NV300-A

Military Jetson AGX Orin IP65 Rugged Computer

User's Manual

Revision Date: Mar. 10. 2026

Safety Information

Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Make sure that your power supply is set to the correct voltage in your area.
- If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your local distributor.

Operation safety

- Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.
- Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter any technical problems with the product, contact your local distributor

Statement

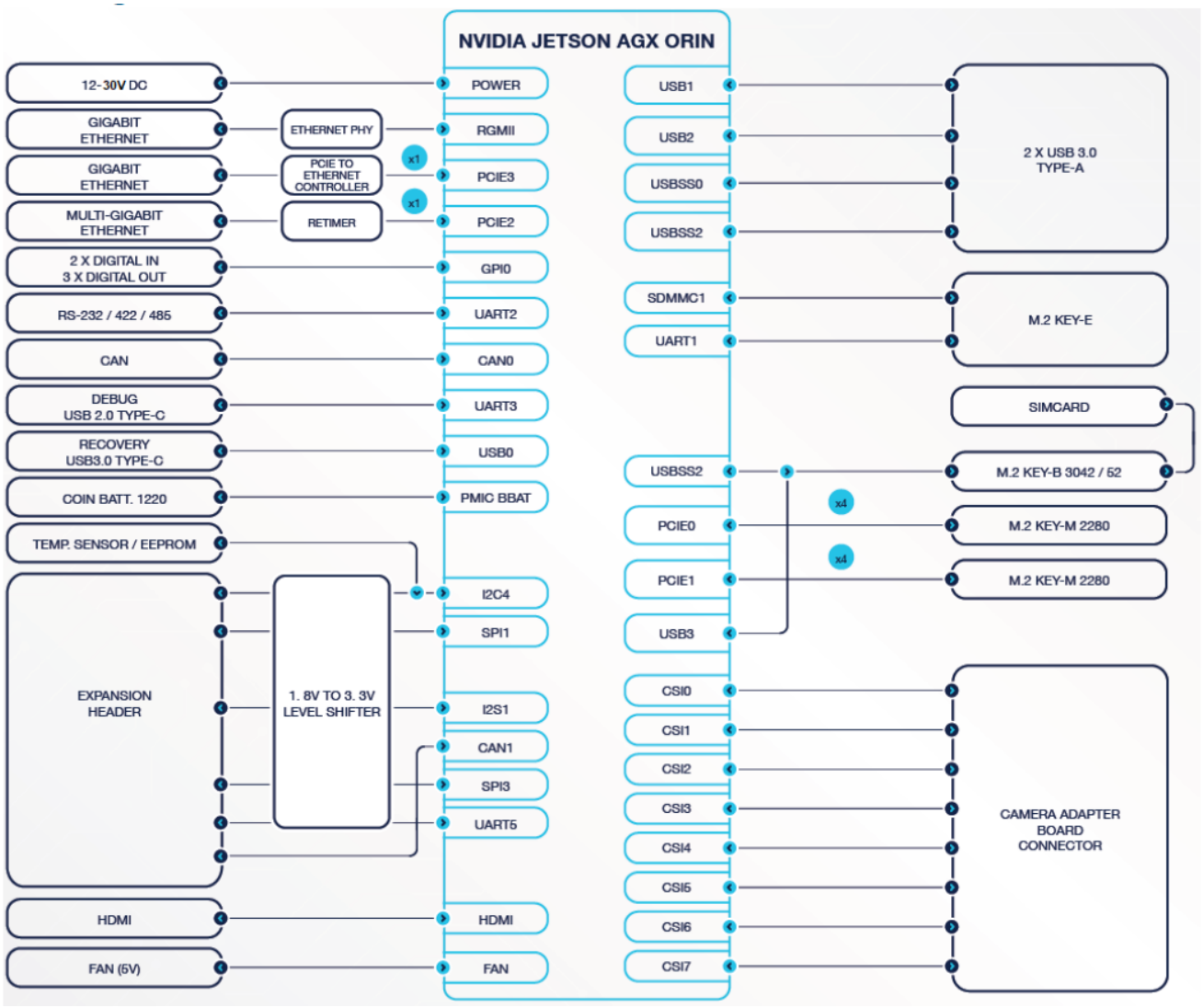
Table of Contents

Specifications

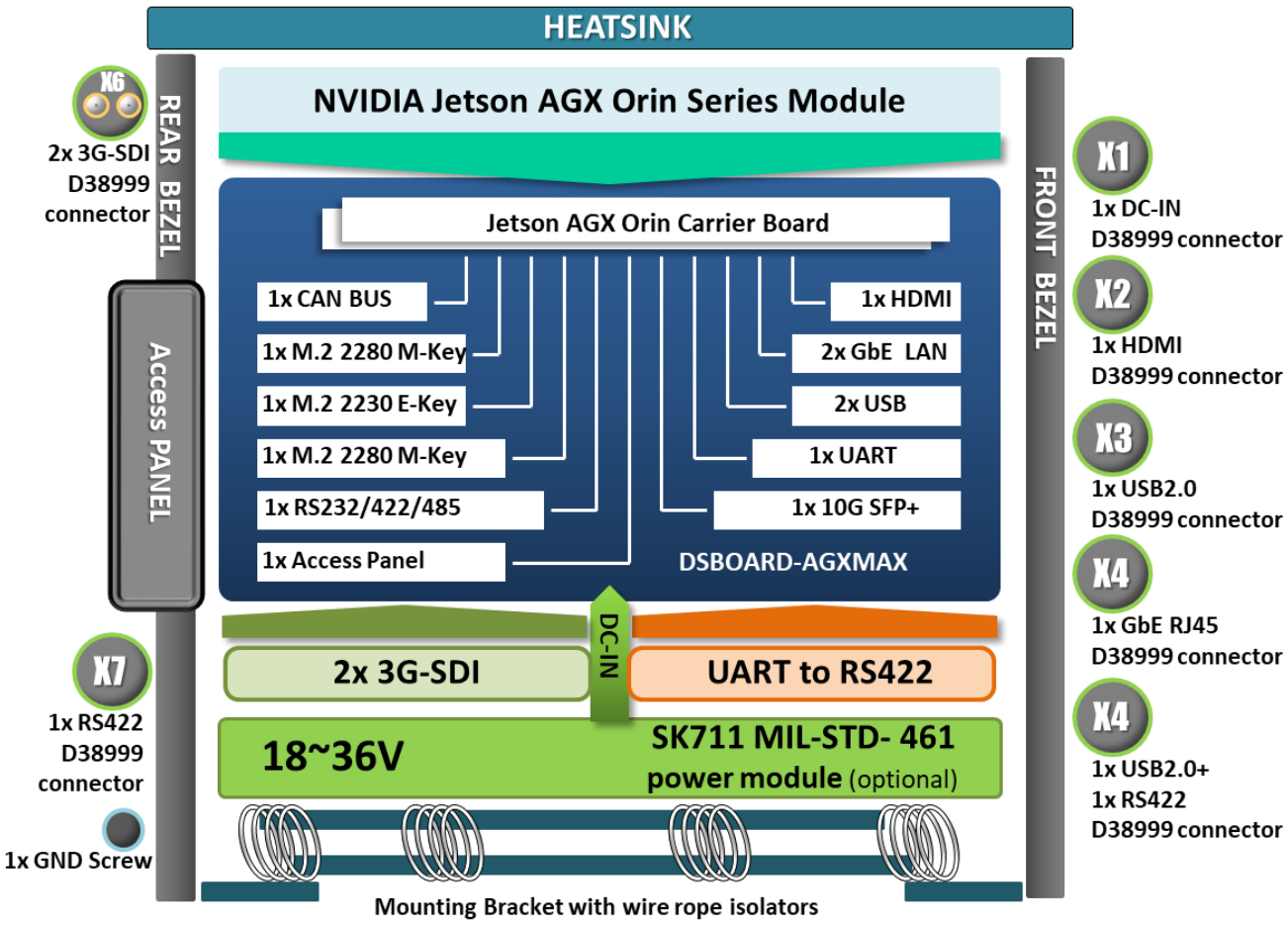
System	
AI Performance	275 TOPS
CPU module	Ampere GPU + Arm Cortex-A78AE CPU + 64GB LPDDR5 + 64GB eMMC 5.1
GPU	NVIDIA Ampere architecture with 2 GPX/8TPC, 2048 NVIDIA® CUDA® cores and 64 Tensor Cores, max freq. 1.3GHz
CPU	12-core Arm® Cortex®-A78AE v8.2 64-bit CPU, 3MB L2 + 6MB L3, max freq. 2.2GHz
Memory	64GB 256-bit LPDDR5, 3200MHz
Expansion Slot	2x M.2 2280 M key (PCIe x4) 1x M.2 3042/3052 B key 1x M.2 2030 E Key 2x UART 1x I2S 1x I2C 2x SPI 1x CAN 1x SIM 1x MIPI Camera connector (6CSI camera support)
Display	
Display	1x HDMI 2.0(max resolution 3840x2160)
Storage	
On Board	64GB eMMC 5.1
M.2	1x M.2 2280 M-Key 256GB SSD, up to 2TB
Ethernet	
Ethernet	1x RGMII GbE LAN (10/100/1000 Mbps supported) 1x GbE LAN by Intel® i210
Ethernet	1x MGBE 10GbE LAN
Front I/O	
X1	12V~30V DC-IN with D38999 connector
X2	1x HDMI with D38999 connector
X3	1x USB2.0 with D38999 connector
X4	1x GbE LAN(RJ45) with D38999 connector
X5	1x USB2.0 + 1x RS422 with D38999 Connector
Rear I/O	
X6	2x 3G-SDI input with D38999 connector
Debug Access Panel	1x Reset Button

	1x Recover Button
	1x USB type-C for Debug
	1x USB Type-C for Recovery
	1x Boot LED
	1x Nano SIM Slot
X7	1x RS422 with D38999 connector
Ground Screw	1x
Power Requirement	
Power Input	12V~30 DC-in
Applications, Operating System	
Applications	Energy/Smart Grid/Power Plant Management, Intelligent Automation and manufacturing applications/ AI
Operating System	Ubuntu 20.04 with JetPack6.0 or later
Physical	
Dimension	250 x 325 x 100 mm (W x D x H)
Weight	TBC
Chassis	Aluminum Alloy
Heatsink	Aluminum Alloy, Corrosion Resistant
Finish	Anodic aluminum oxide, Color: PANTONE 7743C
Environmental	
Compliance	MIL-STD-810G, IEC-61850-3, IEEE-1613, CE and FCC, RoHS
Operating Temp.	-20°C to 50°C
Storage Temp.	-40°C to 85°C
Relative Humidity	5% to 95%, non-condensing

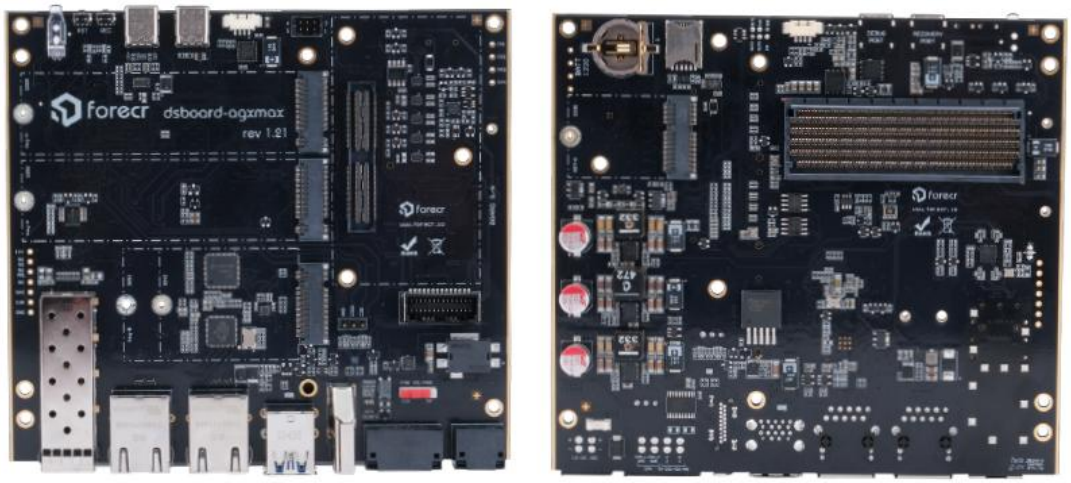
Mother Board Block Diagram



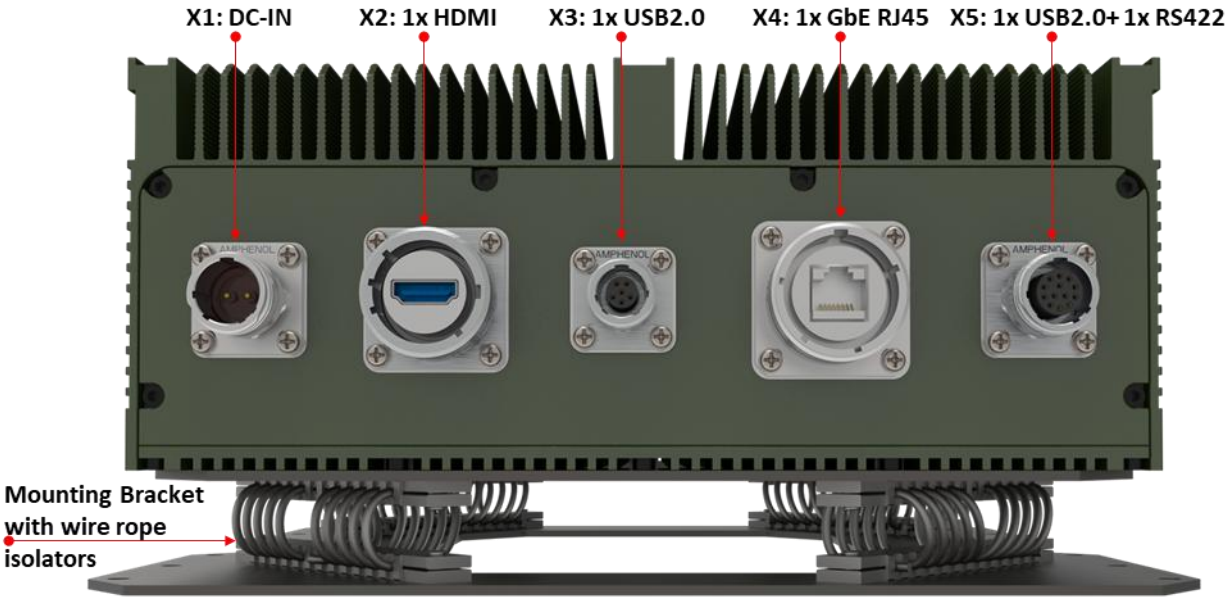
System Block Diagram

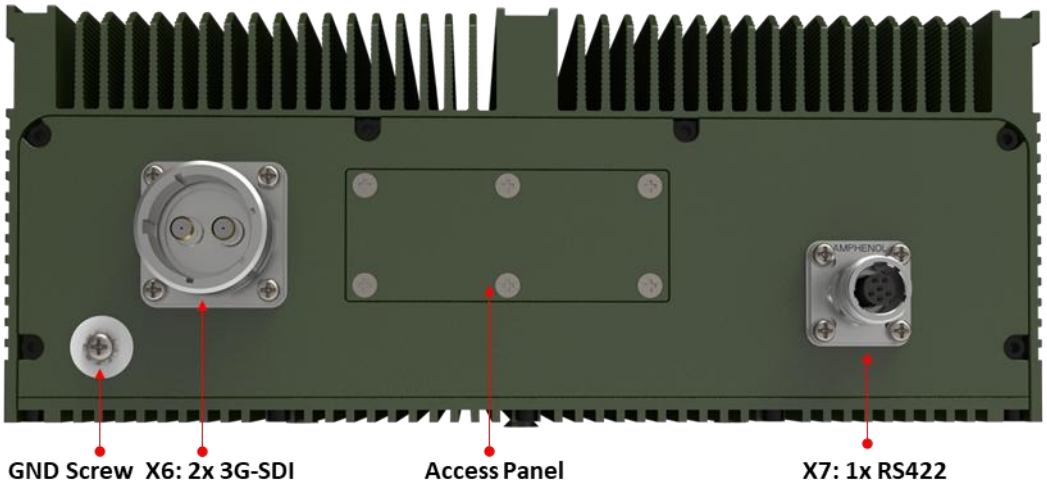


Board Visuals

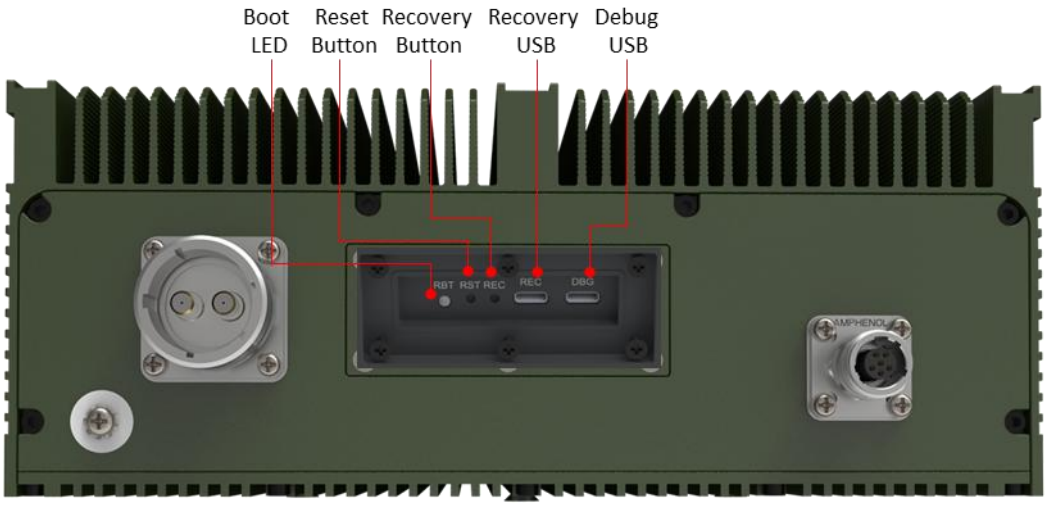


System Front/Rear IO Visuals



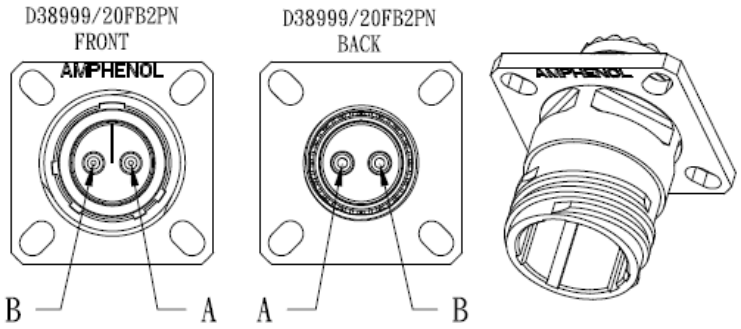


List of Connectors & Buttons



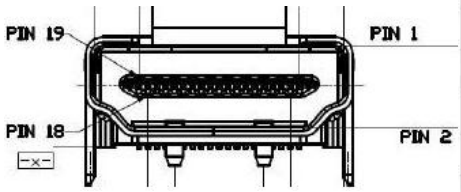
Definition of each I/O

X1: DC Power IN:



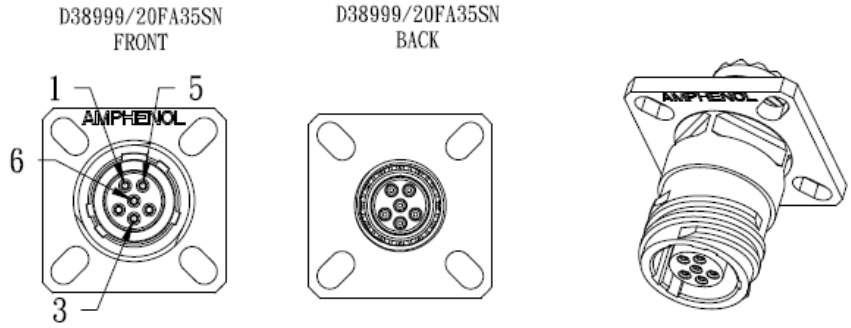
D38999/20FB2PN DC-IN	
A	Vin+
B	Vin-

X2: HDMI 2.0



Pin #	Signal	Pin #	Signal
1	HDMI_TX2_P	2	GND
3	HDMI_TX2_N	4	HDMI_TX1_P
5	GND	6	HDMI_TX1_N
7	HDMI_TX0_P	8	GND
9	HDMI_TX0_N	10	HDMI_CLK_P
11	GND	12	HDMI_CLK_N
13	CEC	14	NC
15	HDMI_SCL	16	HDMI_SDA
17	GND	18	+5 V Power
19	Hot Plug Detect	20	GND
21	GND	22	GND
23	GND		

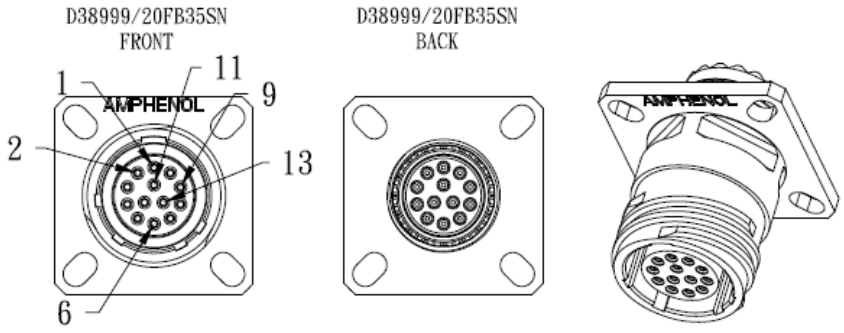
X3: USB2.0



D38999/20FA35SN USB2.0	
1	VCC
2	D−
3	D+
4	GND
5	N.C.
6	N.C.

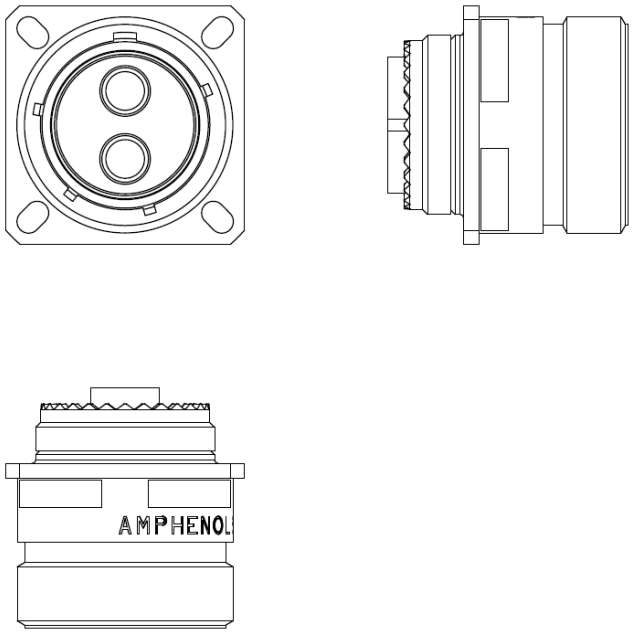
X4: 1x GbE LAN RJ45 jack with D38999 connector

X5: 1x USB2.0 + 1x RS422:



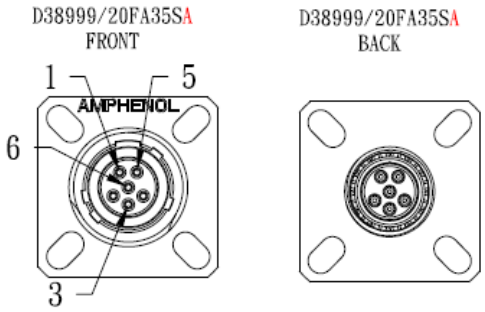
D38999/20FB35SN RS422+USB2.0	
1	VCC
2	D−
3	D+
4	GND
5	TX+
6	TX−
7	RX+
8	RX−
13	GND
9	N.C.
10	N.C.
11	N.C.
12	N.C.

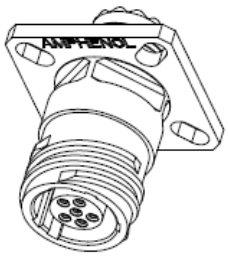
X6: 2x 3G-SDI input with D38999 connector



Manufacturer	AMPHENOL SOCAPEX
Description	Metallic shell, square flange receptacle, Crimp twinax (standard) contacts, Aluminum, Nickel plated, 17-75 arrangement, P: Pin (500 cycles), delivered without contacts
Part number	TVPS00RF17-75PLC
Note Firewall	-
Series	TV: Metallic shell
Class	F: Aluminum, Nickel plated
Shell type	P00: Square flange receptacle
Contact type	Crimp
PC tail contacts	Not available
Shell Size and Contact arrangement	17-75
High speed contacts	Twinax (standard)
PC tail plating	Not available
Contact gender	P: Pin (500 cycles)
Coding	N
Contacts	LC: Connector delivered without contacts

X7: 1x RS422 with D38999 connector





D38999/20FA35SA RS422	
1	TX+
2	TX−
3	RX+
4	RX−
5	GND
6	N. C.

Ordering Information

Model No	NV300-A	NV300-B	NV300-C	NV300-D	NV300-E
GPU	2048 CUDA core NVIDIA Ampere with 64 Tensor Cores (AGX Orin 64GB)				1792 CUDA core NVIDIA Ampere with 56 Tensor Cores (AGX Orin 32GB)
Memory	64GB				32GB
AI Performance	275 TOPs				200 TOPs
CPU	Arm® Cortex®-A78AE v8.2 64-bit CPU 12-core /3 CPU cluster /259 SPECint_rate2006, 3MB L2 + 6MB L3				Arm® Cortex®-A78AE v8.2 64-bit CPU 8-core / 2 CPU clusters / 177 SPECint_rate2006, 3MB L2 + 6MB L3
Module total module power	Up to 60W				Up to 40W
Storage	1x M.2 NVMe 256GB	TBD	1x M.2 NVMe 256GB		None
	64GB eMMC 5.1 Flash				64GB eMMC 5.1 Flash
Front I/O					
X1	12-30 VDC with D38999				12-30 VDC with D38999
X2	1x HDMI with D38999				1x HDMI with D38999
X3	1x USB2.0 with D38999	TBD	1x USB3.0	1x USB2.0 with D38999	1x USB2.0 with D38999
X4	1x GbE RJ45 with D38999	TBD	1x GbE RJ45 with D38999	1x GbE RJ45 with D38999	4x 3G-SDI with BNC connectors
X5	1x USB2.0+ 1x RS422 with D38999	TBD	1x USB2.0+ 1x RS422 with D38999	1x USB2.0+ 1x RS422 with D38999	None
Rear I/O					
X6	2x 3G-SDI with D38999	TBD	None	2x 3G-SDI with D38999	None
X7	1x RS422 with D38999	TBD	None	1x RS422 with D38999	None
Ground	1x GND Screw				1x GND Screw
Access panel					
	1x Reset Button				1x Reset Button
	1x Recover Button				1x Recover Button
	1x Debug Type-C				1x Debug Type-C
	1x Recovery Type-C				1x Recovery Type-C
	1x Boot LED				1x Boot LED
Color	Pantone 7743C			RAL8025	Pantone 7743C
Dimensions	250 x 325 x 100mm(WxDxH)				250 x 325 x 100mm(WxDxH)

Software Information

Software Configuration

JetPack-6.0 Installation can be found here: https://www.forecr.io/blogs/installation/jetpack-6-x-installation-for-dsboard-agxmax

System Recovery

You will need a host PC in order to flash your client device with a new system image.

Host PC

Before flashing the image, you should prepare an OTG cable (USB Type-C) for connecting to NV300-A (recovery port), and a host PC with USB Type-A running Ubuntu 20.04.

JetPack-6.x Installation for NV300-A(原-1LS64).

In this tutorial, we will install JetPack-6 for NV300-A. First, we will include our Image, DTB(Device Tree Blob) & pinmux files in Jetson OS image. Then, we will install the Jetson OS into the NV300-A. Finally, we will install the Jetson SDK components into it.

Attention: Before starting the flashing process, please remove the 10G SFP+ Ethernet adapter on Carrier Board (DSBOARD-AGXMAX) if you have mounted it.

Attention: If you want to transfer the root file-system to an external drive and it has another JetPack version root file system, please format it before starting this blog post.

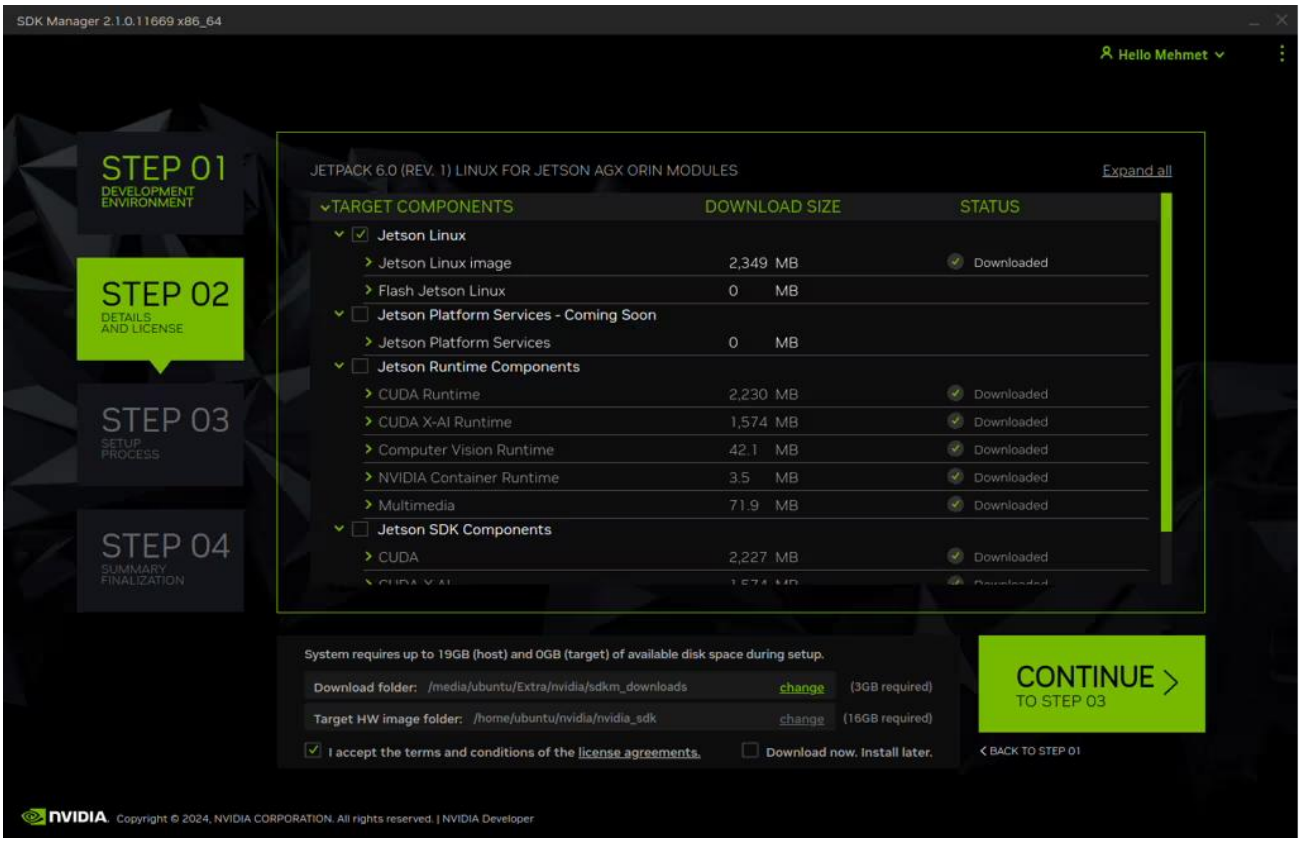
Known Issues for JetPack-6.0: The desktop service is not loading while the SFP+ transceiver has been connected before powering the DSBOARD-AGXMAX (previous versions from rev-1.22) up. If you will mount physically after powering it up, the desktop will load and the network interface established by the system. We are working on it to fix this problem.

Including the Kernel Files in Jetson OS Image

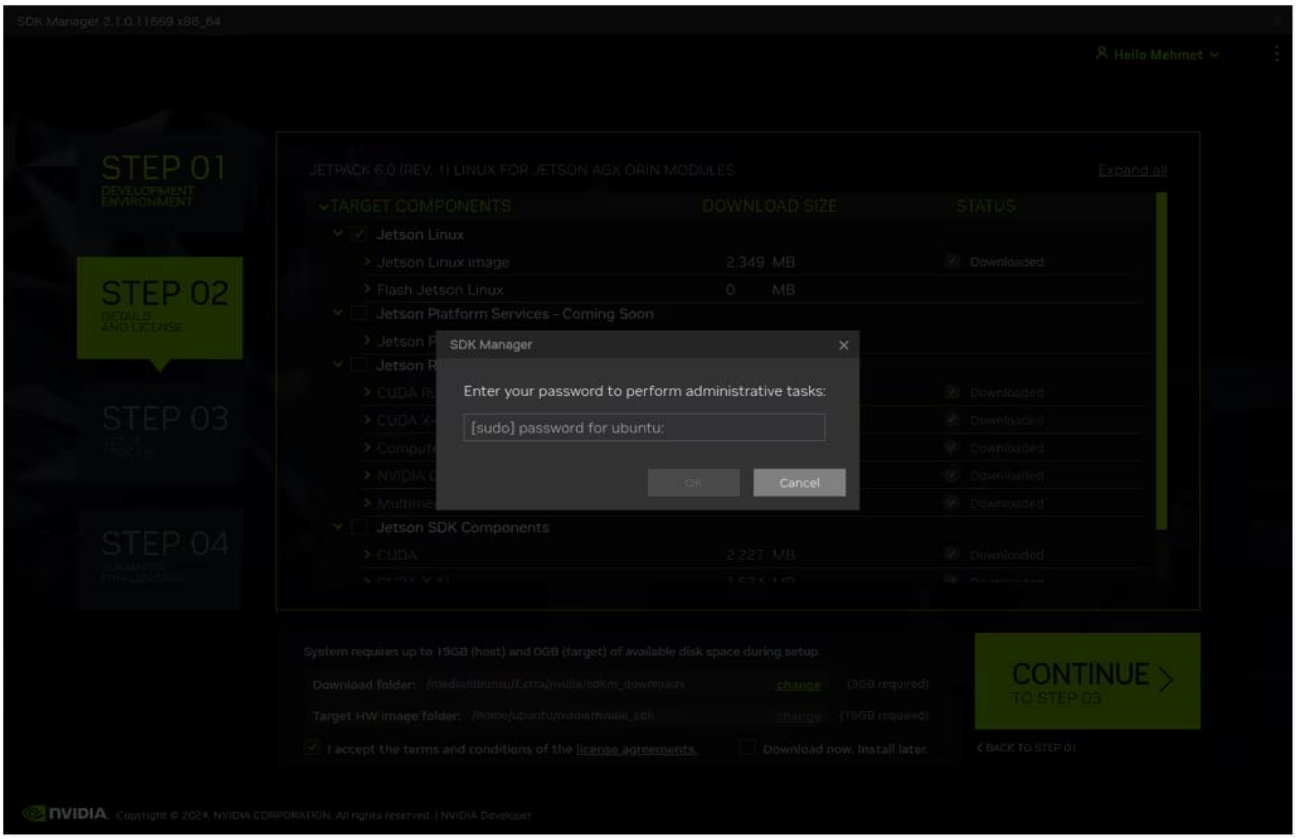
Open the NVIDIA SDK Manager (https://developer.nvidia.com/sdk-manager). Select the correct JetPack version (sdkmanager_2.1.0 or later version) for Target Operating System and "Jetson AGX Orin modules" for Target Hardware (The "Host Machine" components are not required).

Then, continue to Step 2.

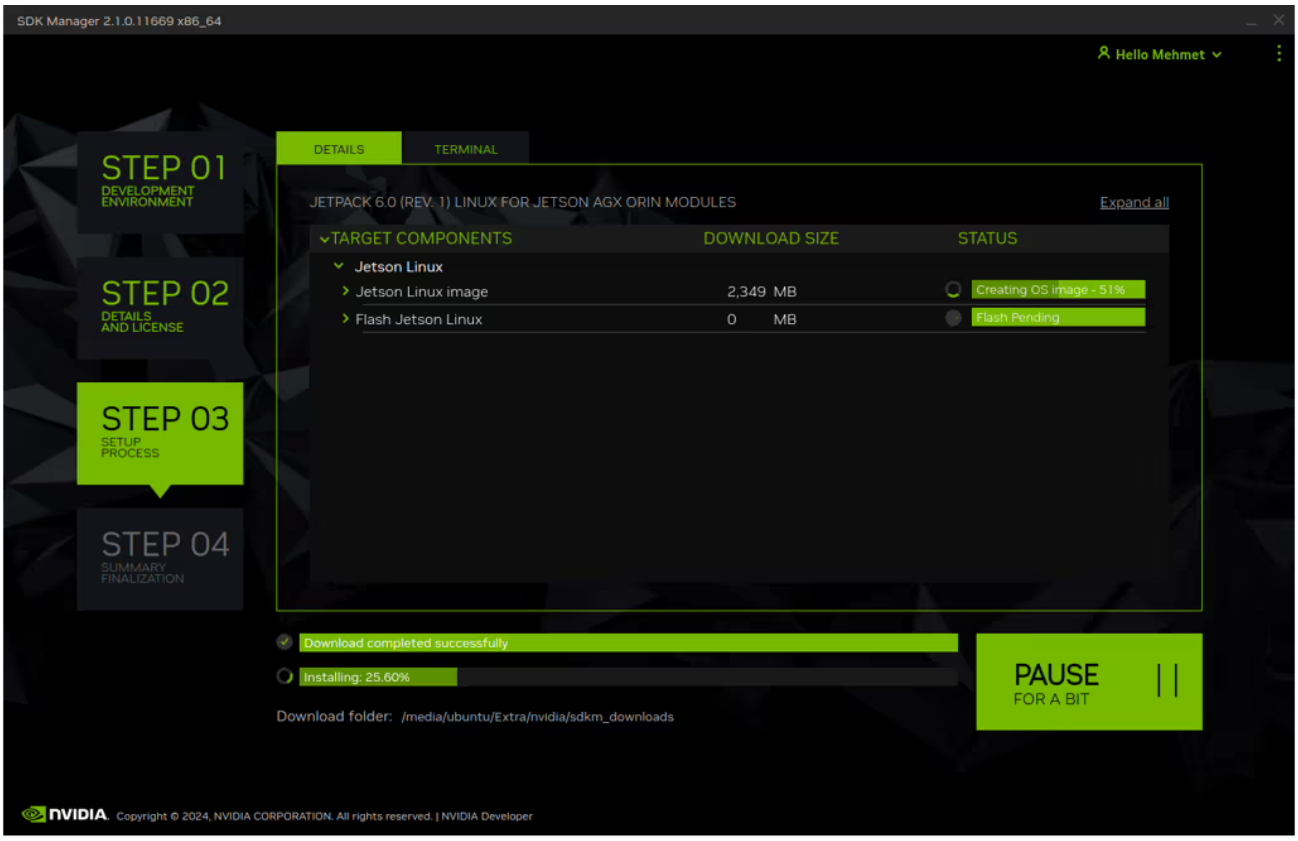
Choose only "Jetson Linux", accept the terms & conditions and continue to Step 3.



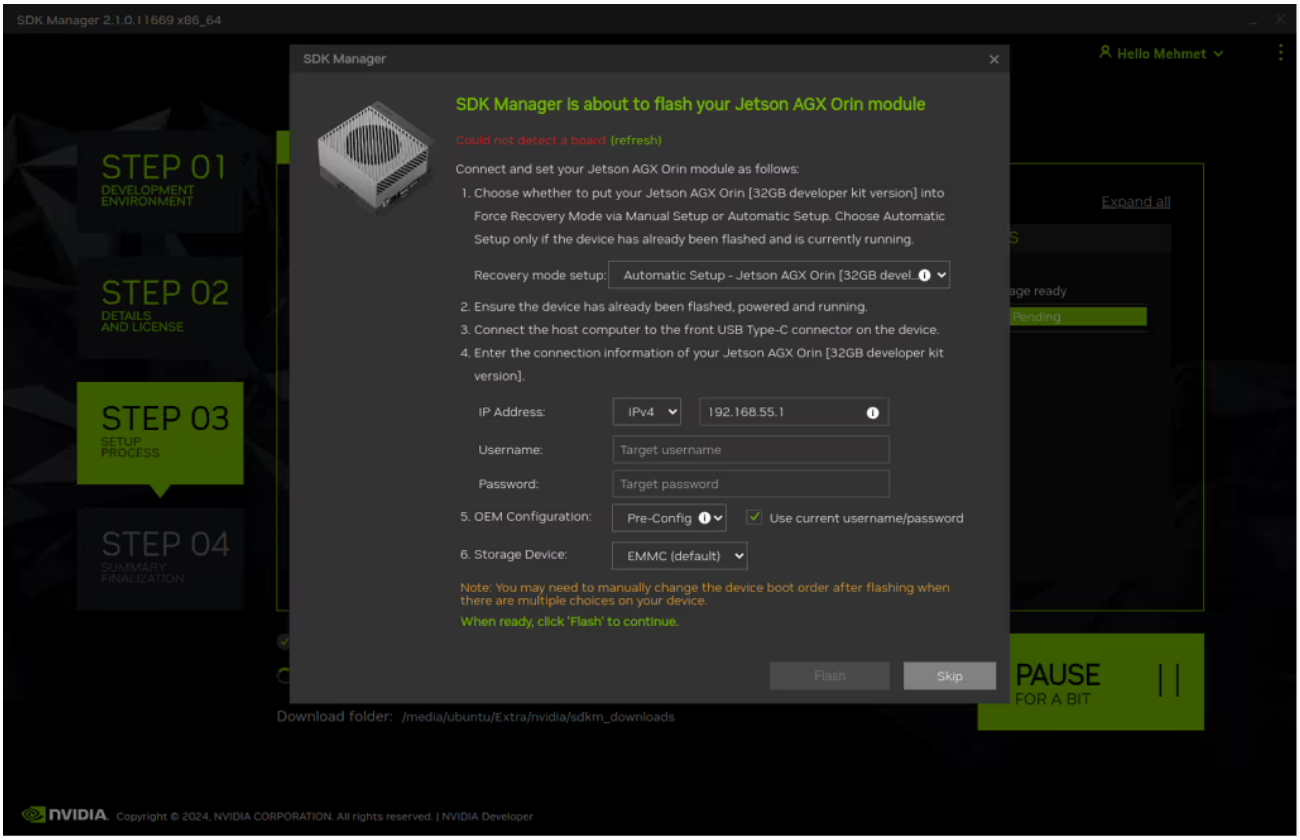
The SDK Manager will ask the username's password. Fill it and continue.

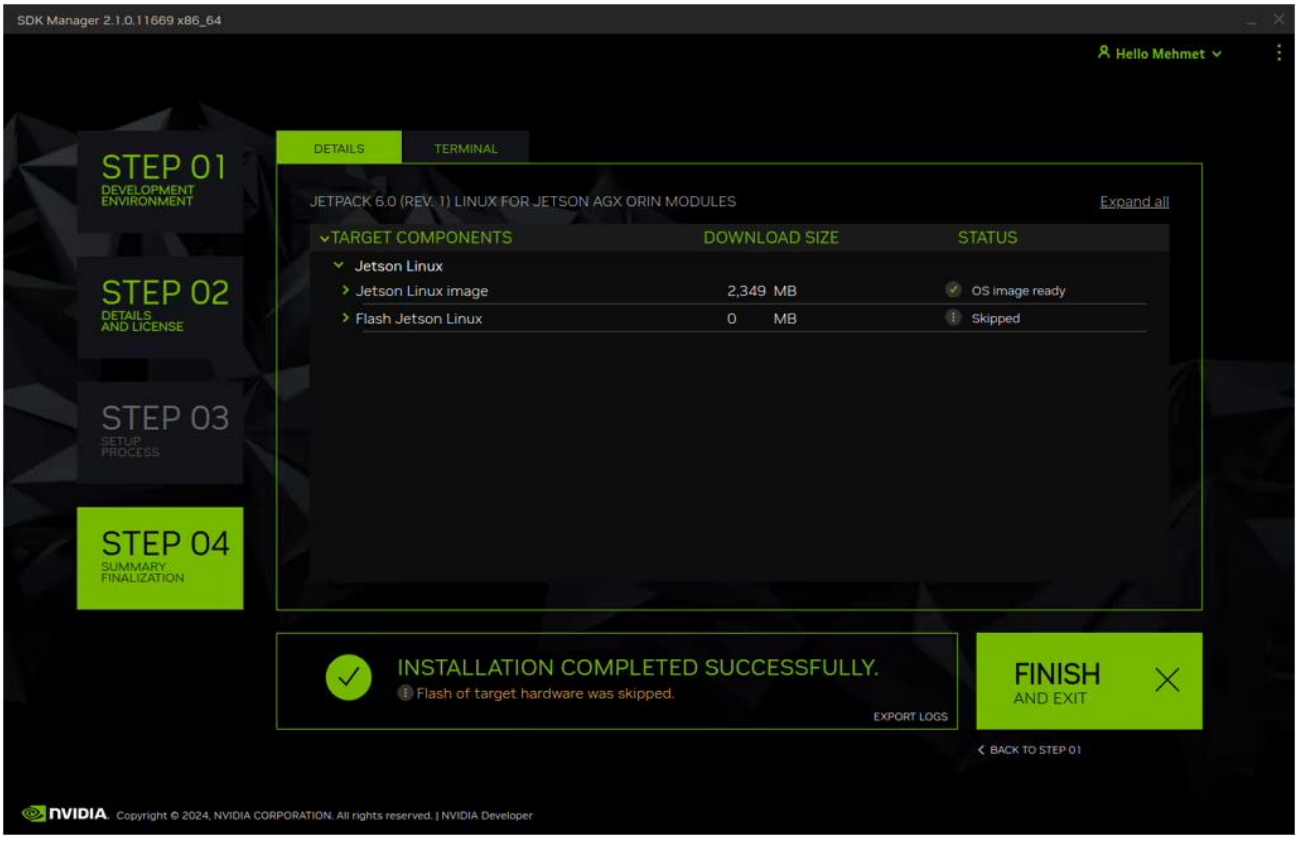


A few seconds later...



After the Jetson OS has created, the SDK Manager asks the Jetson module's flashing style. Just skip it and exit from the SDK Manager.





Open the target HW image folder.

For JetPack-6.0:

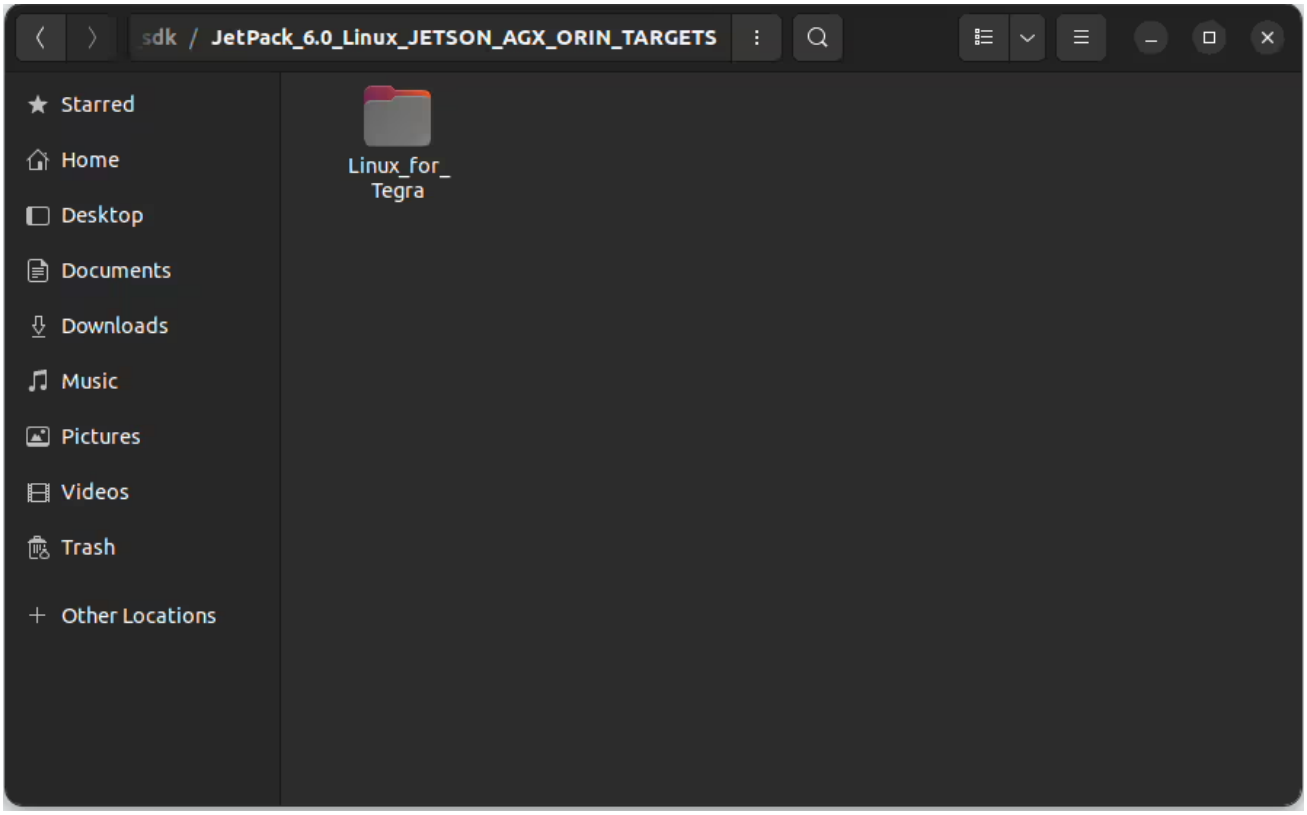
AGX Orin or AGX Orin Industrial: ~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARGETS/

For JetPack-6.1:

AGX Orin or AGX Orin Industrial: ~/nvidia/nvidia_sdk/JetPack_6.1_Linux_JETSON_AGX_ORIN_TARGETS/For JetPack-5.1.1

For JetPack-6.2:

AGX Orin or AGX Orin Industrial: ~/nvidia/nvidia_sdk/JetPack_6.2_Linux_JETSON_AGX_ORIN_TARGETS/



For JetPack-6.0:

Download the BSP files from GitHub link and extract it (AGX Orin, AGX Orin Industrial)

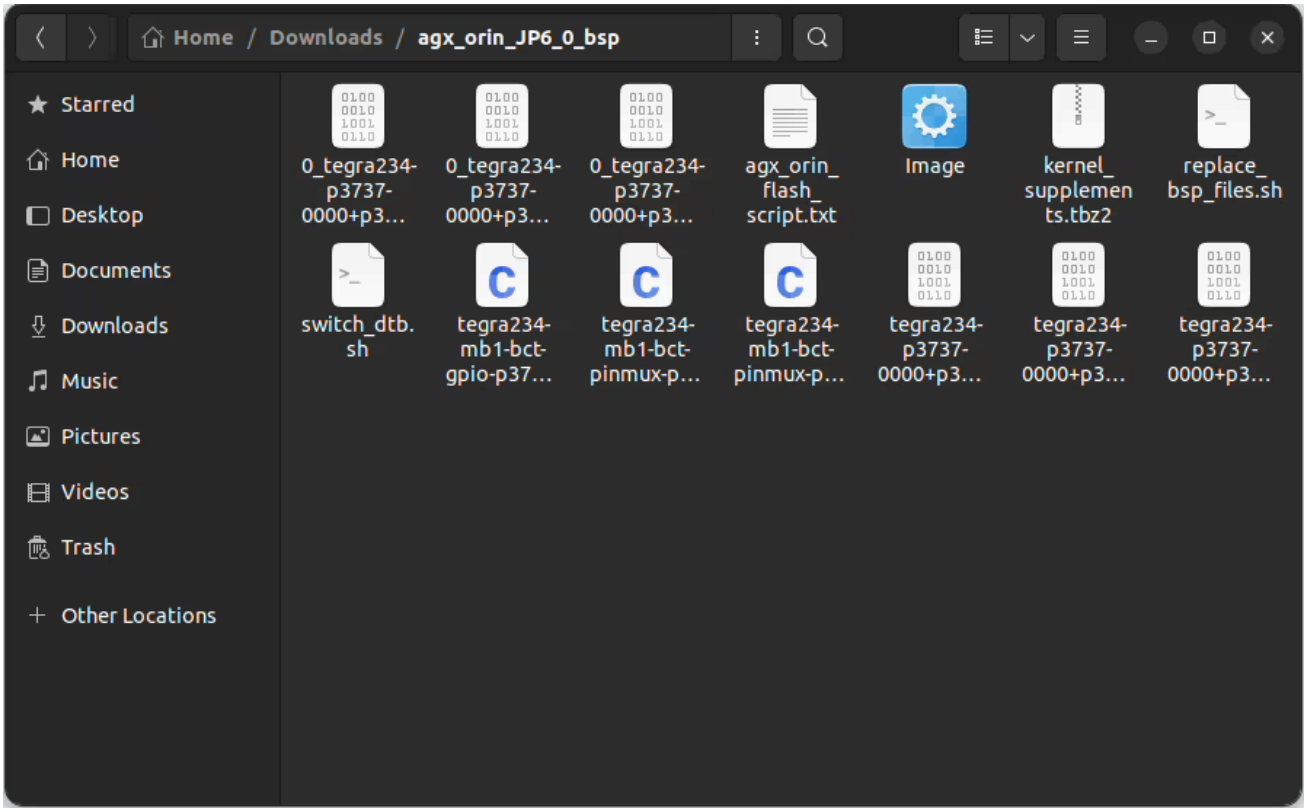
For JetPack-6.1:

Download the BSP files from GitHub link and extract it (AGX Orin, AGX Orin Industrial)

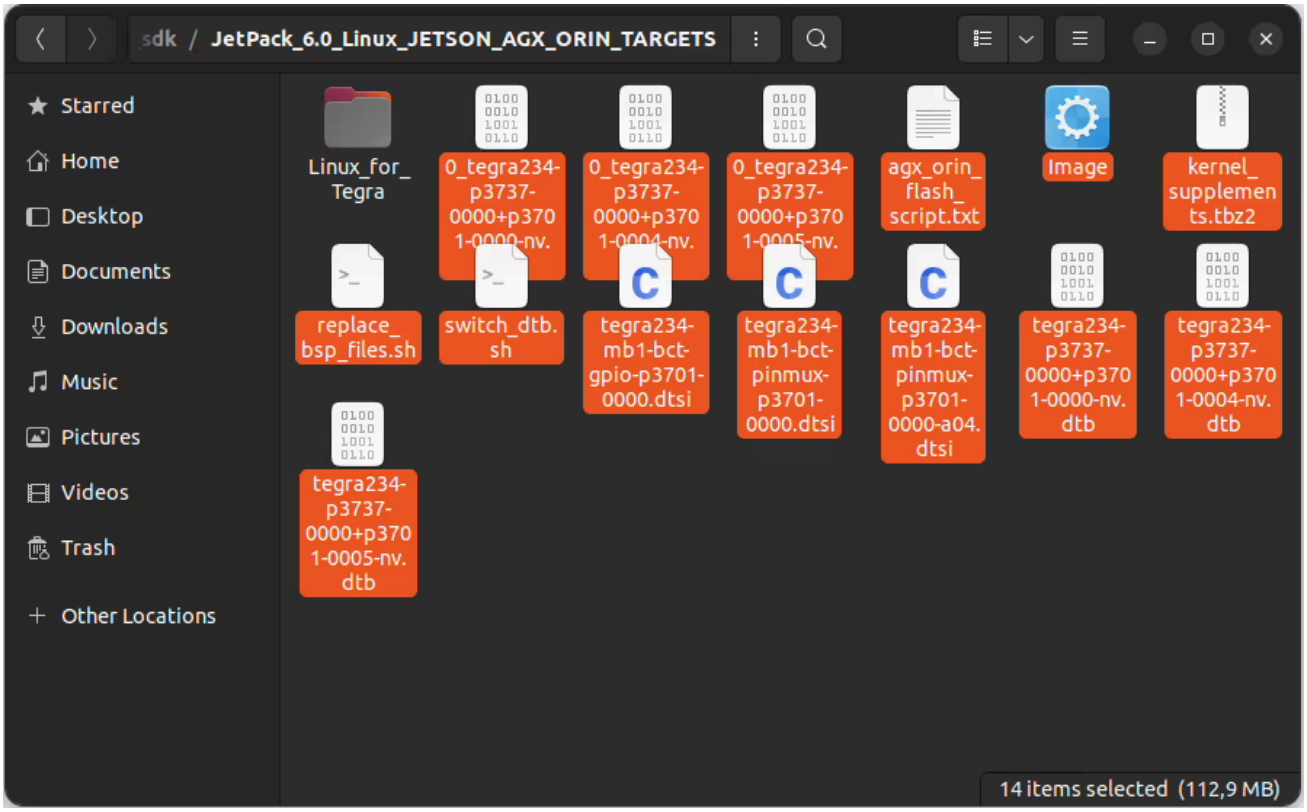
For JetPack-6.2:

Download the BSP files from GitHub link and extract it (AGX Orin, AGX Orin Industrial)

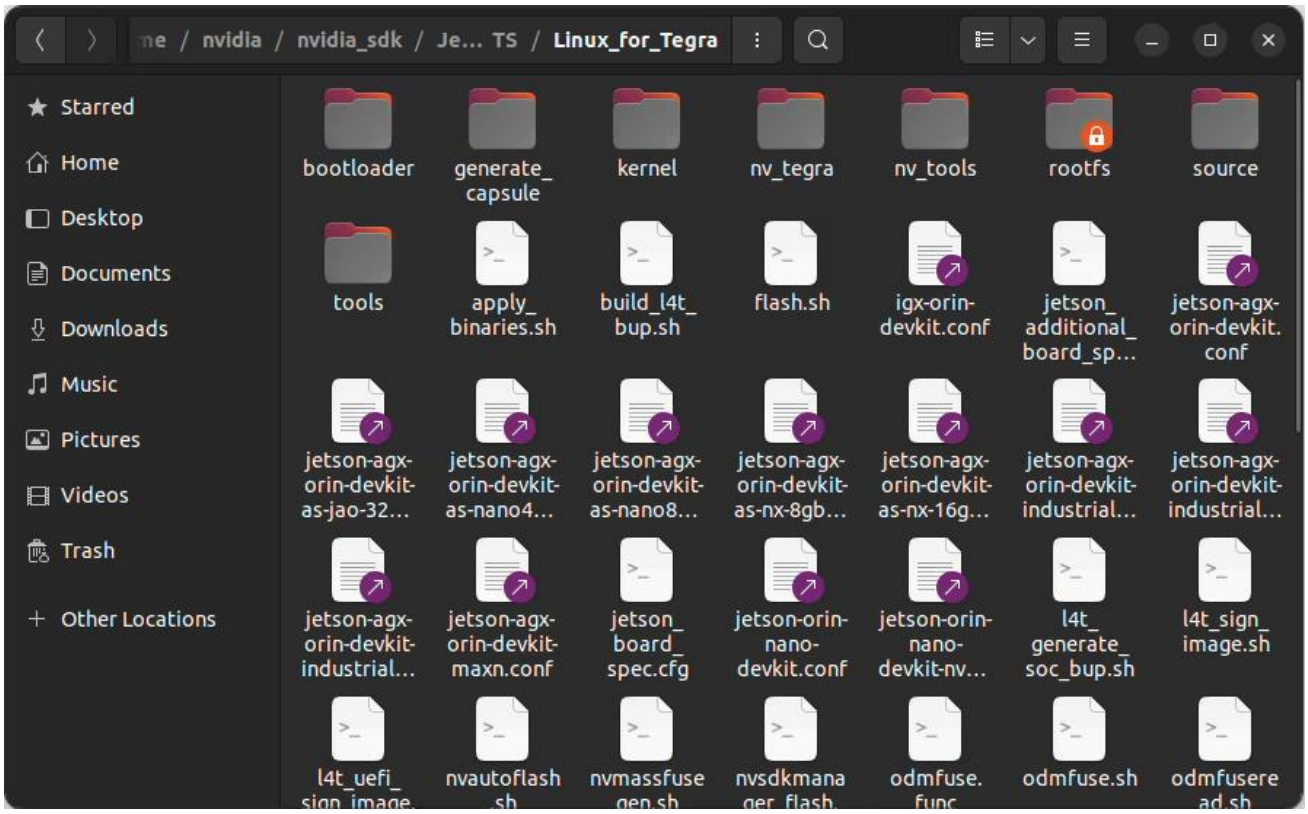
Hint: The following steps have done for AGX Orin, but they are the same for the other Jetson module types (only the BSP files and flashing commands are different).



Copy all files to the target HW image folder.

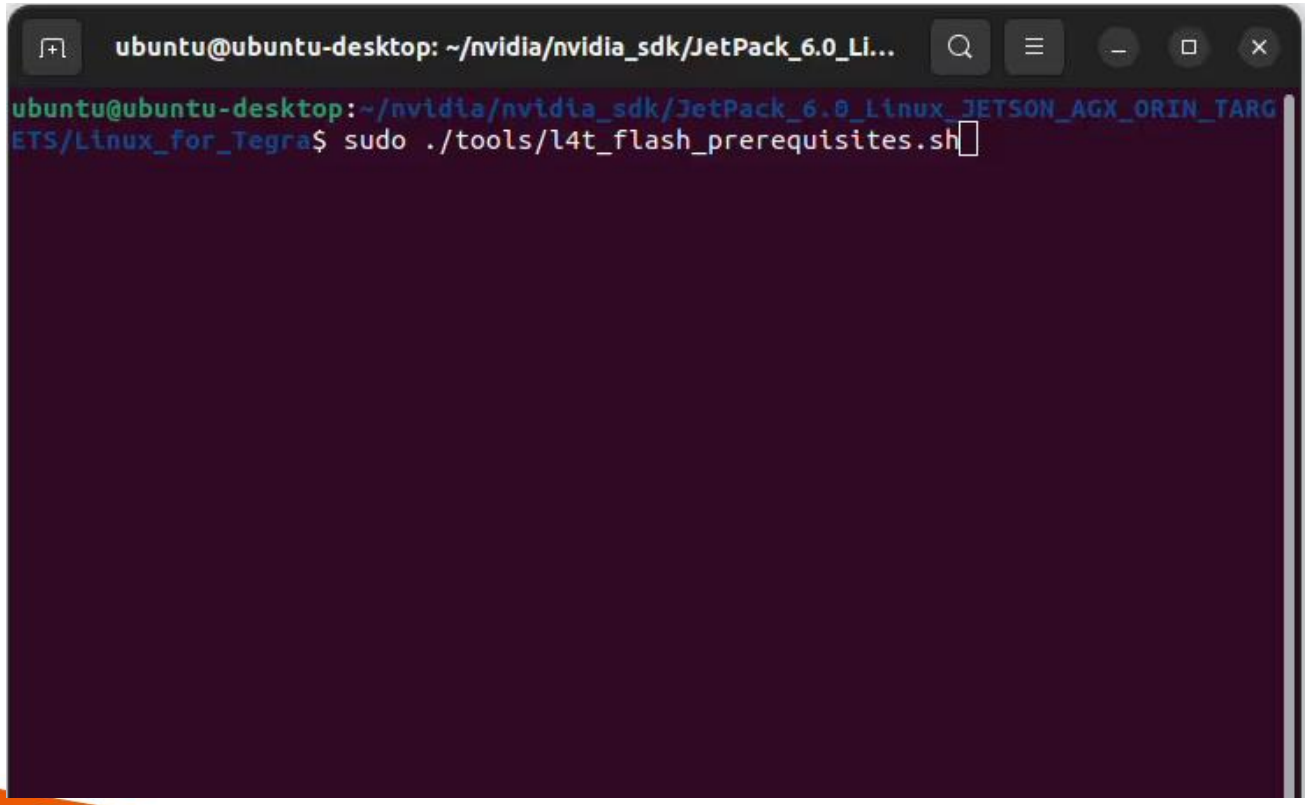


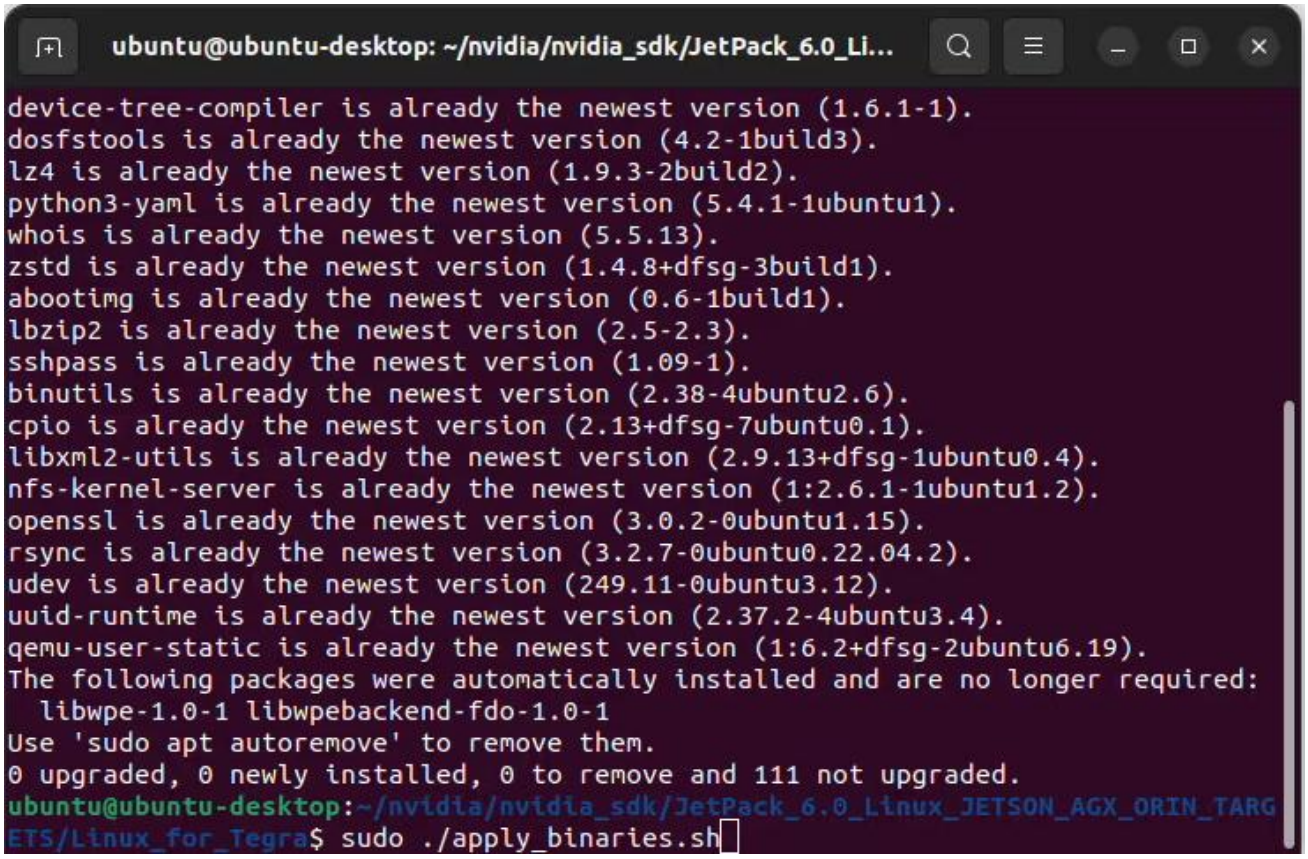
Open a terminal from the "Linux_for_Tegra" folder

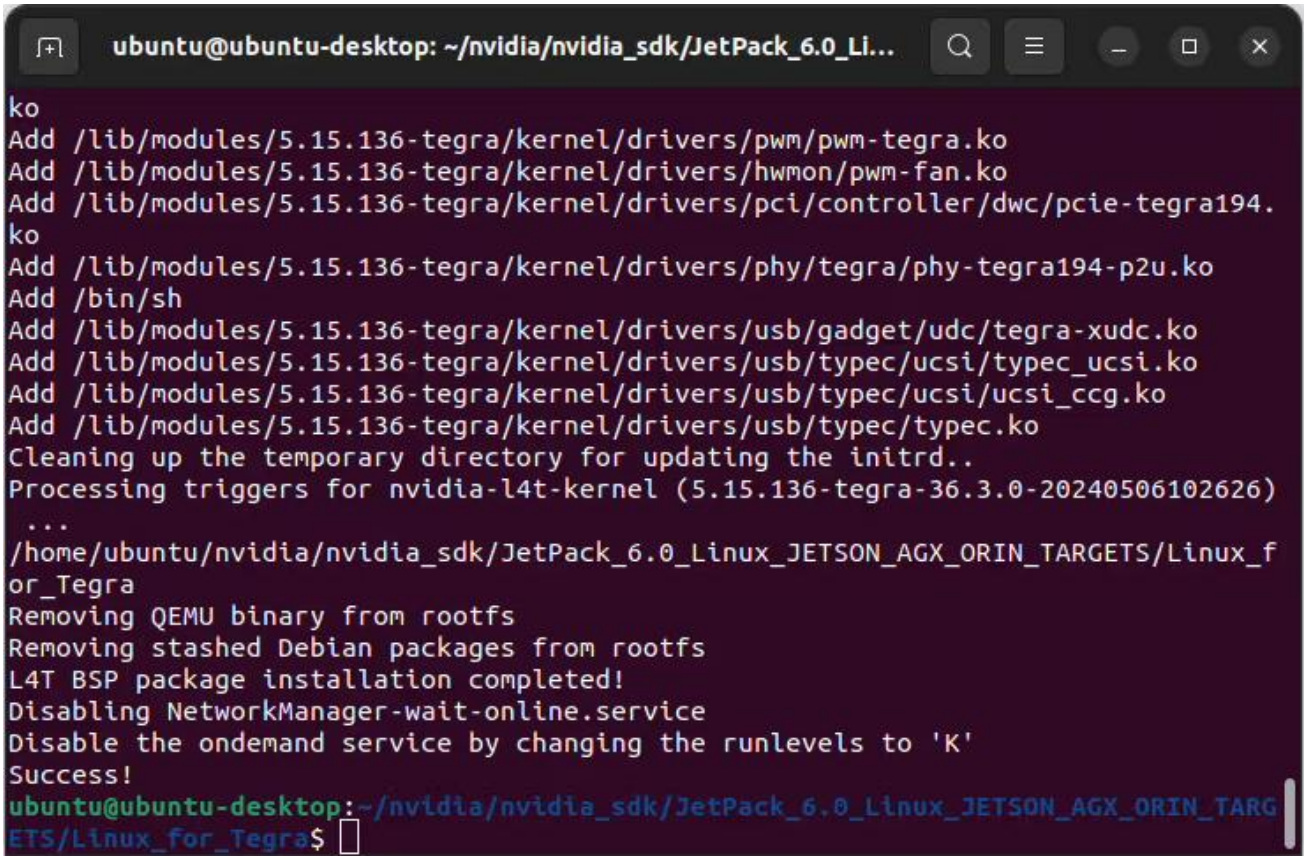


Create the system binaries with these commands below:

```
sudo ./tools/l4t_flash_prerequisites.sh
sudo ./apply_binaries.sh
```

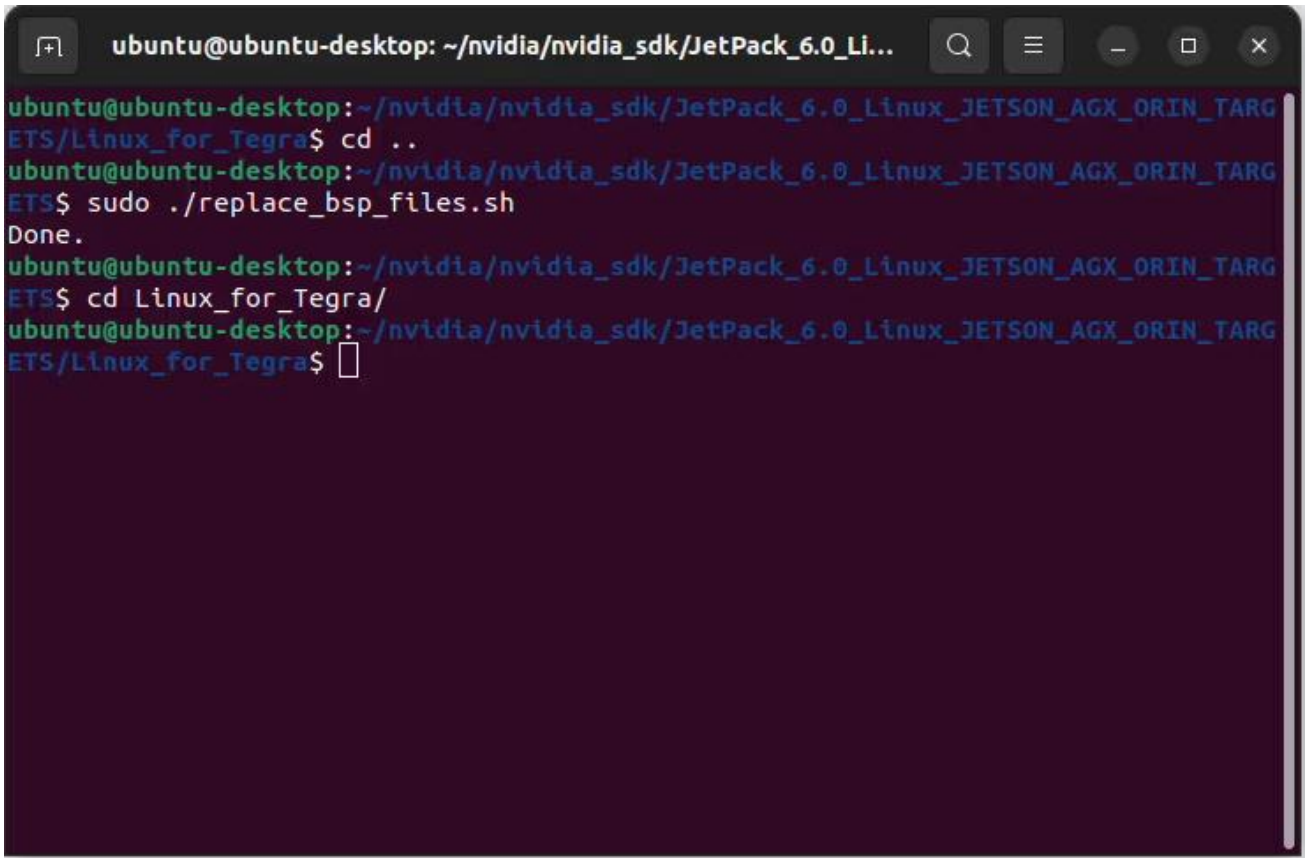



ubuntu@ubuntu-desktop: ~/nvidia/nvidia_sdk/JetPack_6.0_Li...
device-tree-compiler is already the newest version (1.6.1-1).
dosfstools is already the newest version (4.2-1build3).
lz4 is already the newest version (1.9.3-2build2).
python3-yaml is already the newest version (5.4.1-1ubuntu1).
whois is already the newest version (5.5.13).
zstd is already the newest version (1.4.8+dfsg-3build1).
abootimg is already the newest version (0.6-1build1).
lbzip2 is already the newest version (2.5-2.3).
sshpass is already the newest version (1.09-1).
binutils is already the newest version (2.38-4ubuntu2.6).
cpio is already the newest version (2.13+dfsg-7ubuntu0.1).
libxml2-utils is already the newest version (2.9.13+dfsg-1ubuntu0.4).
nfs-kernel-server is already the newest version (1:2.6.1-1ubuntu1.2).
openssl is already the newest version (3.0.2-0ubuntu1.15).
rsync is already the newest version (3.2.7-0ubuntu0.22.04.2).
udev is already the newest version (249.11-0ubuntu3.12).
uuid-runtime is already the newest version (2.37.2-4ubuntu3.4).
qemu-user-static is already the newest version (1:6.2+dfsg-2ubuntu6.19).
The following packages were automatically installed and are no longer required:
libwpe-1.0-1 libwpebackend-fdo-1.0-1
Use 'sudo apt autoremove' to remove them.
0 upgraded, 0 newly installed, 0 to remove and 111 not upgraded.
ubuntu@ubuntu-desktop:~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARGETS/Linux_for_Tegra$ sudo ./apply_binaries.sh


ubuntu@ubuntu-desktop: ~/nvidia/nvidia_sdk/JetPack_6.0_Li...
ko
Add /lib/modules/5.15.136-tegra/kernel/drivers/pwm/pwm-tegra.ko
Add /lib/modules/5.15.136-tegra/kernel/drivers/hwmon/pwm-fan.ko
Add /lib/modules/5.15.136-tegra/kernel/drivers/pci/controller/dwc/pcie-tegra194.ko
Add /lib/modules/5.15.136-tegra/kernel/drivers/phy/tegra/phy-tegra194-p2u.ko
Add /bin/sh
Add /lib/modules/5.15.136-tegra/kernel/drivers/usb/gadget/udc/tegra-xudc.ko
Add /lib/modules/5.15.136-tegra/kernel/drivers/usb/typec/ucsi/typec_ucsi.ko
Add /lib/modules/5.15.136-tegra/kernel/drivers/usb/typec/ucsi/ucsi_ccg.ko
Add /lib/modules/5.15.136-tegra/kernel/drivers/usb/typec/typec.ko
Cleaning up the temporary directory for updating the initrd..
Processing triggers for nvidia-l4t-kernel (5.15.136-tegra-36.3.0-20240506102626) ...
/home/ubuntu/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARGETS/Linux_for_Tegra
Removing QEMU binary from rootfs
Removing stashed Debian packages from rootfs
L4T BSP package installation completed!
Disabling NetworkManager-wait-online.service
Disable the ondemand service by changing the runlevels to 'K'
Success!
ubuntu@ubuntu-desktop:~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARGETS/Linux_for_Tegra$

Apply the interface configurations with the following commands below:

```
cd ..
sudo ./replace_bsp_files.sh
cd Linux_for_Tegra/
```



Hint: If you want to configure your username-password & hostname with default settings, you can create user without the Ubuntu installation wizard. To do this, the user generation command structure should be:

```
sudo tools/l4t_create_default_user.sh -u {USERNAME} -p {PASSWORD} -a -n {HOSTNAME} --accept-license
```

For example (username:"nvidia", password:"nvidia", device-name:"nvidia-agx-orin"):

```
sudo tools/l4t_create_default_user.sh -u nvidia -p nvidia -a -n nvidia-agx-orin --accept-license
```

Jetson OS Installation

Connect the recovery USB (between installer PC & AV710-X4-32G4S's recovery USB) and power connection of your NV300-A.

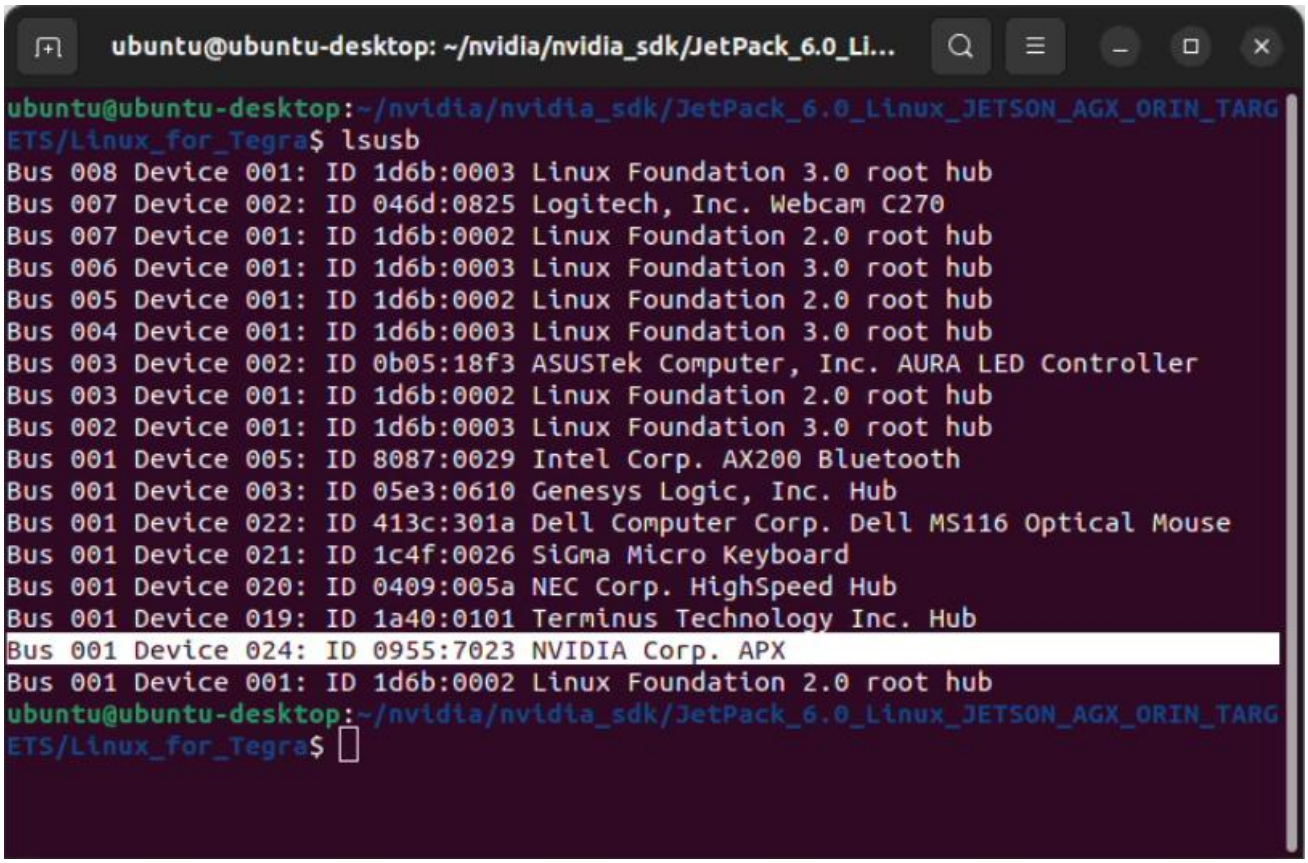
While the NV300-A's power connector plugged in,

- press reset & recovery buttons together
- release reset button
- release the recovery button after 3 seconds later. This will set it to Recovery mode.

Attention: To be able to get more stable USB connection, please do not connect the Jetson via a USB hub or docking station to the host PC. Use a USB cable to the host PC directly.

Then, type "lsusb" and check the device connected in Recovery mode.

- **"0955:7023 NVidia Corp." for AGX Orin 64GB**
- "0955:7223 NVidia Corp." for AGX Orin 32GB
- "0955:7023 NVidia Corp." for AGX Orin Industrial

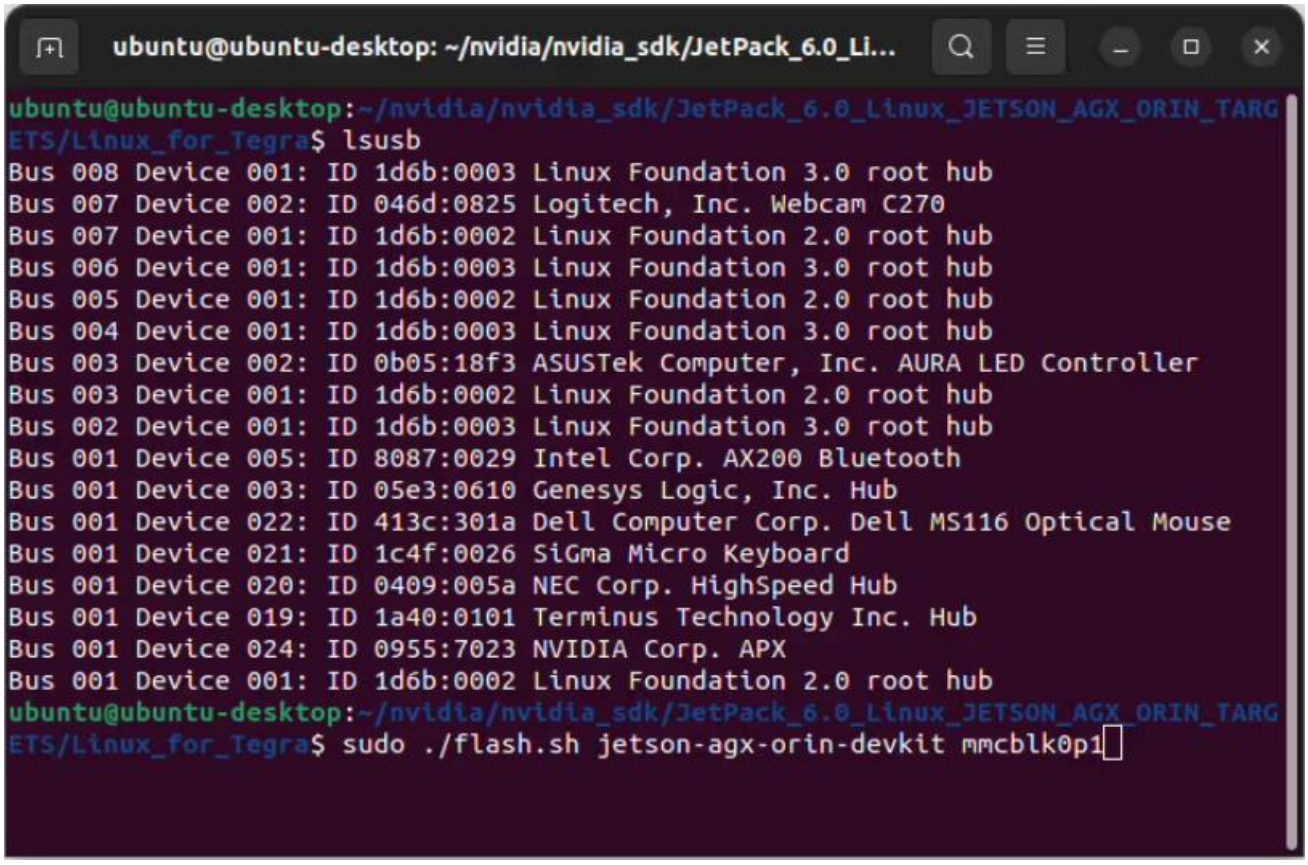


For AGX Orin, flash the Jetson OS with this script below:

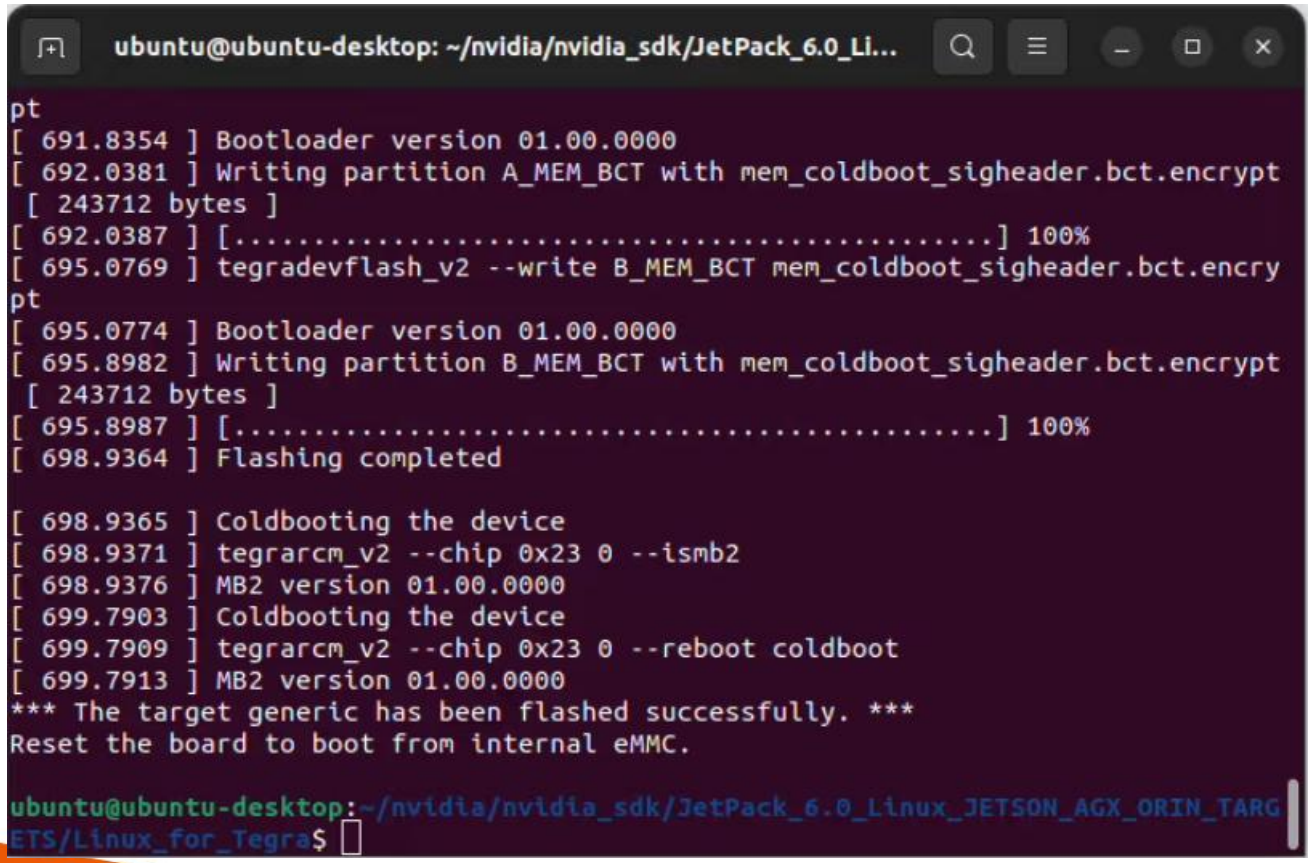
```
sudo ./flash.sh jetson-agx-orin-devkit mmcblk0p1
```

For AGX Orin Industrial, flash the Jetson OS with this script below:

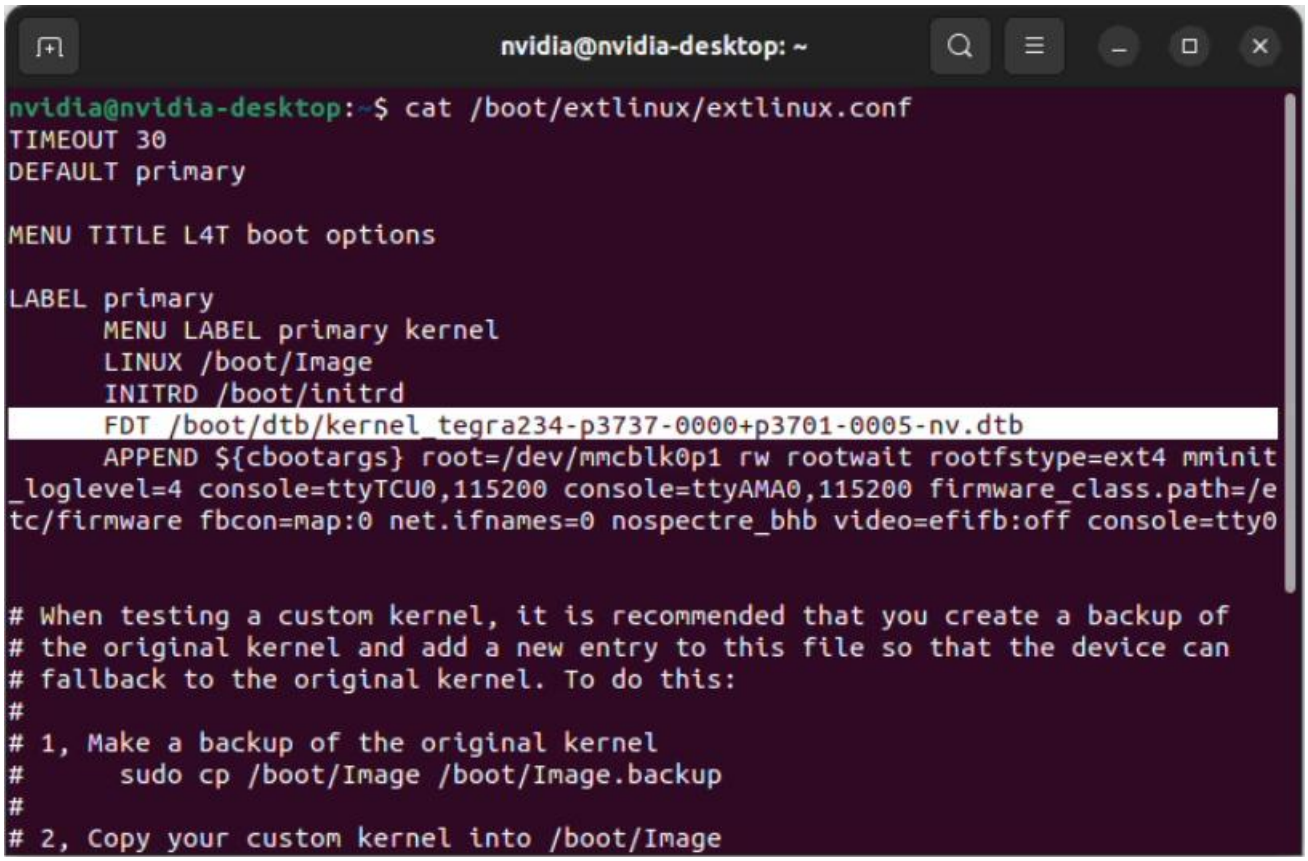
```
sudo ./flash.sh jetson-agx-orin-devkit-industrial mmcblk0p1
```



At the end of the script, the device will reboot. Complete your Ubuntu installation wizard (if you have not created a user with tools/l4t_create_default_user.sh script file) from the NV300-A (language, keyboard type, location, username & password etc.).



[Optional] If you will use the recovery USB port as host (to be able to connect USB devices), please verify that the FDT parameter has been applied in the extlinux.conf file. In JetPack-6 installation, this parameter may not include in it. If this parameter is missing in it, please open it with a text editor and write "FDT" with the DTB file (located in the /boot/dtb/ folder).:



Then, please open a terminal from the Jetson Orin and type the following command below. This will update its current device-tree and reboot it.

Otherwise, you can use this port for virtual network communication (file transfer etc. between host PC with 192.168.55.1 IP address) in default.

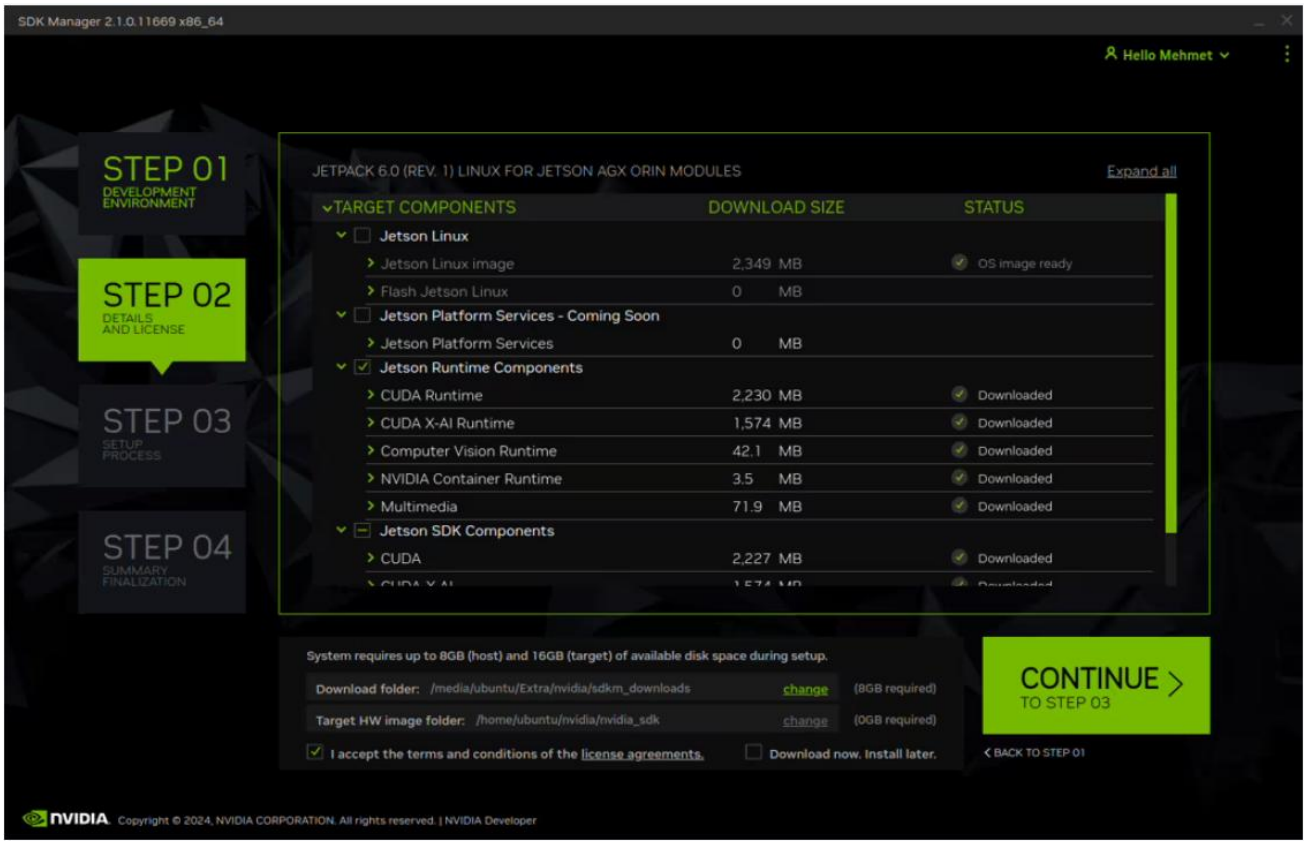
```
sudo switch_dtb.sh
```

Jetson SDK Components Installation

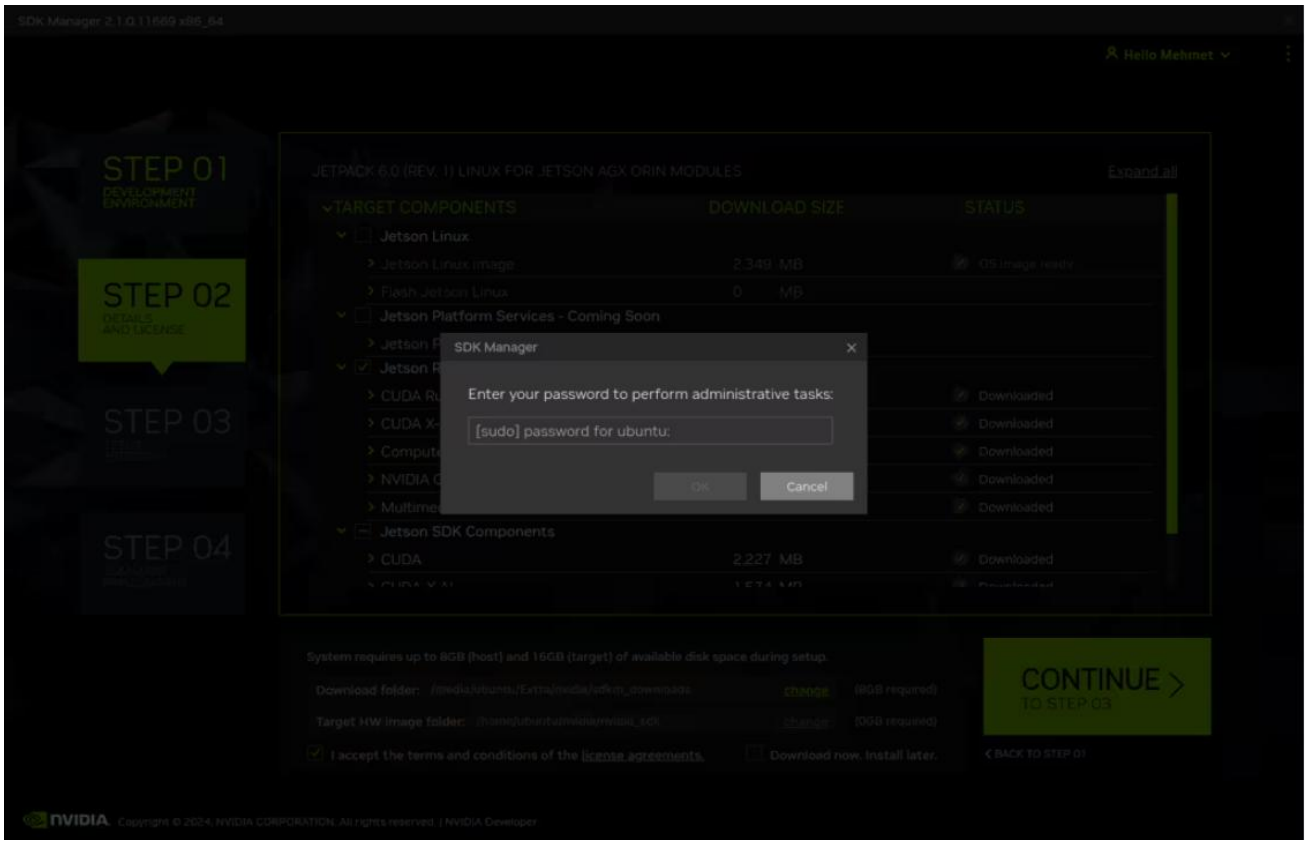
Connect the NV300-A to the Internet. Then, Open the NVIDIA SDK Manager. Select the correct JetPack version for Target Operating System and "Jetson AGX Orin modules" for Target Hardware (The "Host Machine" components are not required. Additional SDKs (DeepStream) are optional).

Then, continue to Step 2.

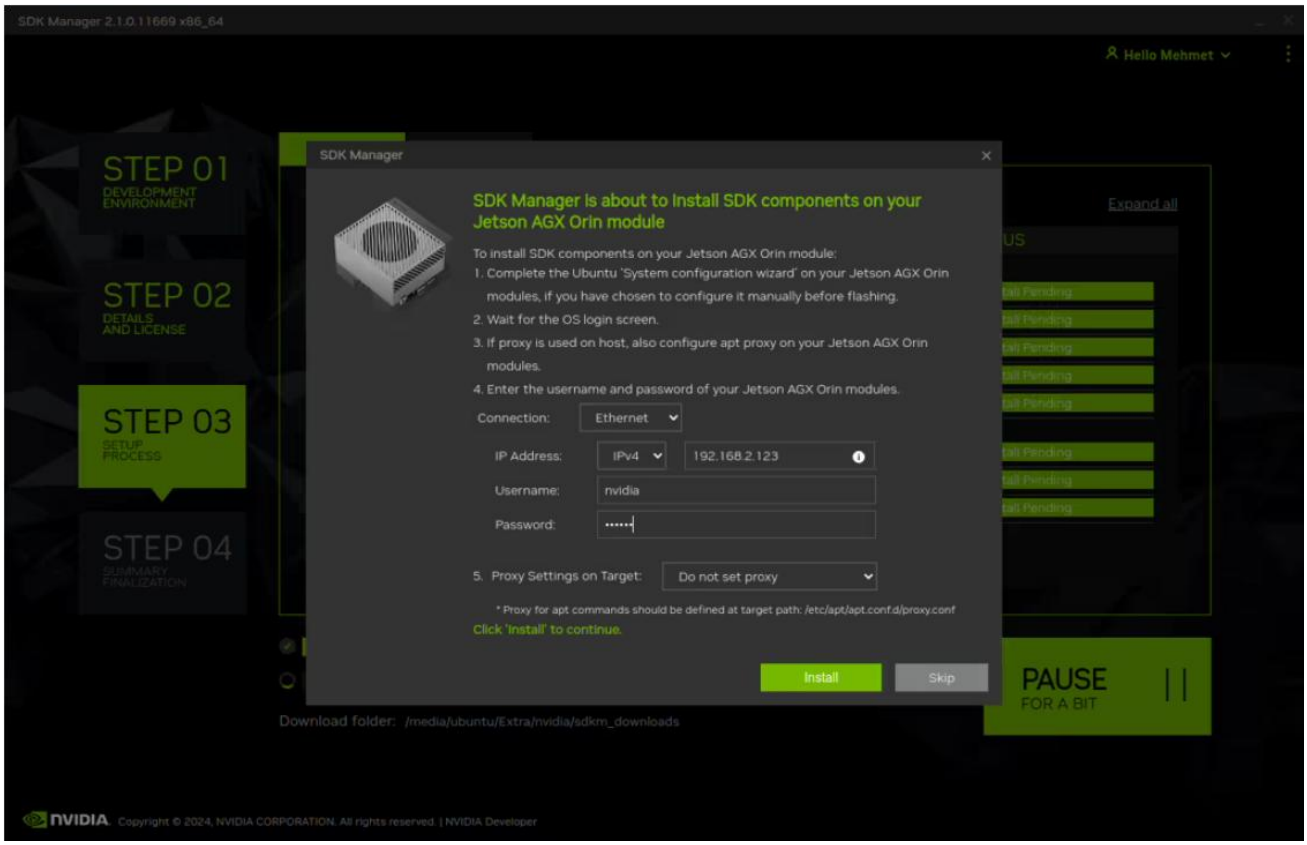
Choose at least "Jetson Runtime Components" ("Jetson SDK Components" are optional. It depends on your use case), accept the terms & conditions and continue to Step 3.



The SDK Manager will ask the username's password. Fill it and continue.



Type the IP address, username and password of Jetson AGX Orin module and install the SDK Components.



At the end of the installation, the NV300-A becomes ready.

To avoid kernel update with "apt upgrade" or "apt-get upgrade" commands, please follow this guide on the Jetson module.

Change Command of X7 to RS422

```
sudo sh -c "echo 485 > /sys/class/gpio/export"
sudo sh -c "echo 344 > /sys/class/gpio/export"
sudo sh -c "echo 428 > /sys/class/gpio/export"
sudo sh -c "echo 433 > /sys/class/gpio/export"
sudo sh -c "echo low > /sys/class/gpio/PZ.07/direction"
sudo sh -c "echo low > /sys/class/gpio/PEE.05/direction"
sudo sh -c "echo high > /sys/class/gpio/PM.04/direction"
sudo sh -c "echo low > /sys/class/gpio/PN.01/direction"
```

Install the driver for Capture Card

unzip 20240925_V1350_orin_5.15.136
tegra_r36.3_arm64.zip
cd 20240925_V1350_orin_5.15.136
tegra_r36.3_arm64/release
chmod +x *.sh
sudo ./setup.sh
reboot

Change Root File System to M.2 SSD Directly

Formatting the M.2 SSD Storage

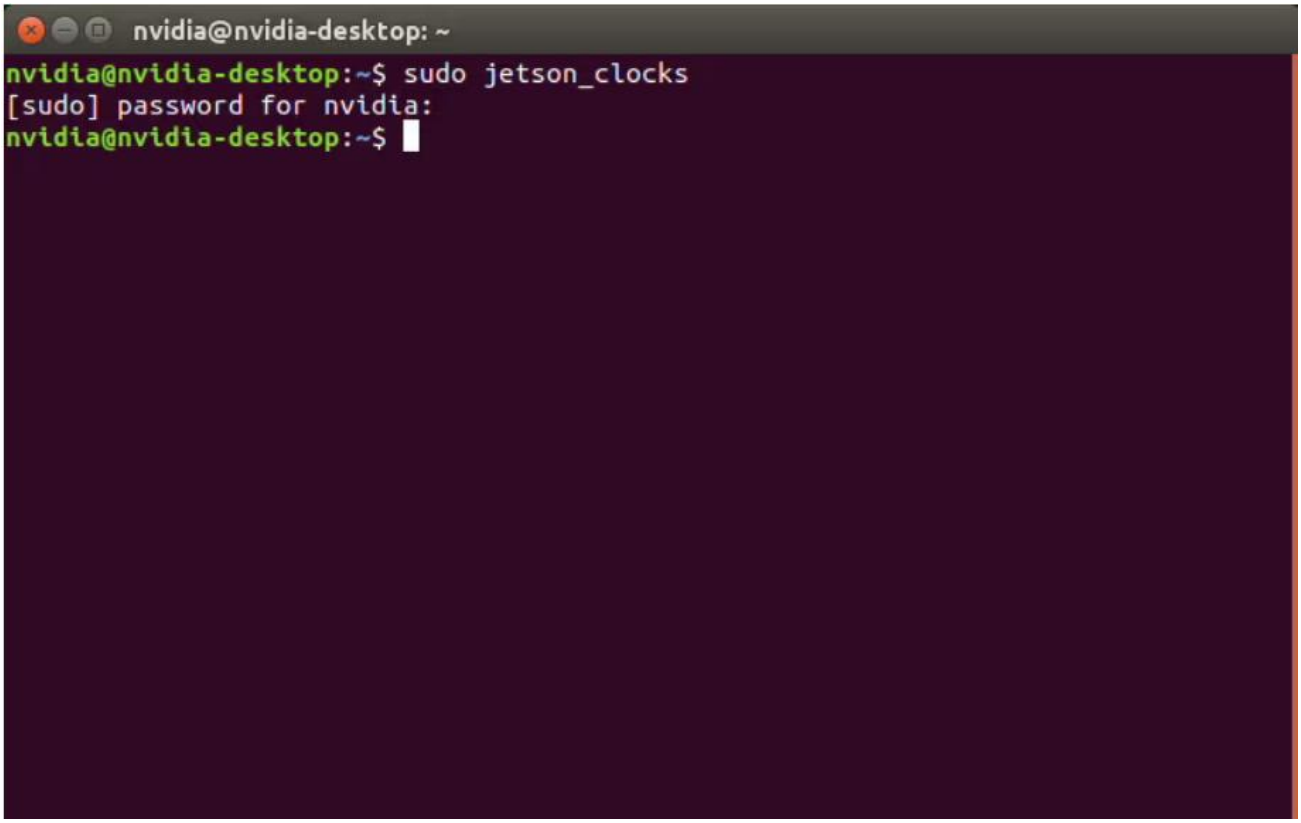
we will explain how to move your root file system on EMMC flash to SSD storage on M.2 slot directly. The previous version of this post is here: https://www.forecr.io/blogs/bsp-development/changing-storage-of-the-root-file-system-emmc-to-m-2-ssd

The advantage of this version is the boot up speed. In the previous version, the file system into the SSD mounted with a service after the file system into the eMMC mounted. This process increases the boot up time. In this post, the file system into the SSD mounted directly without any service. On the other hand, the Jetson module won't boot up without SSD until the extlinux.conf file changed. To avoid this problem, you can backup your Jetson module before changing the root file system.

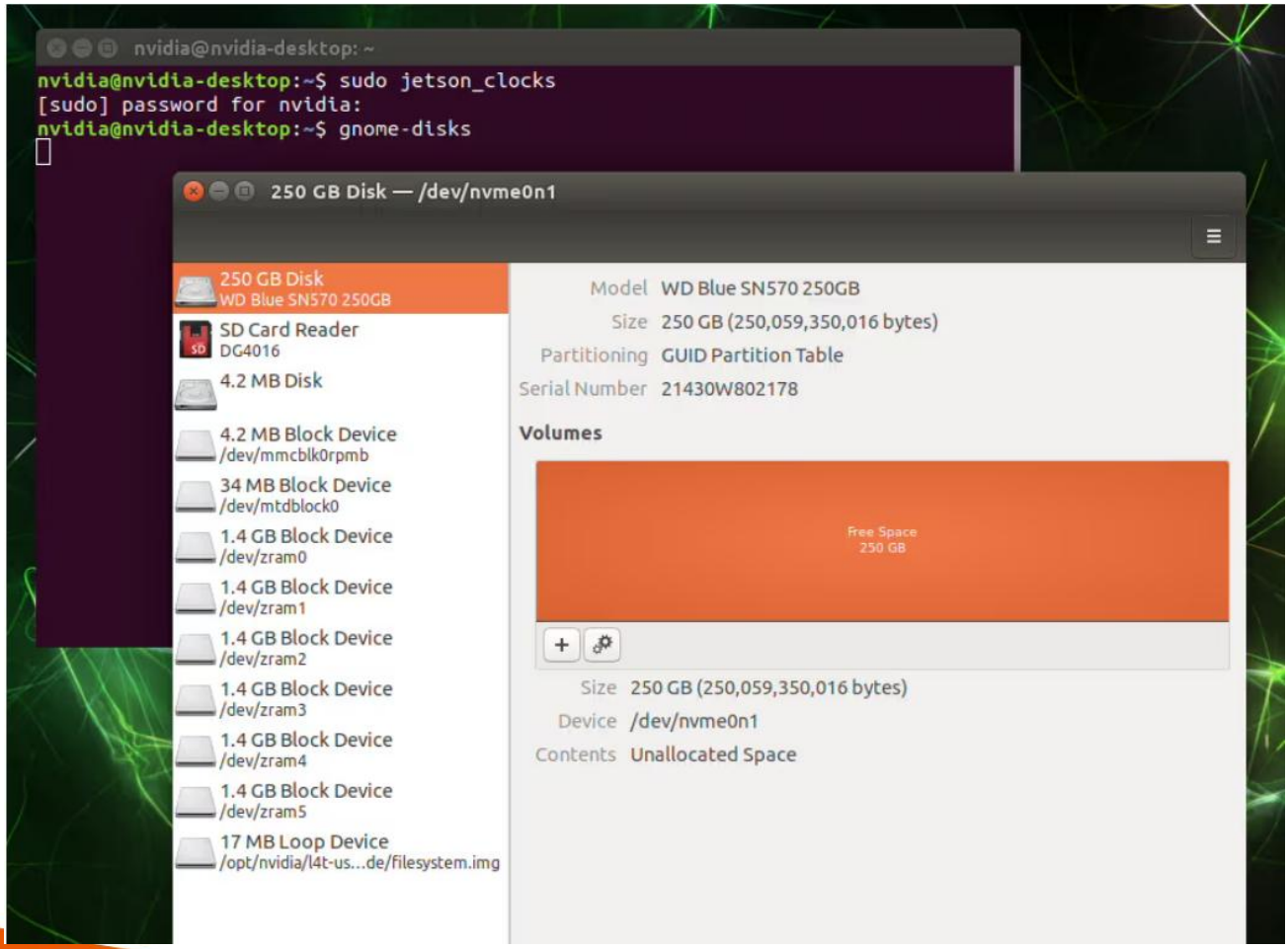
First, connect your M.2 compatible storage device to M.2 connector and connect the basic interfaces (Ethernet, HDMI, keyboard, mouse) then power on.

Open a terminal and type these commands below:

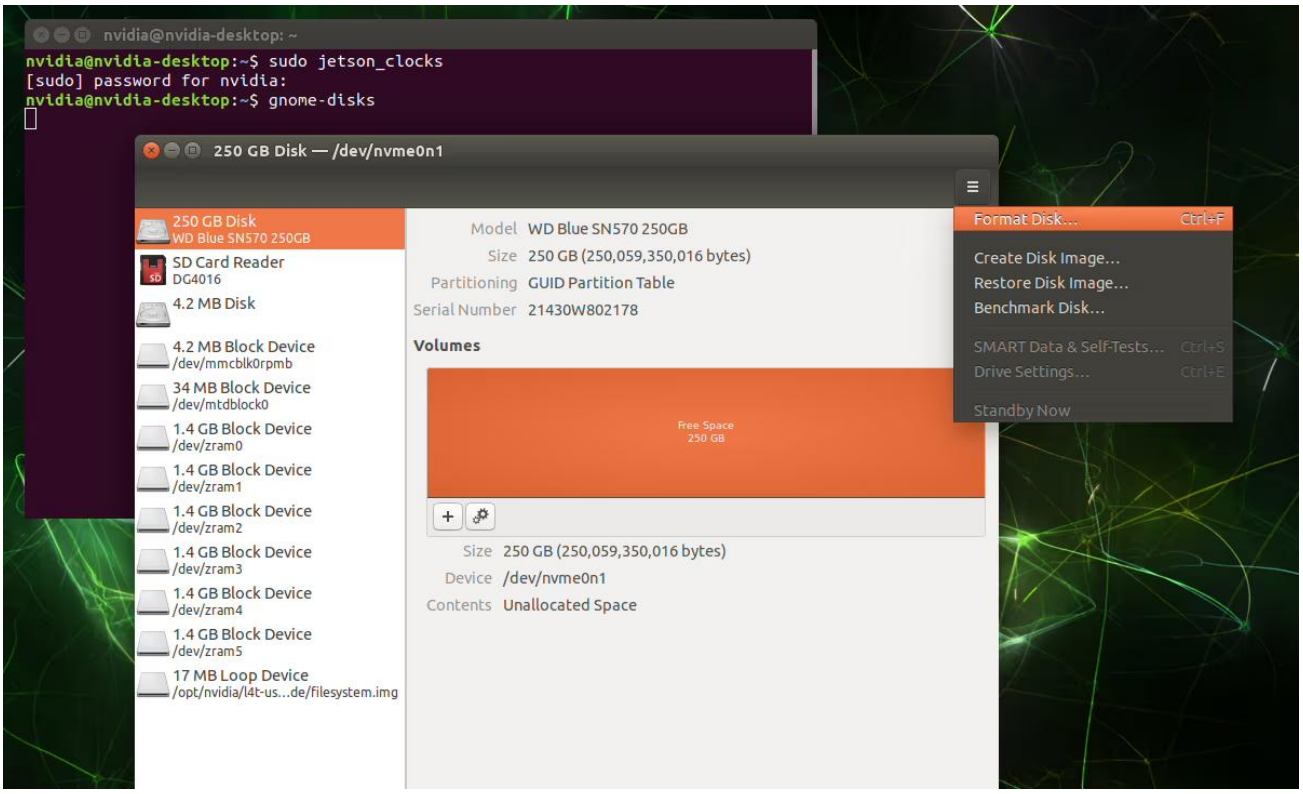
```
sudo jetson_clocks
gnome-disks
```

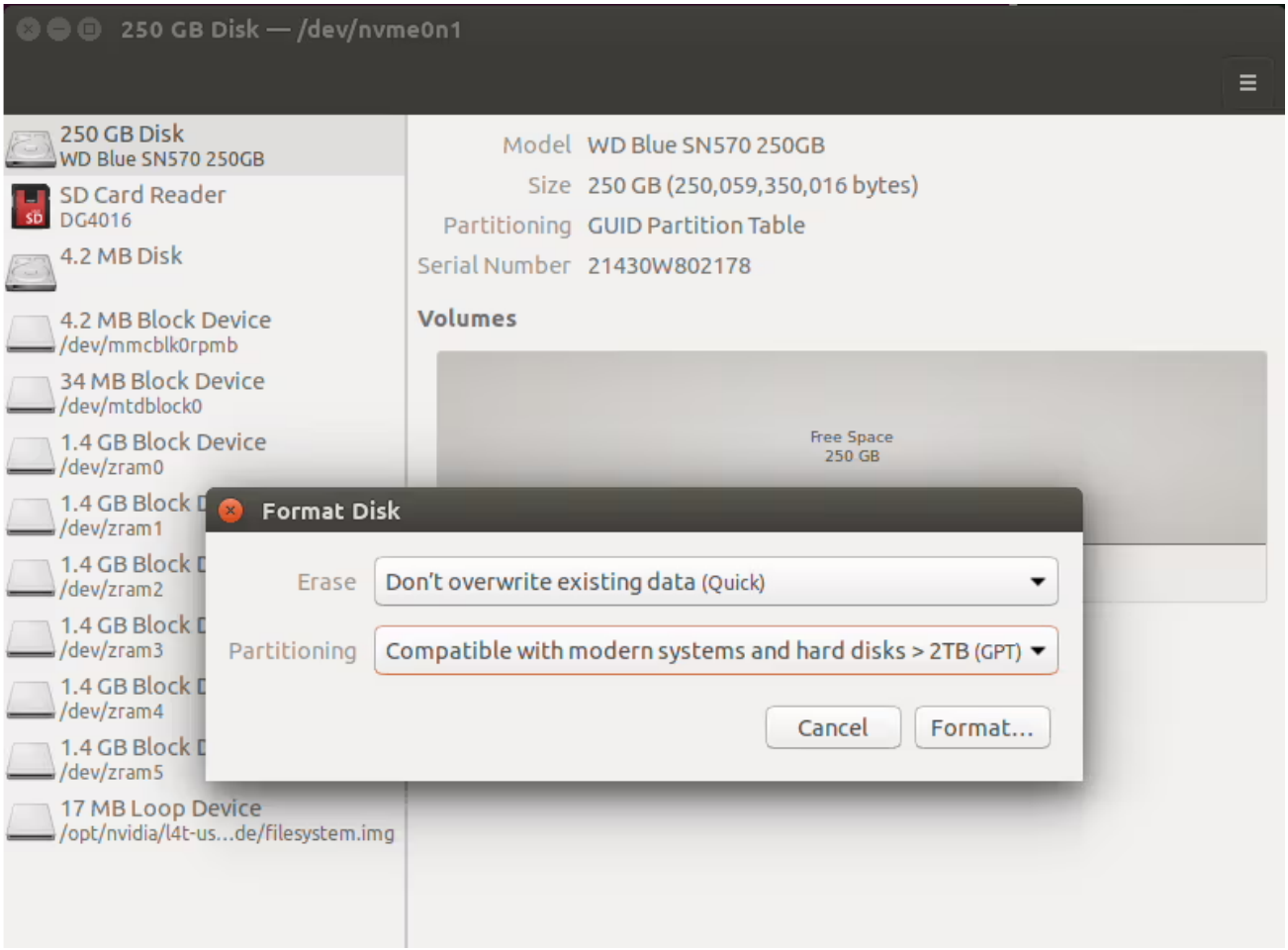


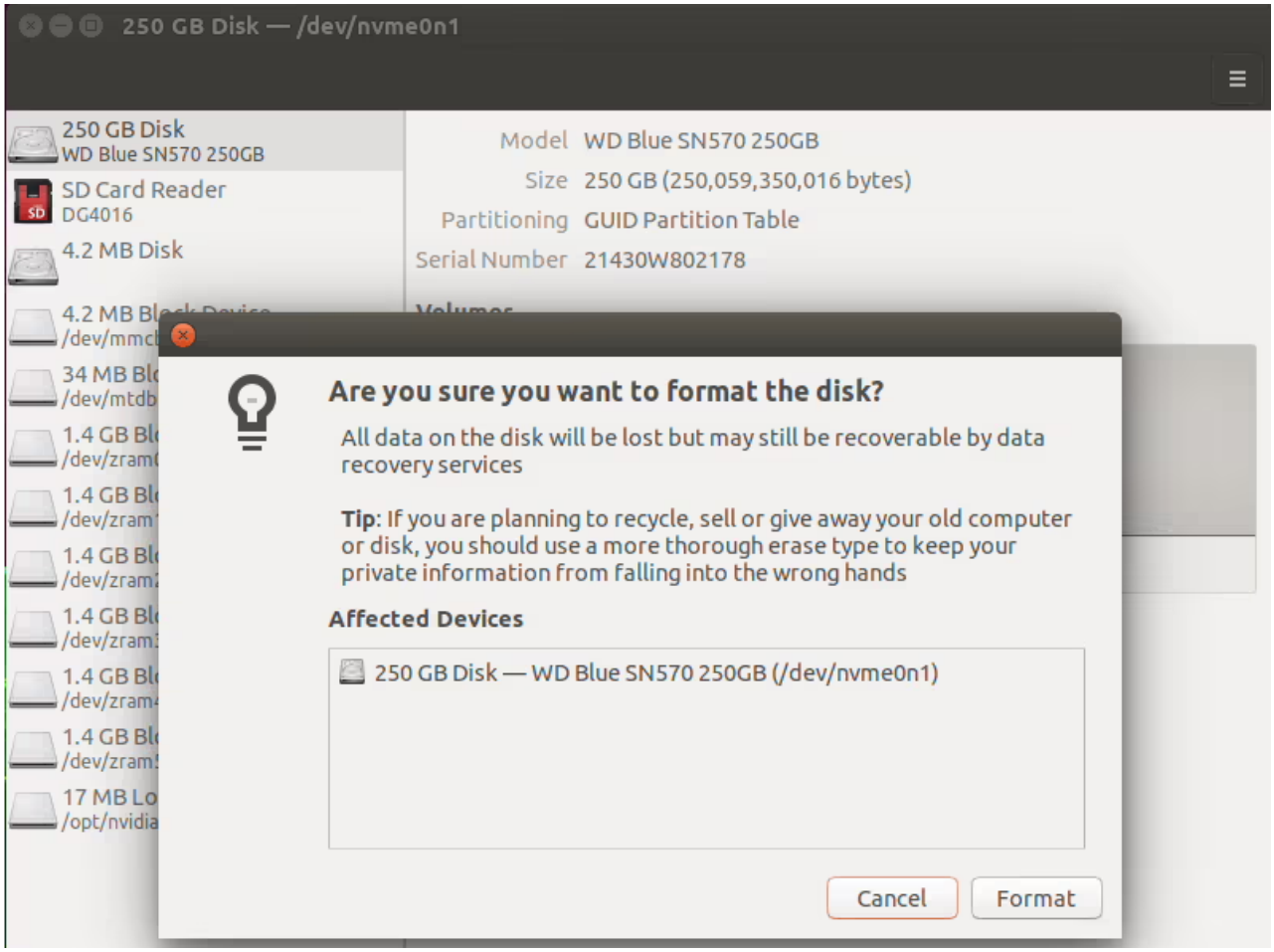
The first command allows the Jetson module's whole sources to use. The next command opens GNOME Disks application below.

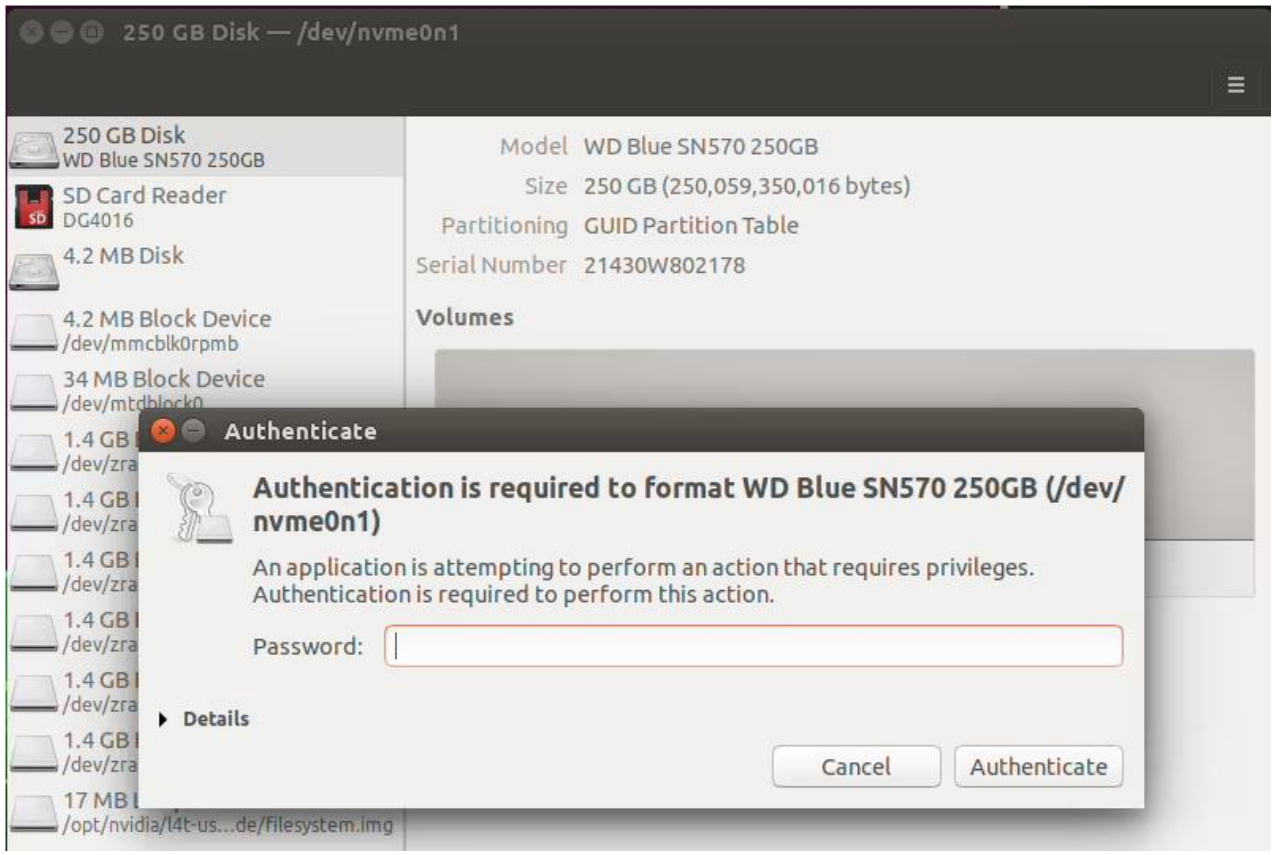


Format the whole disk before creating the storage.

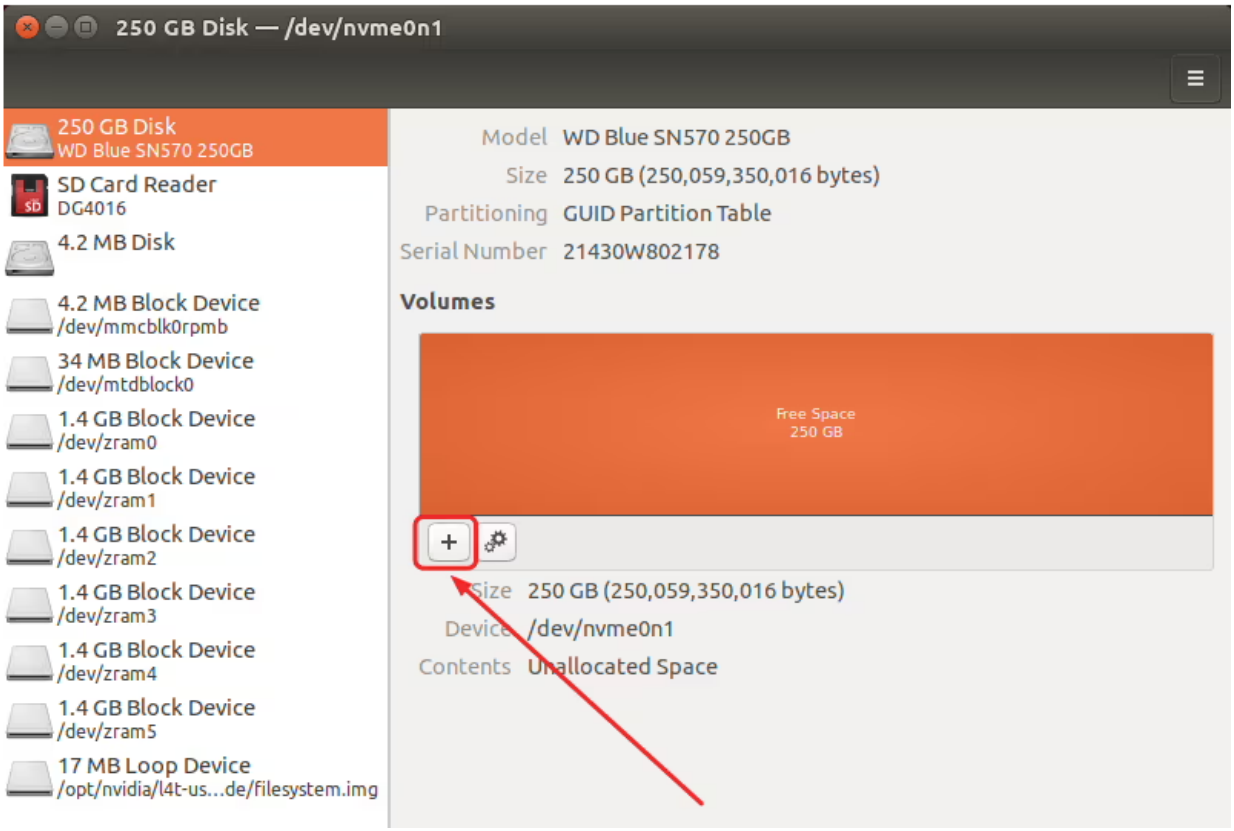


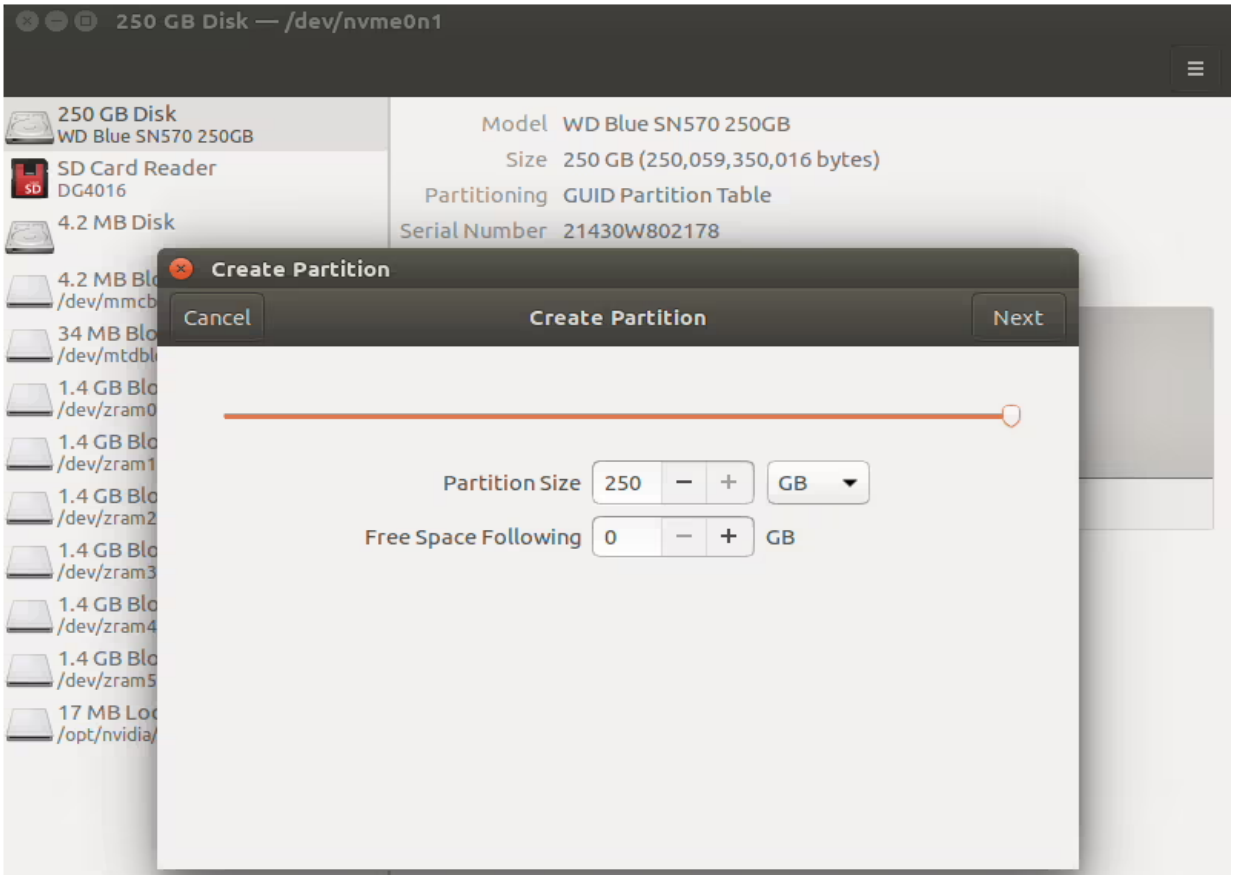




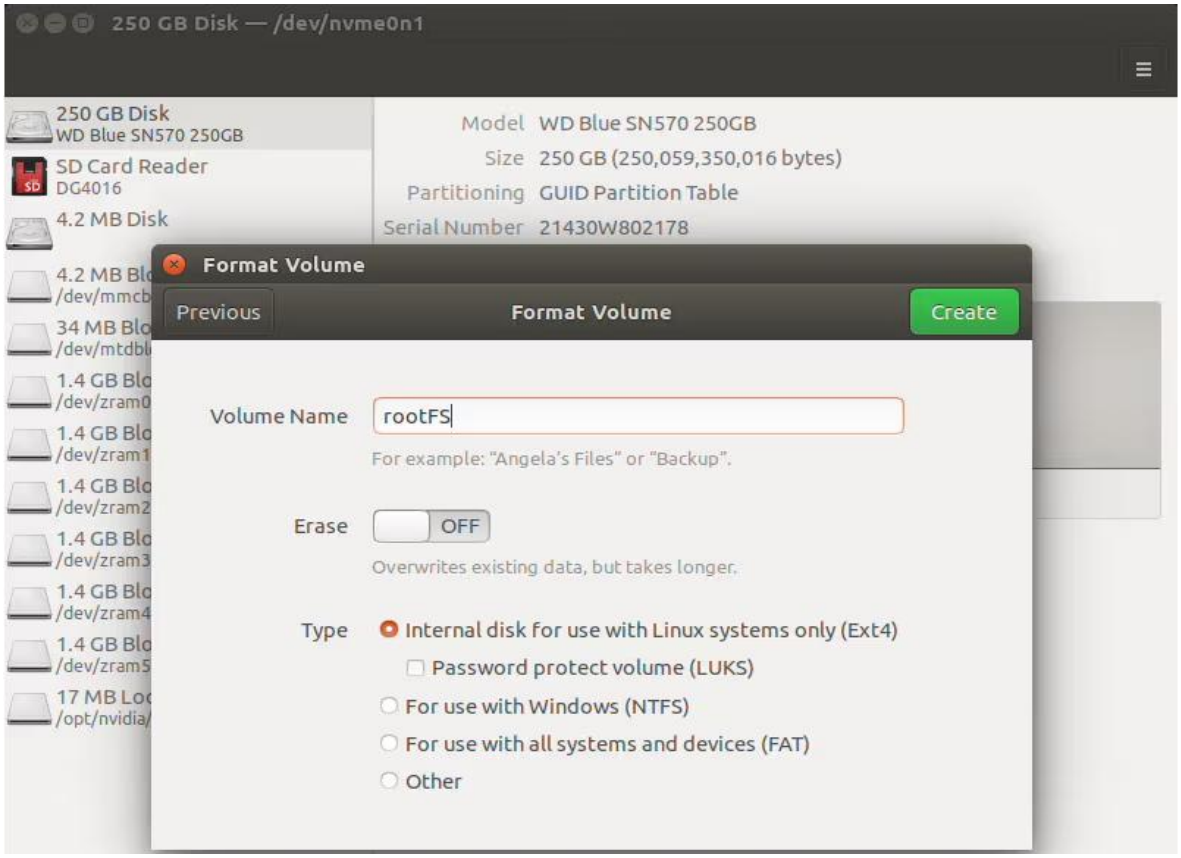


Then, create a new partition from SSD storage.

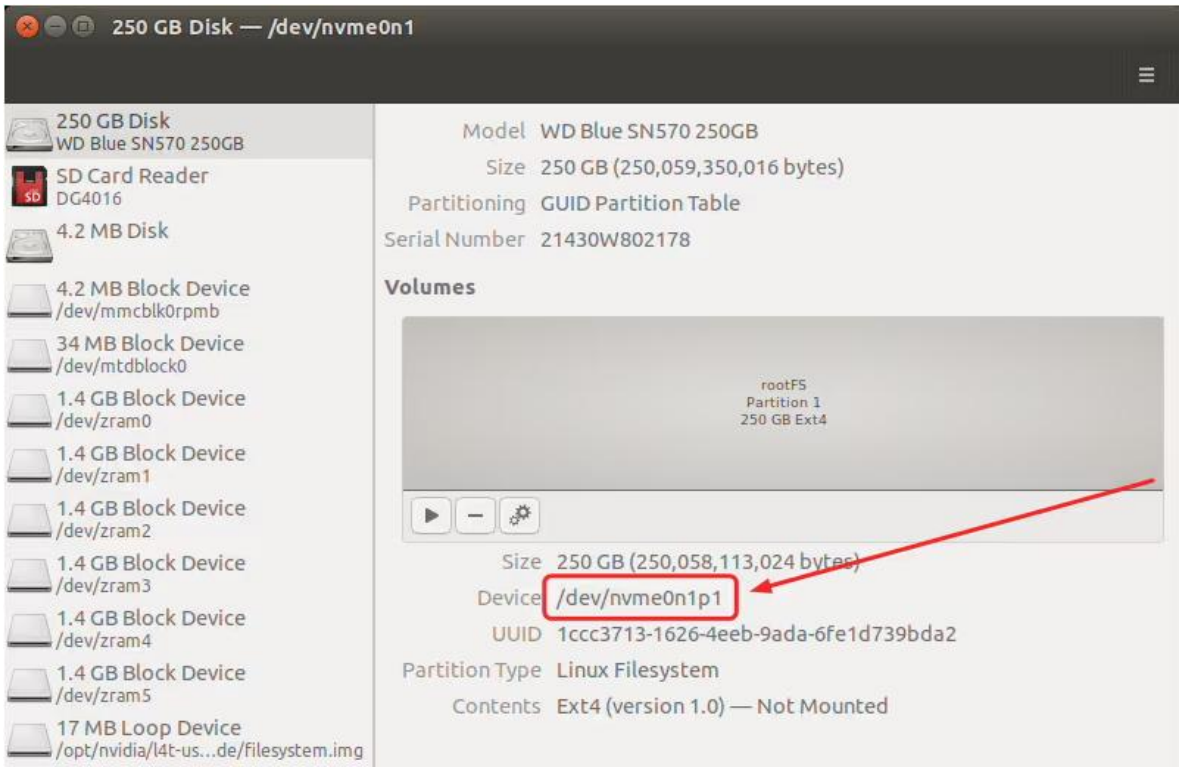




Format the disk as ext4 format (partition size is up to you but must be min current file system's size).



After creating the partition, check it's name (/dev/nvme0n1p1).



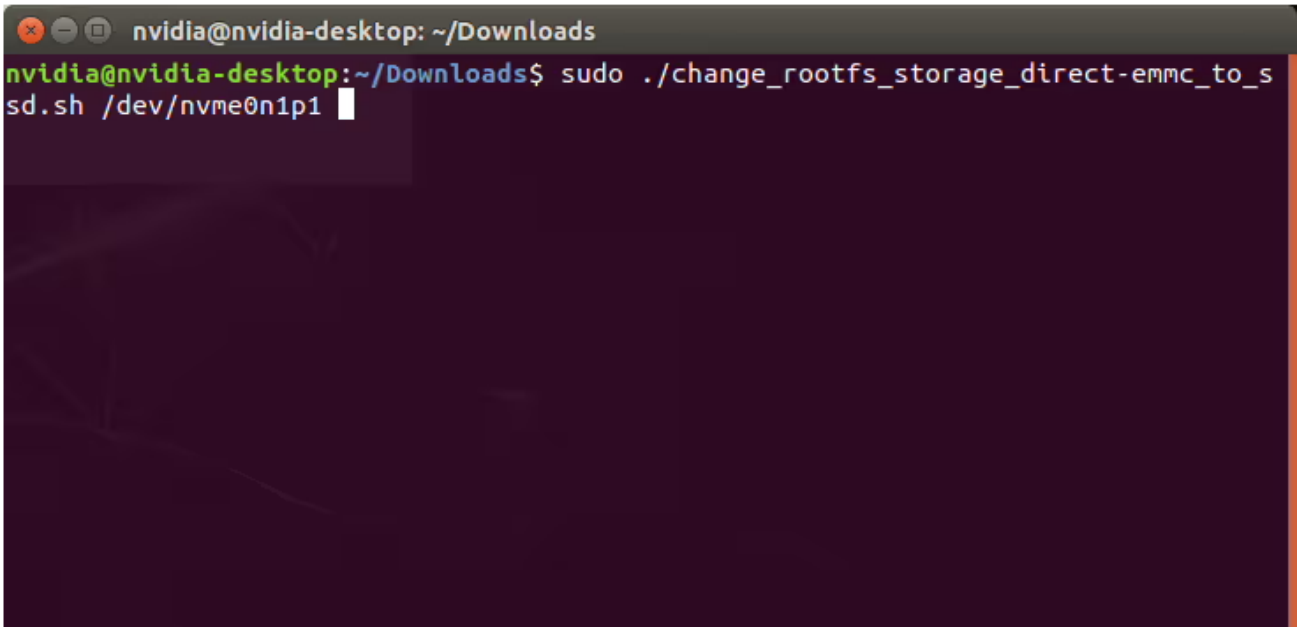
Copying the Root File System

Download the script file from here and extract it. Then, run it with this command below:

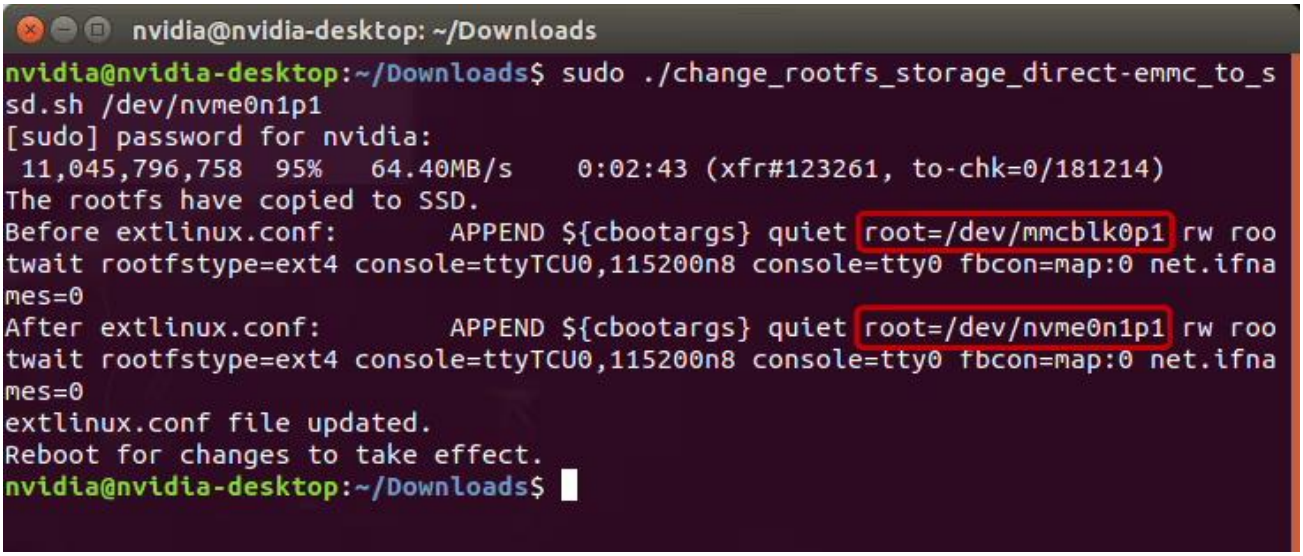
```
sudo ./change_rootfs_storage_direct-emmc_to_ssd.sh {EXTERNAL_STORAGE}
```

In our setup, we typed this command below:

```
sudo ./change_rootfs_storage_direct-emmc_to_ssd.sh /dev/nvme0n1p1
```



A few times later, the whole file system copied and the root path changed.

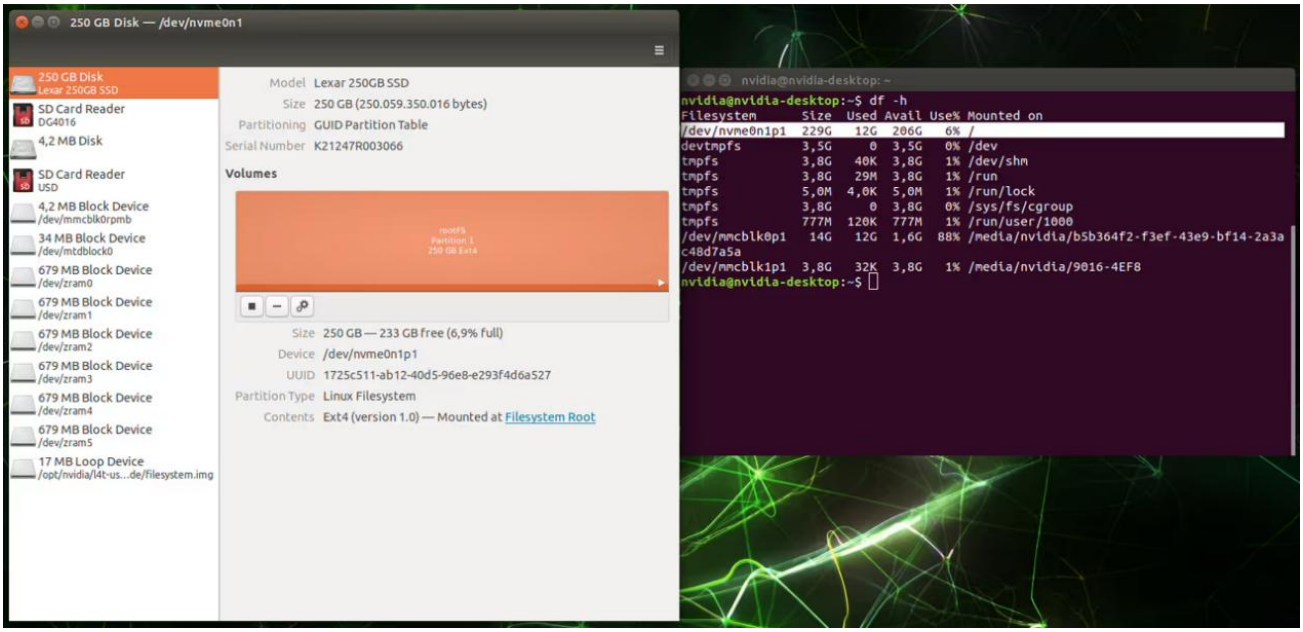


It's time to reboot the Jetson module. Reboot it and check the Root File System copied successfully.

Assignment of the Root File System

Open a terminal and type this command to check the root mounted from SSD below:

```
df -h
```



After rebooting you can see that the new storage is assigned as root file system.