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".

			Thi	nkPad Set	tup		
Ma	in Cor	ıfig	Date/Time 👘	Secur	ity Sta	artup 👘	Restart
Exi Exi Loa Dis Sau	t Saving (t Discardi d Setup De OS Optimiz card Chang e Changes	Changes ng Chang faults red Defau jes	es lts [<u>Enabl</u> []	ed] isabled nabled		Item The des setting changed Select Meet M Windows Certif Require setting Suppor Boot, D Boot, D Boot, S Preven Virtua feature	Specific Help fault value of gs below are d accordingly. "Enabled" to icrosoft" s 10 ® ication ement. Affected gs are CSM t, UEFI/Legacy UEFI/Legacy riority, Secure Secure RollBack tion, and lization es.
F1 Esc	Help †↓ Exit ↔	Select Select	Item +/- Menu Enter	Change Select	Values ▶ Sub-Mem	F9 1 F10	Setup Defaults Save and Exit

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

					Thim	kPad Set	tup			
Ma	in	Con	fig	Date/	Time	Secur	ity S	Startup	Restart	
Exi Exi	t Savi t Disc	ing C ardi	hanges ng Chan	ges				Ite	em Specific Help	
					Att	ention!				
Selec	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.									
				res						
								Boot Preve Virtu featu	Secure RollBack ention, and ualization ures.	K
F1 Esc	Help Exit	†↓ +→	Select Select	Item Menu	+/- Enter	Change Select	Values ► Sub-Me	F9 enu F10	Setup Defaults Save and Exit	

• Tab over to the "Startup" menu tab.

					Thin	kPad Set	tup			
Ma	in	Con	fig	Date/1	[ime	Secur	ity	Sta	rtup	Restart
► Boo	ıt								Ite	m Specific Help
Net	work Bo	oot			EPXE	BOOTI				
UEF -	T∕Legaa CSM Suj	cy Bo ppor	oot t		EUEF ENoJ * Un: Sec	[Only] selectal cure Boo	ole for ot			
Boo	t Mode				[Qu i	ck]				
Opt	ion ke	y Di:	splay		[Ena]	bled]				
Boo	t devia	ce L	ist F12	Option	n [Enal	bled]				
Boo	t Orden	r Lo	ck		Dis	abled]				
F1 Esc	Help Exit	†↓ ↔	Select Select	Item Menu	+/- Enter	Change Select	Values ► Sub-	: Menu	F9 F10	Setup Defaults 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".

		1	hinkPad Setup			
Main	Config	Date/Time	e Security	Star	·tup	Restart
					Ite	m Specific Help
▶ Boot						
Network	Boot		[PCI LAN]			
UEFI/Leg - UEFI/ - CSM S	_{lacy} Boot 'Legacy Boot Support	Priority	[Both] [UEFI First] [Yes]			
Boot Mod	le		[Quick]			
Option k	ey Display		[Enabled]			
Boot dev	ice List F1	2 Option	[Enabled]			
Boot Ord	ler Lock		[Disabled]			
F1 Help Esc Exit	o <mark>†↓</mark> Selec : ←→ Selec	t Item +/- t Menu Ent	- Change Va er Select⊦	lues Sub-Menu	F9 F10	Setup Defaults Save and Exit

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

		Thi	nkPad Setup		
Main (Config	Date/Time	Security	Startup	Restart
▶ Boot				Ite	m Specific Help
Network Boo	ot	(P)	XE BOOTJ		
UEFI/Legacy	J Boot	EB	oth]		_
- CSM Supp	6	Setup	Confirmation		
Boot Mode	Save	configuratio	n changes and e	exit now?	
Option key		[Yes]	[No]	l	
Boot device	e List F12	Option [E	nabledl		
Boot Order	Lock	[D	isabled]		
F1 Help 1 Esc Exit +	<mark>t∔</mark> Select → Select	Item +/- Menu Enter	Change Values Select ► Sub-	s F9 -Menu F10	Setup Defaults 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. <u>Note:</u> 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.

			Thin	kPad Set	tup		
Ma i	in C	onfig 🛛	Date/Time	Secur	ity Sta	artup 👘	Restart
 Netu USB Keyl Disŋ Powe Beep Stor CPU Thur Inte Inti Setu 	work poard/Mo play er p and Al rage nderbolt ±1® AMT icators up UI	use arm (TM) 3 Control	[Simple Text]			Iter	a Specific Help
F1 Esc	Help Exit +	↓ Select → Select	Menu Enter	Change Select	va1uës ▶ Sub-Menu	F9 1 F10	Setup Defaults 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 Graphics Device Total Graphics Memory Boot Time Extension IthinkPad LCD (Hybrid Graphics) (256MB) * Unselectable when Discrete Graphics Hybrid Graphics Disabled	Discrete Graphics mode will achieve higher graphics performance. Hybrid Graphics mode runs as Integrated Graphics mode to achieve longer battery life, and Discrete Graphics is enabled on demand.
F1 Help ↑↓ Select Item +/- Change Values Esc Exit ↔ Select Menu Enter Select ▶ Sub-Menu	F9 Setup Defaults 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".

	Odebian
Select a language	
Choose the language default language for t Language:	to be used for the installation process. The selected language will also be the he installed system.
Chinese (Simplified)	- ^十 火(间冲)
Chinese (Traditional)	- 中文(繁體)
Croatian	- Hrvatski
Czech	- Čeština
Danish	- Dansk =
Dutch	- Nederlands
Dzongkha	1 제 2 월 -
English	- English
Esperanto	- Esperanto
Estonian	- Eesti
Finnish	- Suomi
French	- Français
Galician	- Galego
Georgian	- ქართული
German	- Deutsch
Screenshot	Go Back Continue

Continue to personalize options.





• Set the desired root password

•

Odebian
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.

Odebian	Ŀ3				
Set up users and passwords					
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.

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

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

Odebian	
Partition disks	
This machine's firmware has started the installer in UEFI mode but it looks like there may operating systems already installed using "BIOS compatibility mode". If you continue to UEFI mode, it might be difficult to reboot the machine into any BIOS-mode operating systems, you wish to install in UEFI mode and don't care about keeping the ability to boot one systems, you have the option to force that here. If you wish to keep the option to boot operating system, you should choose NOT to force UEFI installation here.	ay be existing i install Debian in stems later. of the existing an existing
No	
⊖ Yes	
Screenshot Go Ba	ck Continue

• Choose "Guided – use entire disk" partitioning method.



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

Odebian	
Partition disks	
Note that all data on the disk you select will be erased, but not before you have confirmed that you really want to make the changes. Select disk to partition:	
/dev/nvme0n1 - 256.1 GB INTEL SSDPEKKF256G8L	
Screenshot Go Back Continue	е

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



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

Odebian			
Partition disks			
This is an overview of your currently configured partitions and mount points. Select a partition to modify its so (file system, mount point, etc.), a free space to create partitions, or a device to initialize its partition table.	ettings		
(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 SSDPEKKF256G8L > #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			
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.

Odebian
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.

Odebian	
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.	
No	
○ Yes	
Screenshot Go Back Continue	

• Choose desired software to install.

Odebian				
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				
✓ MATE				
✓ LXDE				
✓ LXQt				
✓ web server				
✓ print server				
SSH server				
✓ standard system utilities				
Screenshot Continue				

• Choose the desired default display manager.

Odebian			
Configuring lightdm			
A display manager is a program that provides graphical login capabilities for the X Window System. Only one display manager can manage a given X server, but multiple display manager packages are			
installed. Please select which display manager should run by default. Multiple display managers can run simultaneously if they are configured to manage different servers; to achieve this, configure the display managers accordingly, edit each of their init scripts in /etc/init.d, and disable the check for a default display manager.			
gdm3 lightdm			
sddm			
Screenshot Continue			

• Select "Yes" to install the GRUB boot loader to the master boot record.

Odebian	
Install the GRUB boot loader on a hard disk	
It seems that this new installation is the only operating system on this computer. If so, it should be safe to install the GRUB boot loader to the master boot record of your first hard drive.	
Warning: If the installer failed to detect another operating system that is present on your computer, modifying the master boot record will make that operating system temporarily unbootable, though GRUB can be manually configured later to boot it.	
No	
Yes	
Screenshot Go Back Continue	•

• Select the boot disk for boot loader installation.

Odebian		
Install the GRUB boot loader on a hard disk		
You need to make the newly installed system bootable, by installing the GRUB I device. The usual way to do this is to install GRUB on the master boot record of you prefer, you can install GRUB elsewhere on the drive, or to another drive, or Device for boot loader installation:	boot loader on your first hard even to a flop	a bootable 1 drive. If py.
Enter device manually		
/dev/nvme0n1 (nvme-INTEL_SSDPEKKF256G8L_BTHP90960KWE256B)		
/dev/sda (usb-SMI_USB_DISK-0:0)		
Screenshot	Go Back	Continue

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

<u>Step 4</u>: Install the development tools package # apt install git build-essential

Step 5: Install linux kernel headers package

apt install linux-headers-\$(uname -r)

<u>Step 6</u>: 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:

<u>Step 1</u>: Download the latest Nvidia graphics driver for the appropriate Nvidia GPU from <u>https://www.nvidia.com/Download/Find.aspx?lang=en-us</u>.

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"

Activities	▷ Terminal ▼	Thu 13:08
	l	enovo@debian: ~
File Edit	View Search Terminal Help	
lenovo@del Password: root@debia root@debia	ebian:~\$ su - .an:~# bash -c "echo blacklist nouveau > /etc/modprobe.d/blacklist-nvidia-nouveau.conf" .an:~# bash -c "echo options nouveau modeset=0 >> /etc/modprobe.d/blacklist-nvidia-nouveau.co	onf"

- Confirm the contents of the new modprobe config file with this command.

cat /etc/modprobe.d/blacklist-nvidia-nouveau.conf

update-initramfs -u

Activities	⊡ Terminal ▼	2	Thu 13:41	
			lenovo@debian: ~	
File Edit	View Search Terminal Help			
root@debian:~# cat /etc/modprobe.d/blacklist-nvidia-nouveau.conf blacklist nouveau options nouveau modeset=0 root@debian:~# update-initramfs -u				

reboot

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

su -

init 3

Activities 🖸 Terminal 🔻	Thu 12:48
	lenovo@debian: ~
File Edit View Search Terminal Help	
lenovo@debian:~\$ su - Password: root@debian:~# 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



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

	NVIDIA Accelerated Graphics Oriver for Linux-x86_64 (440.44)	
Tostall NUTDIA's 92-bit compatibility libearias2		
install wildle s de-bit compatibility libraries)		
	Yes	
HITDTA Orfainer Terkeller for Helica bein		
NVIDIM SOTUWARE INSTALLER FOR UNIX/LINUX		uuu.nvidia.com

Step 7: Select to "Install and overwrite" libglvnd libraries.

		NVIDIA Accelerated Graphics Driver for Linux-x86_64 (440.44)		
Tibglynd Libraries	no das round. Hit or the essential lingivho libra	tes are present, out one or more optional components are missin	By no dom many to install a toll cobd of findityhos unit over the second sec	numite any existing
		Install and overwrite existing files		
NVIDIA Software Installer for Univ/	insy			sue puidia com
aviola on tware installer for unix/L	41540			www.nviula.com

<u>Step 8</u>: Nvidia driver installing progress bar may appear.



<u>Step 9</u>: The Nvidia driver should successfully be installed.



<u>Step 10</u>: 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⊢⊬ Fan Temp Perf Pwr:Usage/Cap	Bus-Id Disp.A Memory-Usage	Volatile Uncorr. ECC GPU–Util Compute M.						
0 Quadro P520 Off N/A 41C P0 N/A / N/A	/ 00000000:3C:00.0 Dff 0MiB / 2002MiB	N/A N/A 1% Default						
Processes: GPU PID Type Proces	s name	GPU Memory Usage						
No running processes found								
root@debian:/home/lenovo/Downloads#								

Step 12: Reboot the system.

<u>Step 13</u>: 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