /etc/modprobe.d/blacklist-nvidia-nouveau.conf"

bash -c "echo options nouveau modeset=0 >> /etc/modprobe.d/blacklist-nvidia-nouveau.conf"

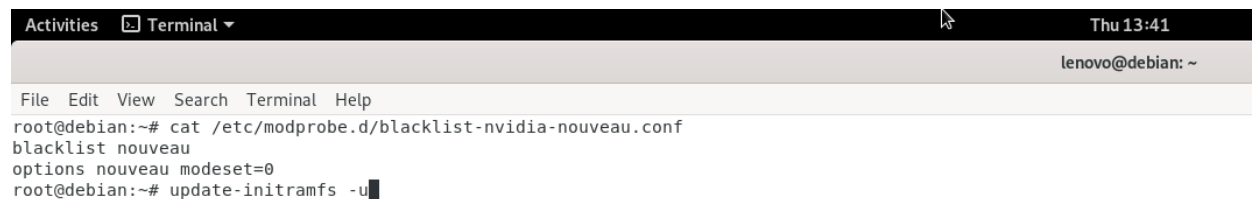- Confirm the contents of the new modprobe config file with this command.
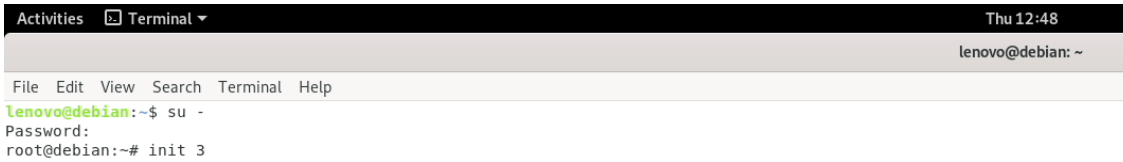
cat /etc/modprobe.d/blacklist-nvidia-nouveau.conf

update-initramfs -u

reboot

Step 3: After rebooting the system, open a terminal window and stop x-windows as root.

su -
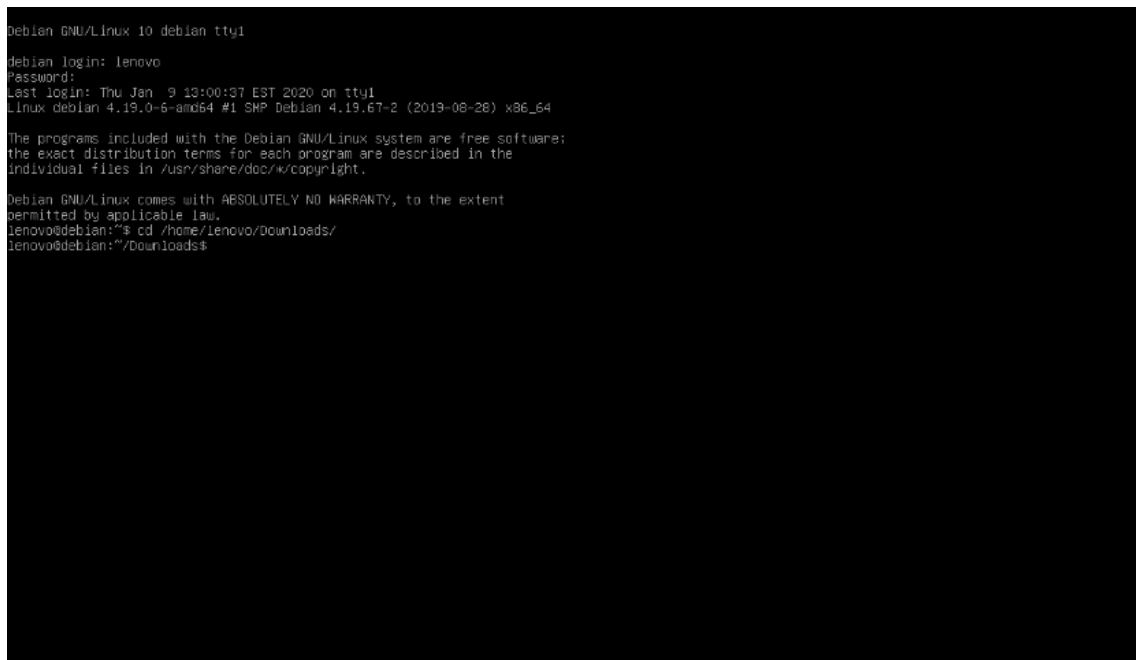
init 3

Step 4: Login and browse to the directory location to where the Nvidia driver installer is.

cd /home/(username)/Downloads/

Step 5: Make the Nvidia installer an executable then run it as root

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

su

./NVIDIA-Linux-x86_64* --no-x-check

```
lenovo@debian:~/Downloads$ chmod +x NVIDIA-Linux-x86_64-440.44.run
lenovo@debian:~/Downloads$ su
Password:
root@debian:/home/lenovo/Downloads# ./NVIDIA-Linux-x86_64-440.44.run --no-x-check
```

Step 6: Optional: Choose whether to install the 32-bit compatibility libraries.
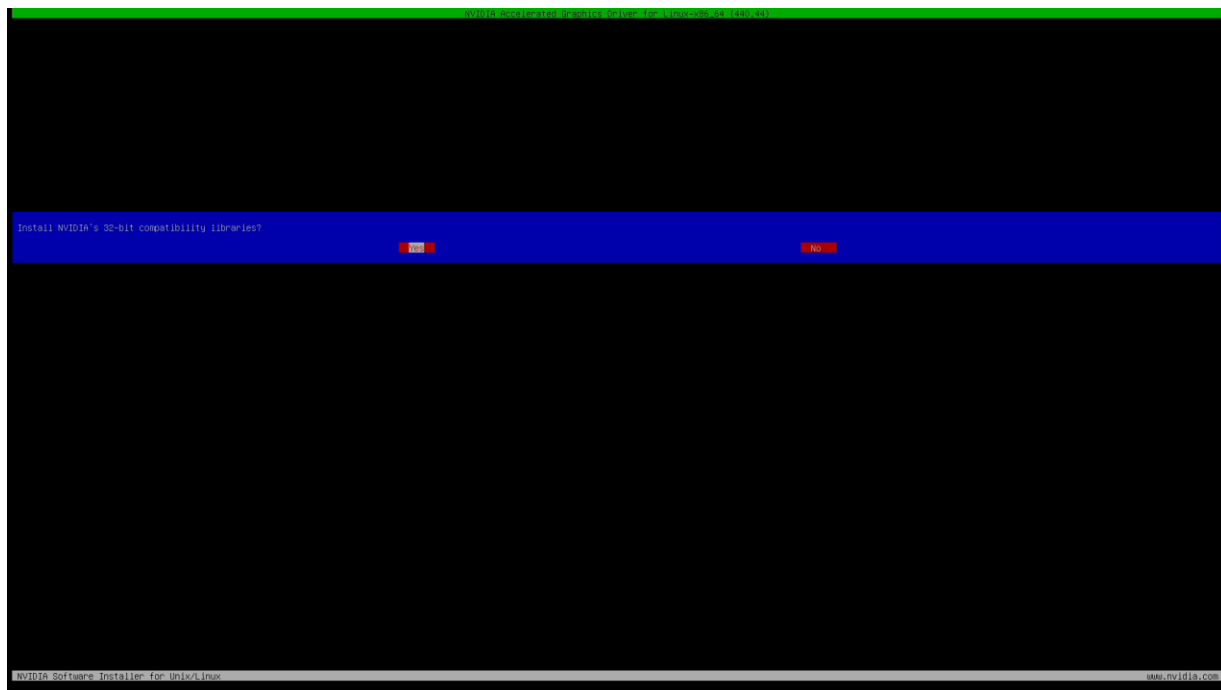
Step 7: Select to "Install and overwrite" libglvnd libraries.
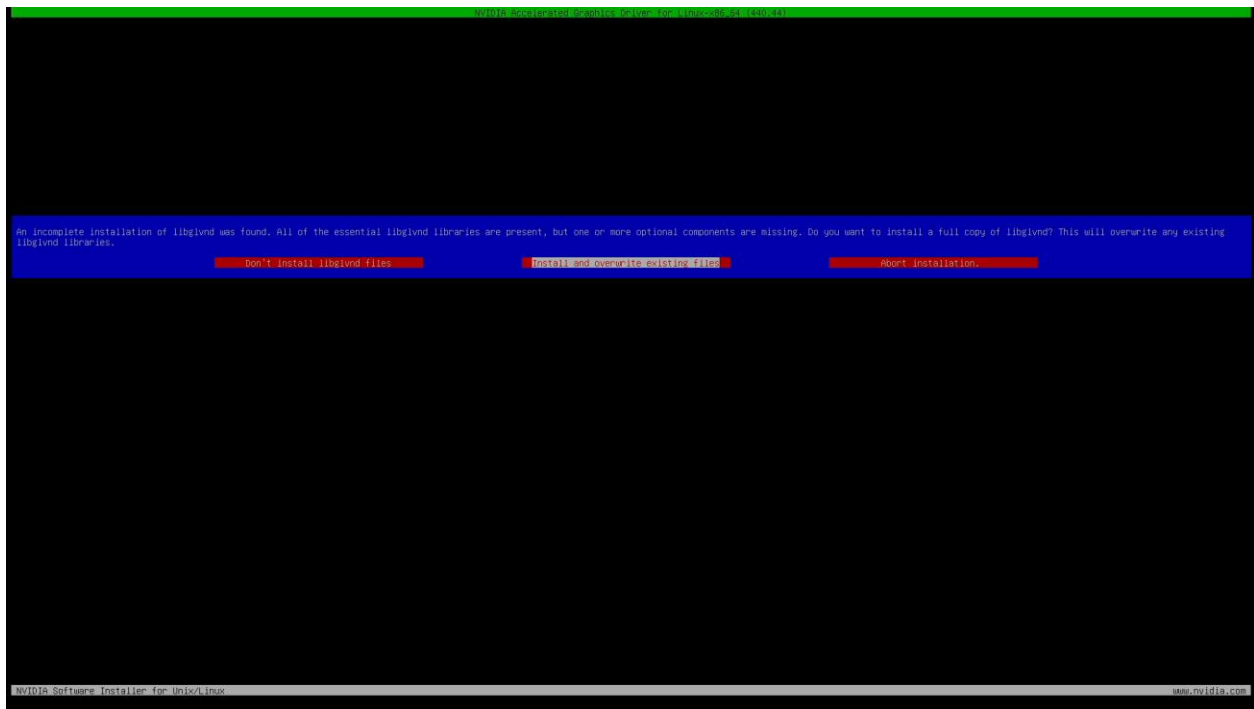
Step 8: Nvidia driver installing progress bar may appear.

Step 9: The Nvidia driver should successfully be installed.

Installation of the kernel module for the NVIDIA Accelerated Graphics Driver for Linux-x86_64 (version 440.44) is now complete.

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

Step 10: Execute the following command to verify the Nvidia driver is loaded.

nvidia-smi


```
root@debian:/home/lenovo/Downloads# nvidia-smi
Thu Jan  9 13:22:29 2020
+-----------------------------------------------------------------------------+
| NVIDIA-SMI 440.44       Driver Version: 440.44       CUDA Version: 10.2      |
|-------------------------------+----------------------+----------------------+
| GPU  Name        Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap|         Memory-Usage | GPU-Util  Compute M. |
|===============================+======================+======================|
|   0  Quadro P520         Off  | 00000000:3C:00.0 Off |                  N/A |
| N/A   41C    P0    N/A /  N/A |      0MiB /  2002MiB |      1%      Default |
+-------------------------------+----------------------+----------------------+

+-----------------------------------------------------------------------------+
| Processes:                                                       GPU Memory |
|  GPU       PID   Type   Process name                             Usage      |
|=============================================================================|
|  No running processes found                                                 |
+-----------------------------------------------------------------------------+
root@debian:/home/lenovo/Downloads#
```
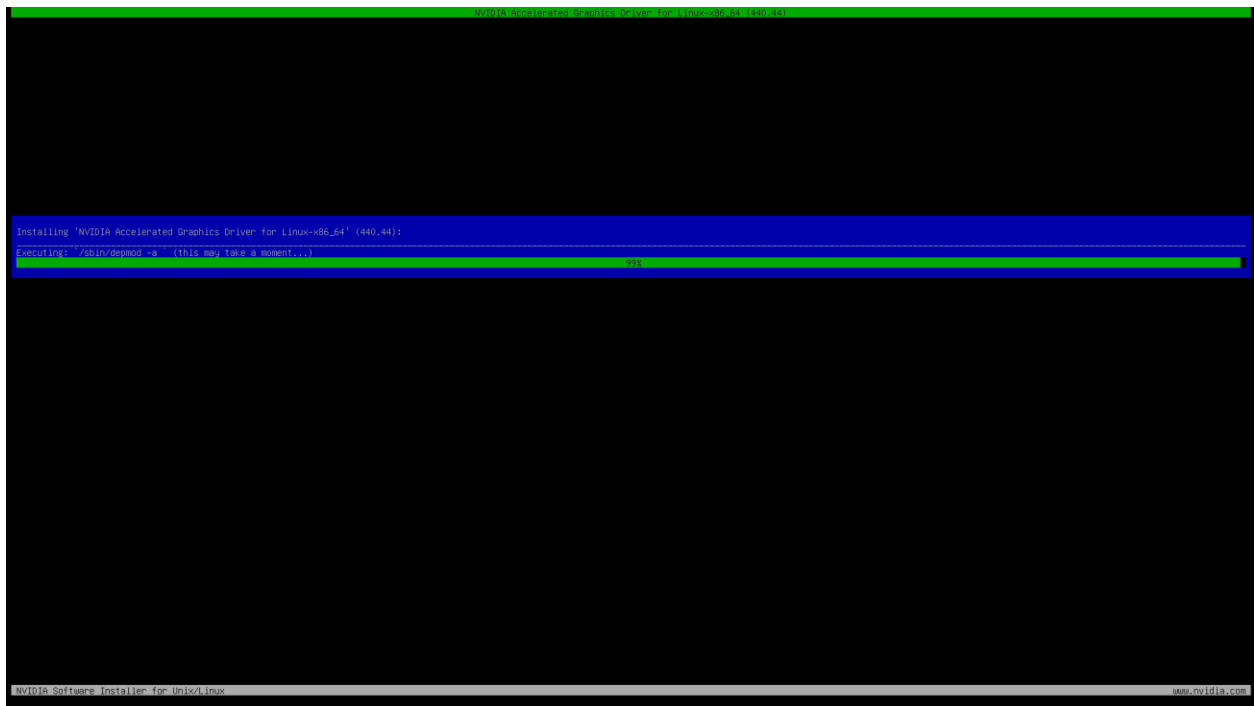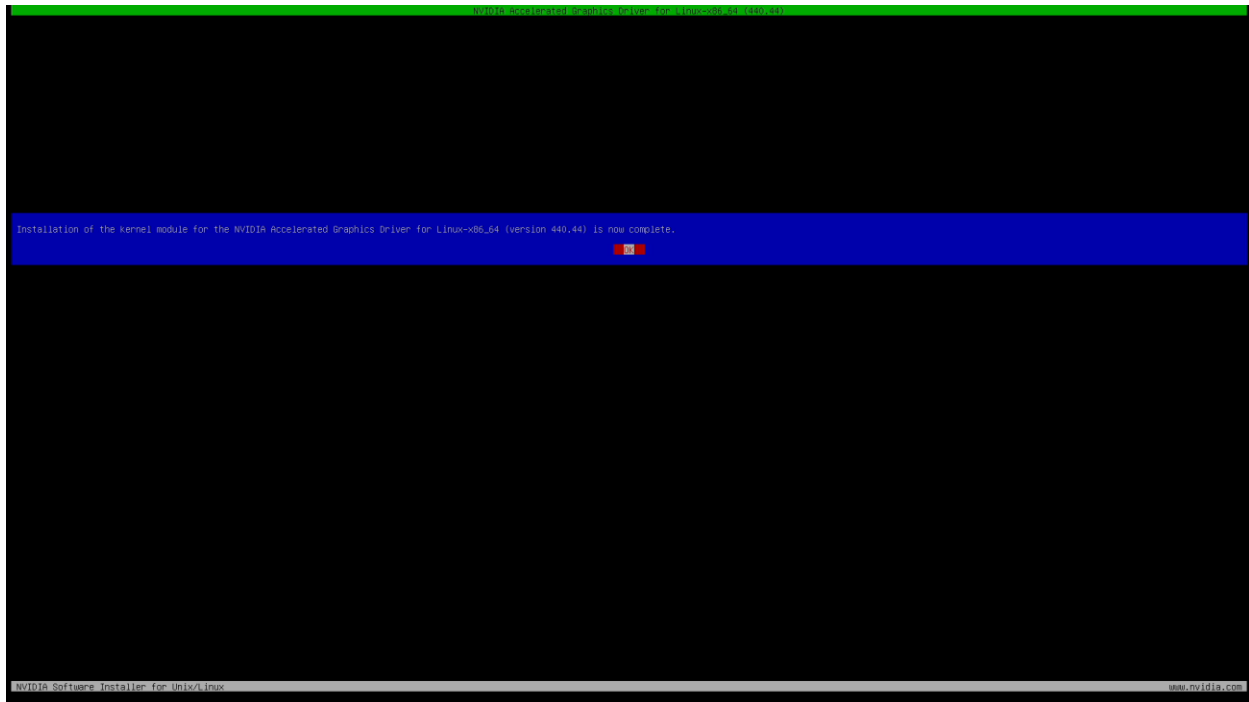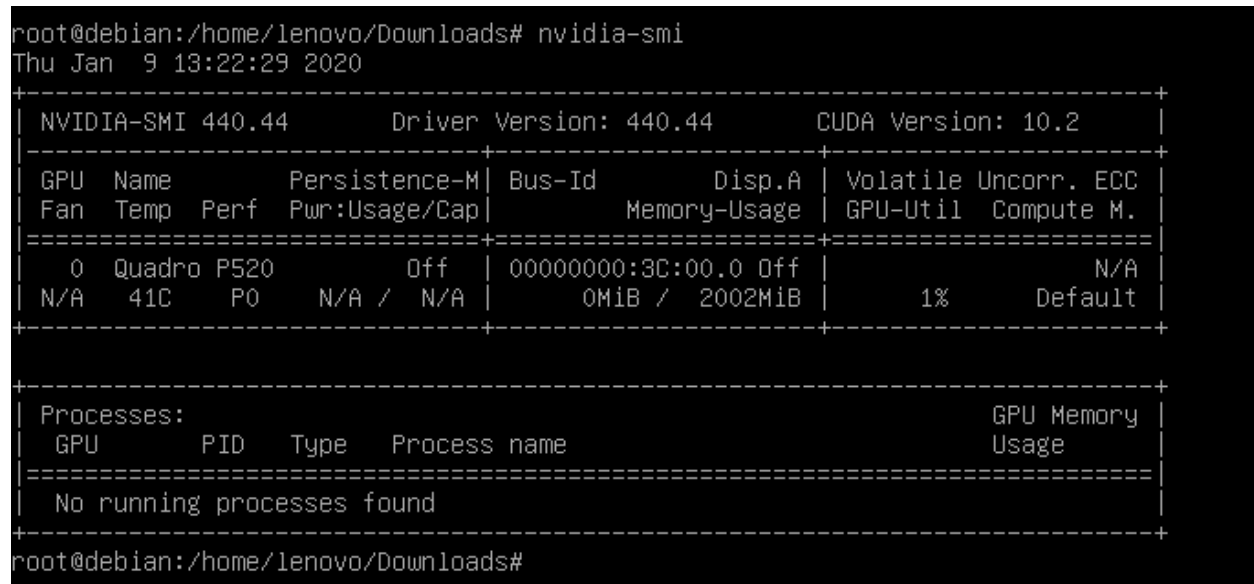
Step 12: Reboot the system.

Step 13: During Reboot you may change the "Graphics Device" to "Discrete Graphics" to exclusively run Nvidia graphics (see Section 2 for more information).

Section 7 – Revision History

Version	Date	Author	Changes/Updates
1.0	01/24/2020	Hady Asad	Initial launch release