



# ***JV300-IL364***

Military Jetson AGX Orin IP65 Rugged Computer



**User's Manual**

Revision Date: Mar. 19, 2025



## 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*

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- All product specifications are subject to change without prior notice



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## 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)<br>1x M.2 3042/3052 B key<br>1x M.2 2030 E Key<br>2x UART<br>1x I2S<br>1x I2C<br>2x SPI<br>1x CAN<br>1x SIM<br>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 )<br>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                       |

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|              |                                |
|--------------|--------------------------------|
|              | 1x Recover Button              |
|              | 1x USB type-C for Debug        |
|              | 1x USB Type-C for Recovery     |
|              | 1x Reboot 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                                                               |

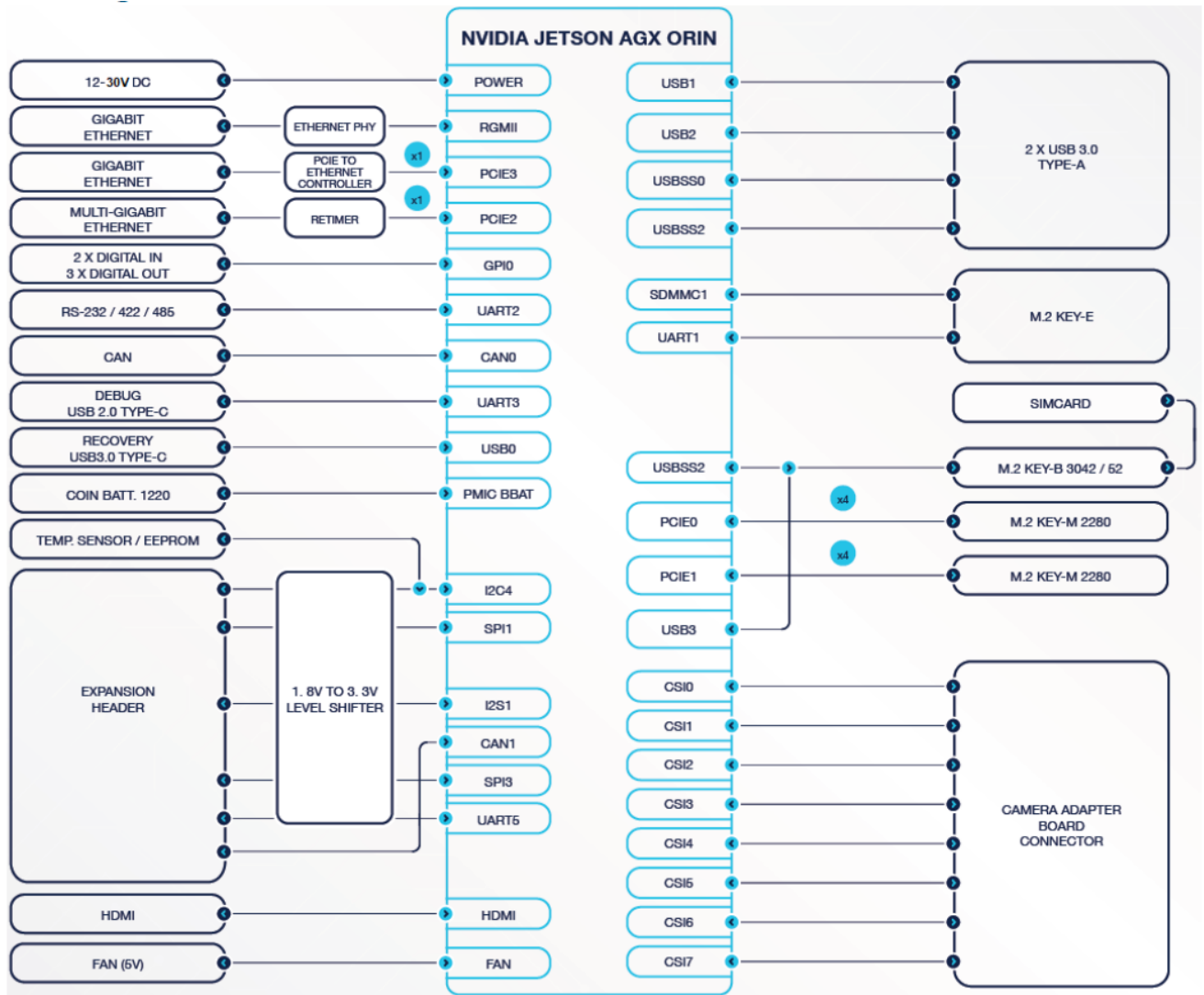
## PHYSICAL

|           |                                     |
|-----------|-------------------------------------|
| 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               |

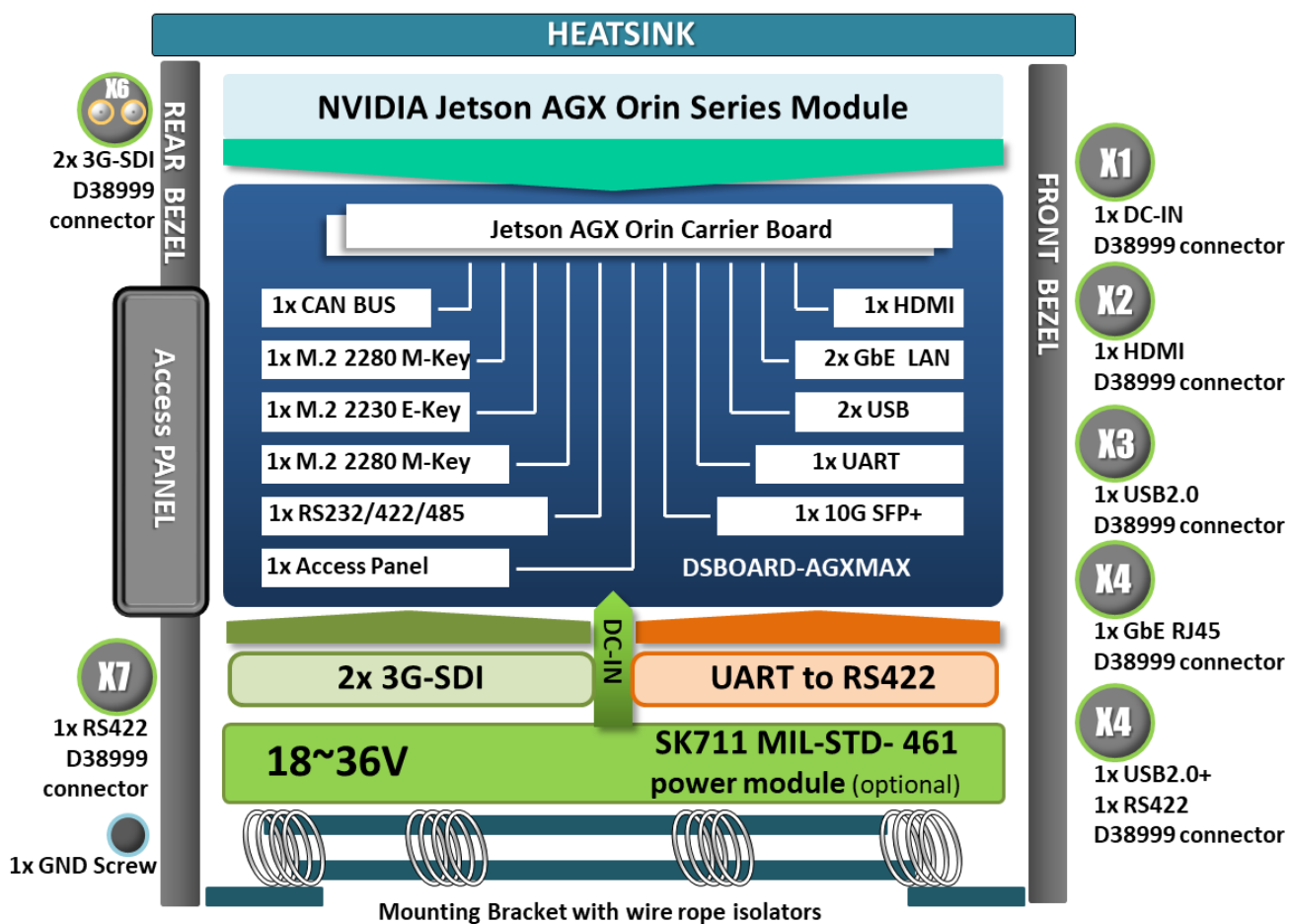
## ENVIRONMENTAL

|                   |                                                        |
|-------------------|--------------------------------------------------------|
| 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                              |

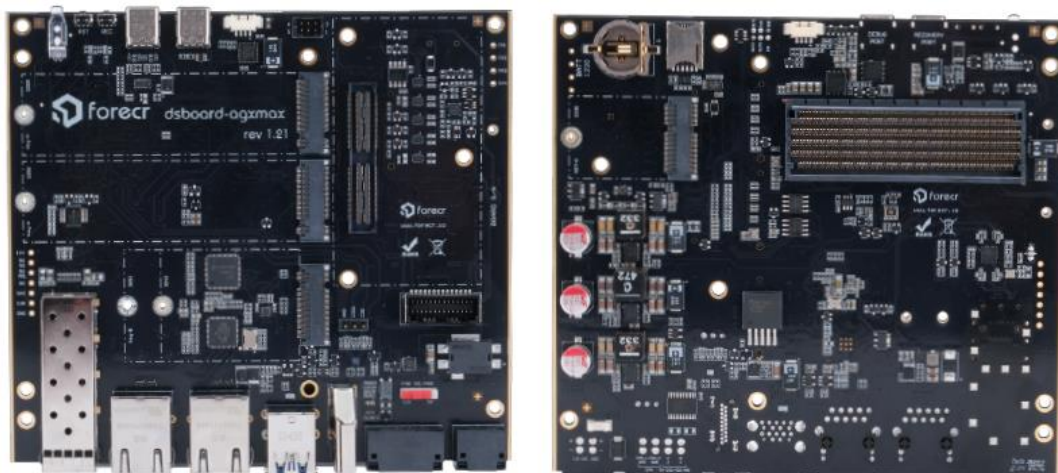
## Mother Board Block Diagram



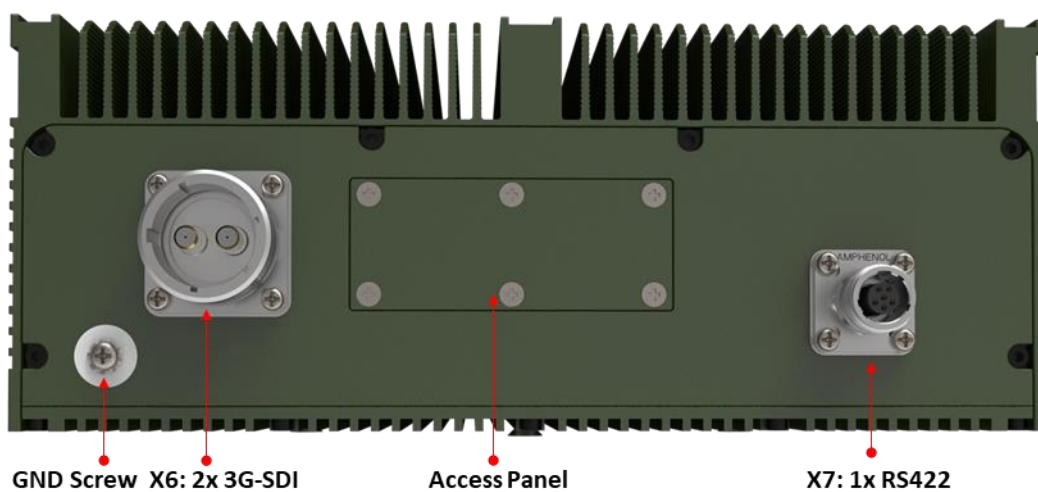
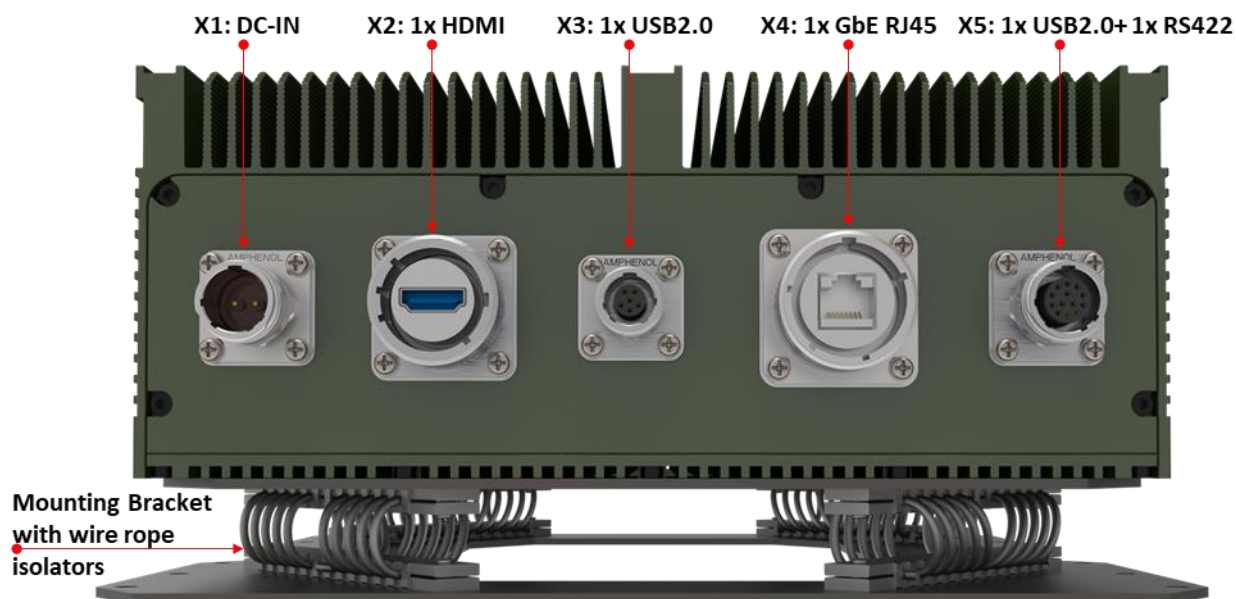
## System Block Diagram



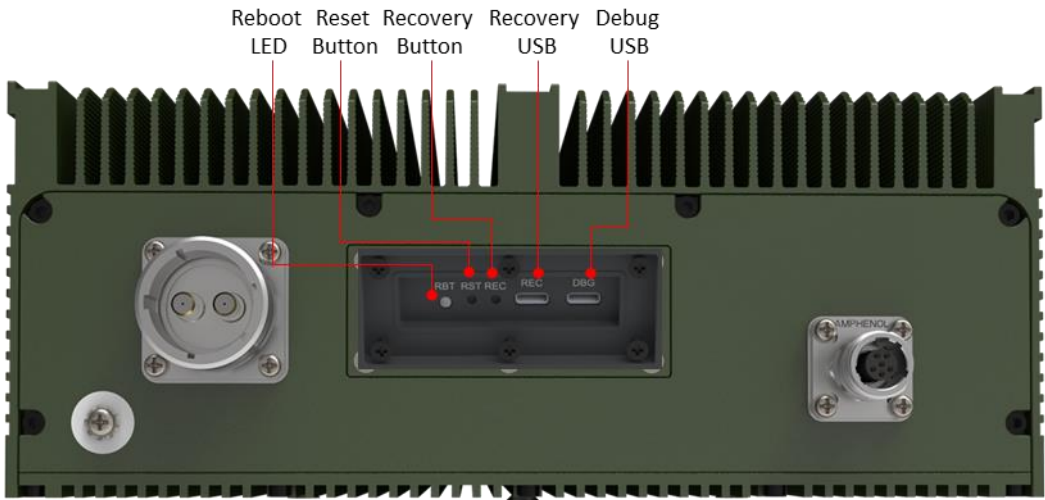
## Board Visuals



## System Front/Rear IO Visuals

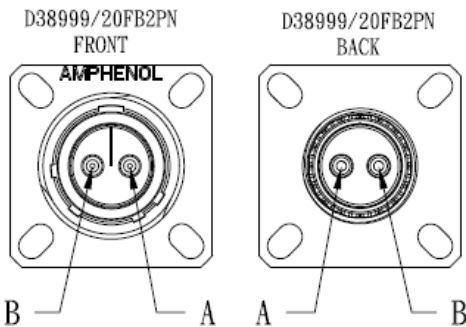


# List of Connectors & Buttons



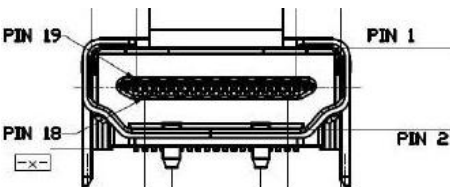
## Definition of each I/O

### X1: DC Power IN:



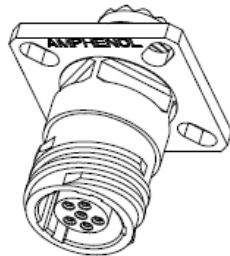
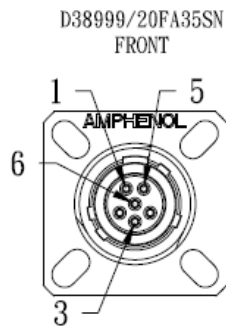
| D38999/20FB2PN<br>DC-IN |      |
|-------------------------|------|
| A                       | Vin+ |
| B                       | Vin- |

### 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             |       |            |

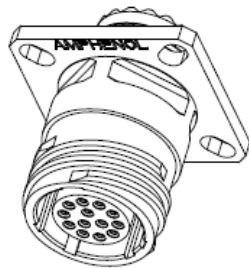
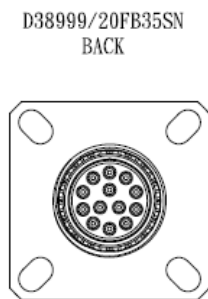
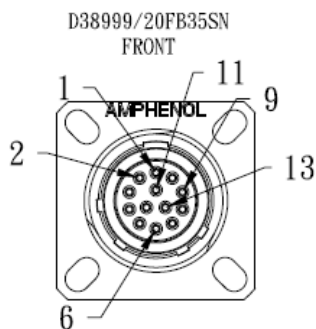
X3: USB2.0



| D38999/20FA35SN<br>USB2. 0 |       |
|----------------------------|-------|
| 1                          | VCC   |
| 2                          | D-    |
| 3                          | D+    |
| 4                          | GND   |
| 5                          | N. C. |
| 6                          | N. C. |

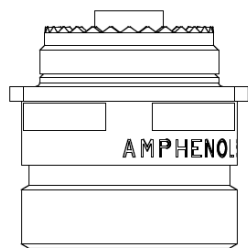
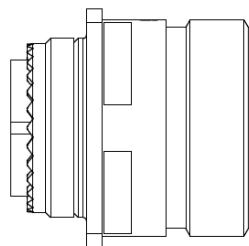
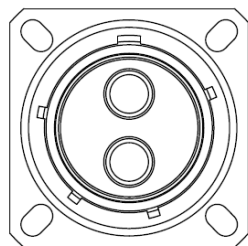
X4: 1x GbE LAN RJ45 jack with D38999 connector

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



| D38999/20FB35SN<br>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. |

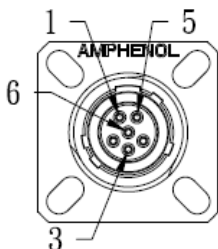
X6: 2x 3G-SDI input with D38999 connector



|                                    |                                                                                                                                                                         |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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                                                                                                                                |

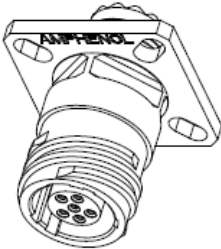
## X7: 1x RS422 with D38999 connector

D38999/20FA35SA  
FRONT



D38999/20FA35SA  
BACK





| D38999/20FA35SA<br>RS422 |       |
|--------------------------|-------|
| 1                        | TX+   |
| 2                        | TX-   |
| 3                        | RX+   |
| 4                        | RX-   |
| 5                        | GND   |
| 6                        | N. C. |



## Ordering Information

| Model                     | NV300-2L64                                                      | NV300-1LS64                        | NV300-2LG64                                    | NV300-2LGS64                                   |
|---------------------------|-----------------------------------------------------------------|------------------------------------|------------------------------------------------|------------------------------------------------|
| GPU                       | 2048-core NVIDIA Ampere with 64 Tensor Cores<br>(AGX Orin 64GB) |                                    |                                                |                                                |
| Memory                    | 64GB                                                            |                                    |                                                |                                                |
| AI Performance            | 275 TOPs                                                        |                                    |                                                |                                                |
| CPU                       | 12-core Arm® Cortex®-A78AE v8.2 64-bit CPU 3MB L2 + 6MB L3      |                                    |                                                |                                                |
| Module total module power | 15W   35W   60W, and up to 75W                                  |                                    |                                                |                                                |
| Storage                   | 2x M.2 NVMe                                                     | 1x M.2 NVMe 256GB                  | 2x M.2 NVMe                                    | 1x M.2 NVMe                                    |
|                           | 64GB eMMC 5.1 Flash                                             | 64GB eMMC 5.1 Flash                | 64GB eMMC 5.1 Flash                            | 64GB eMMC 5.1 Flash                            |
| Front I/O                 |                                                                 |                                    |                                                |                                                |
| X1                        | 12-30 VDC with D38999                                           | 12-30 VDC with D38999              | 12-30 VDC with D38999                          | 12-30 VDC with D38999                          |
| X2                        | 1x HDMI                                                         | 1x HDMI with D38999                | 1x HDMI                                        | 1x HDMI                                        |
| X3                        | 1x USB3.0                                                       | 1x USB2.0 with D38999              | 1x USB3.0                                      | 1x USB3.0                                      |
| X4                        | 1x 10GB MPO                                                     | 1x GbE RJ45 with D38999            | 1x 10GB MPO                                    | 1x 10GB MPO                                    |
| X5                        | 2x GbE+1x RS232/422/485<br>+1x CAN+2x DI+3x DO                  | 1x USB2.0+ 1x RS422 with<br>D38999 | 2x GbE+1x RS232/422/485<br>+1x CAN+2x DI+3x DO | 2x GbE+1x RS232/422/485<br>+1x CAN+2x DI+3x DO |
| Rear I/O                  |                                                                 |                                    |                                                |                                                |
| GMSL                      | N/A                                                             | N/A                                | 4x (up to 8x)                                  | 4x (up to 8x)                                  |
| 3G-SDI                    | N/A                                                             | 2x 3G-SDI with D38999              | N/A                                            | 4x                                             |
|                           | TBD                                                             | 1x RS422                           | TBD                                            | TBD                                            |
| Access panel              |                                                                 |                                    |                                                |                                                |
|                           | 1x Reset Button                                                 |                                    |                                                |                                                |
|                           | 1x Recover Button                                               |                                    |                                                |                                                |
|                           | 1x Debug Type-C                                                 |                                    |                                                |                                                |
|                           | 1x Recovery Type-C                                              |                                    |                                                |                                                |
|                           | 1x Boot LED                                                     |                                    |                                                |                                                |
| Dimensions                | 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 NV300-1LS64 (recovery port), and a host PC with USB Type-A running Ubuntu 20.04.

#### JetPack-6.x Installation for NV300-1LS64.

In this tutorial, we will install JetPack-6 for NV300-1LS64. 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 NV300-1LS64. 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.

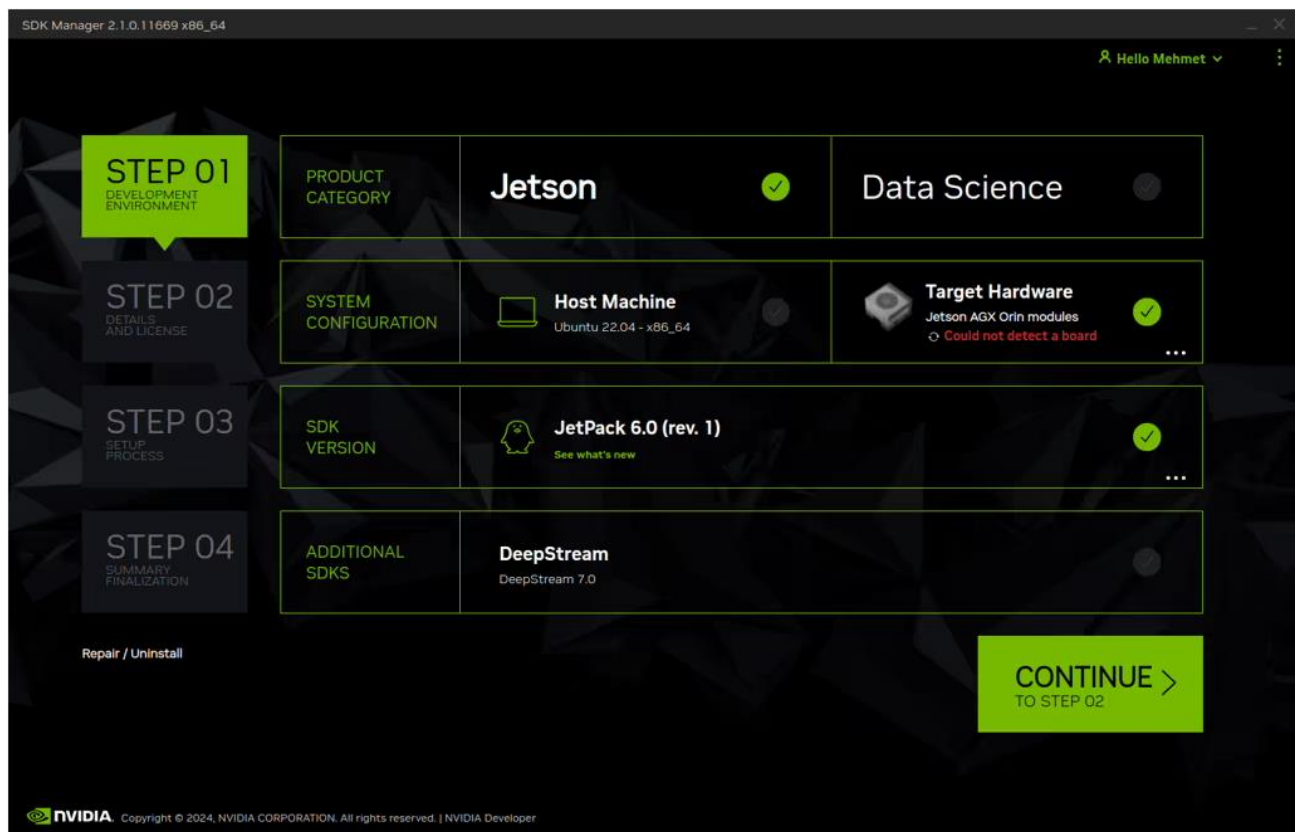
#### Including the Kernel Files in Jetson OS Image

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).

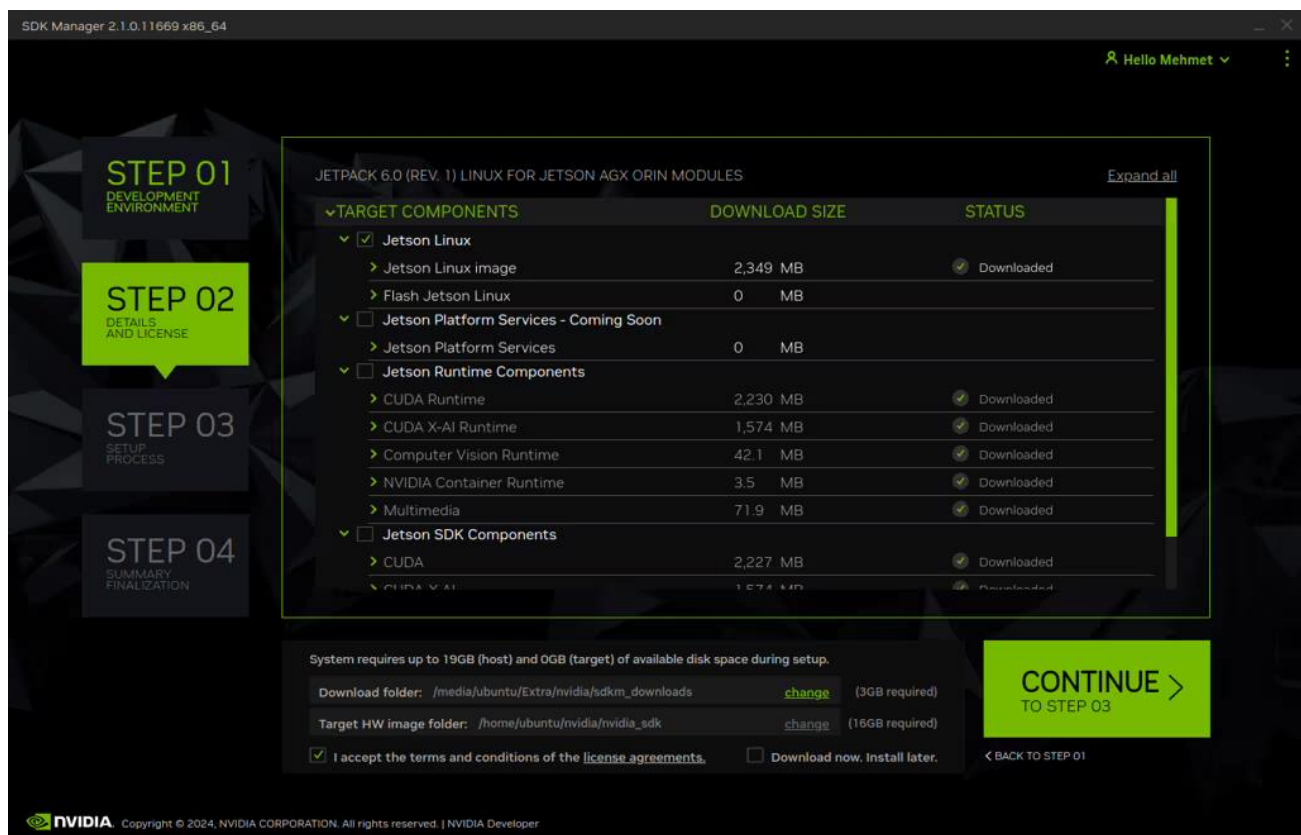
Then, continue to Step 2.

# NV300-1LS64 User's Manual

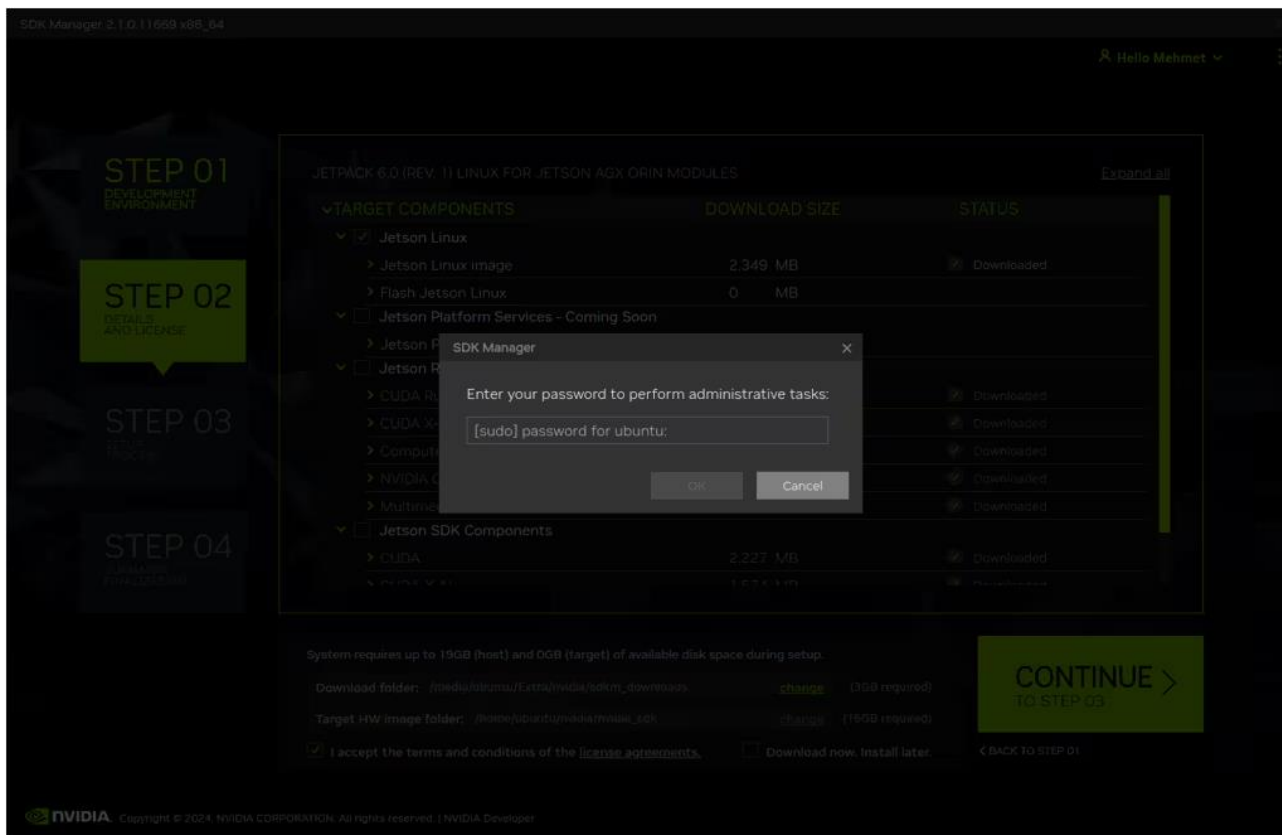
Revision Date: Mar. 19. 2025



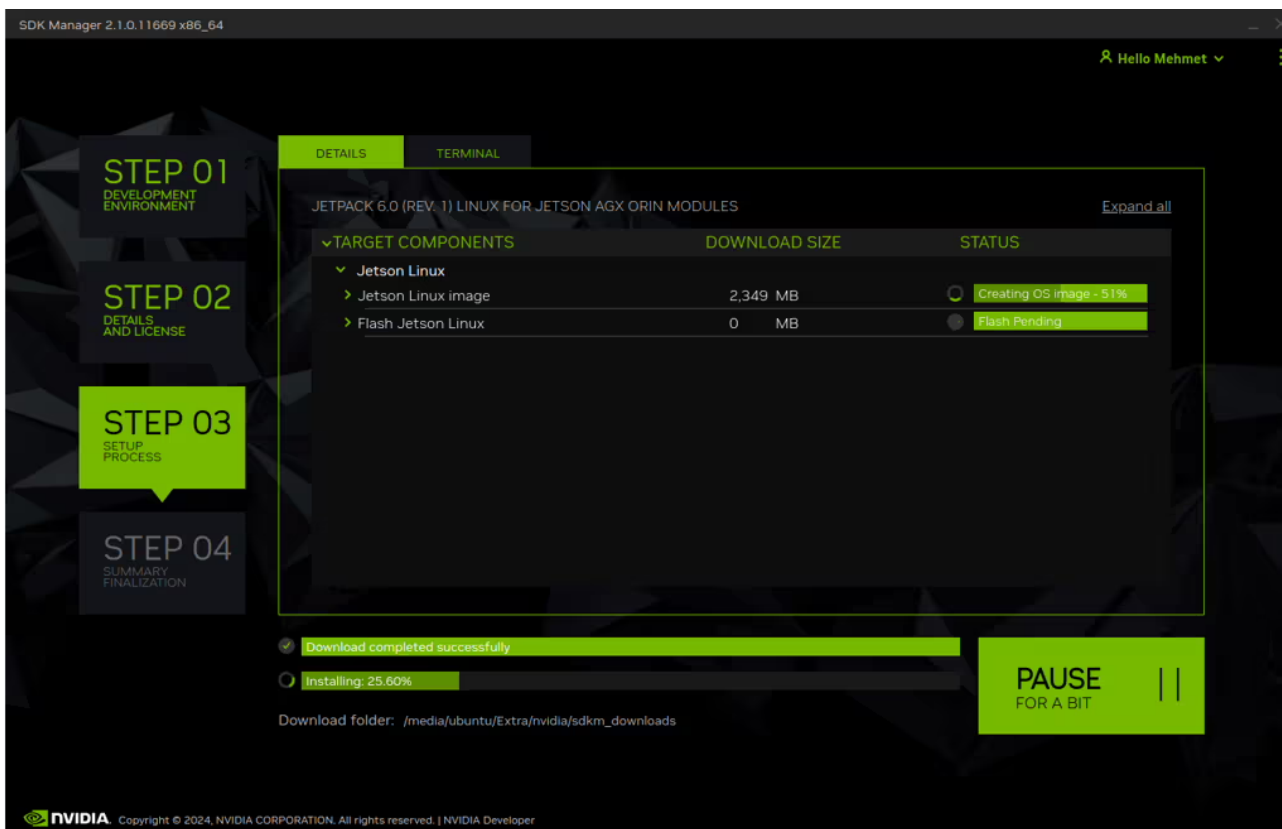
Choose only “Jetson Linux”, accept the terms & conditions and continue to Step 3.



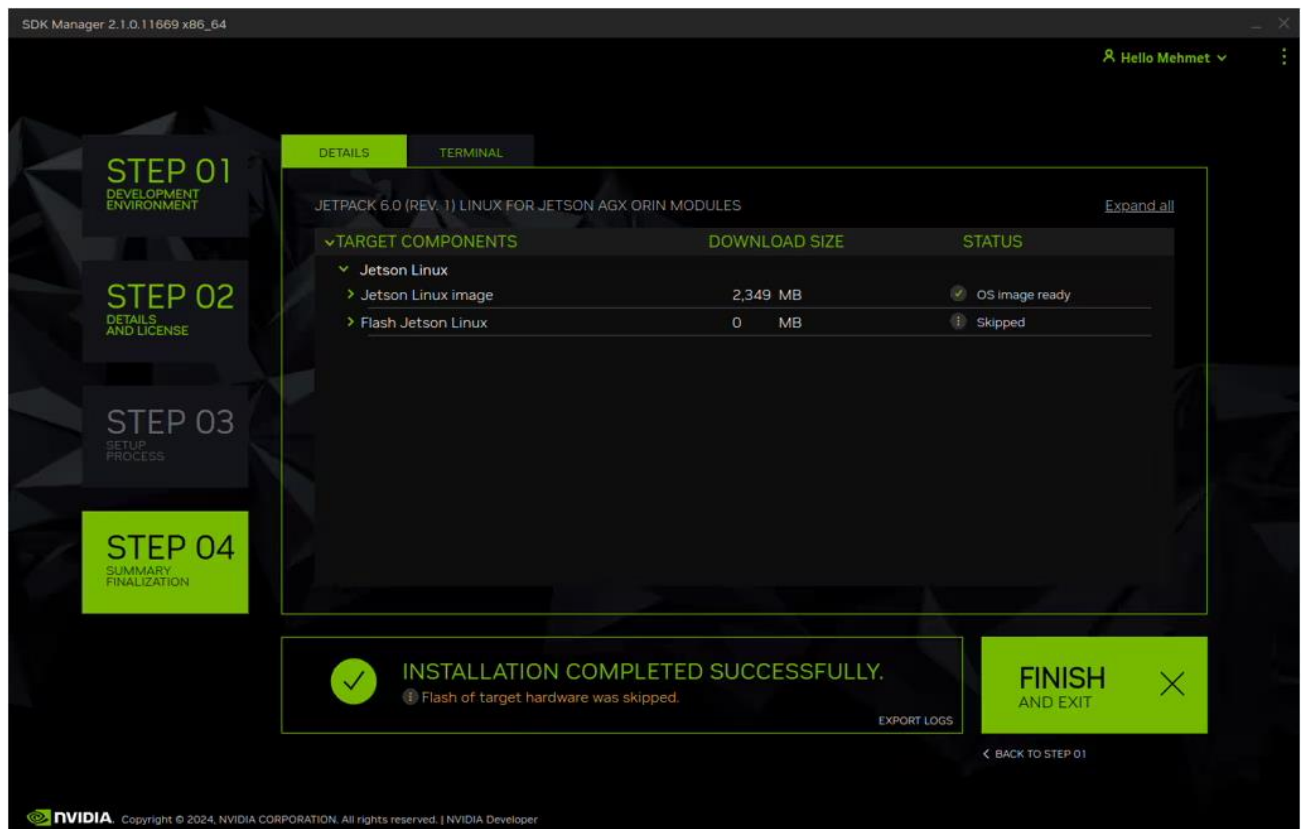
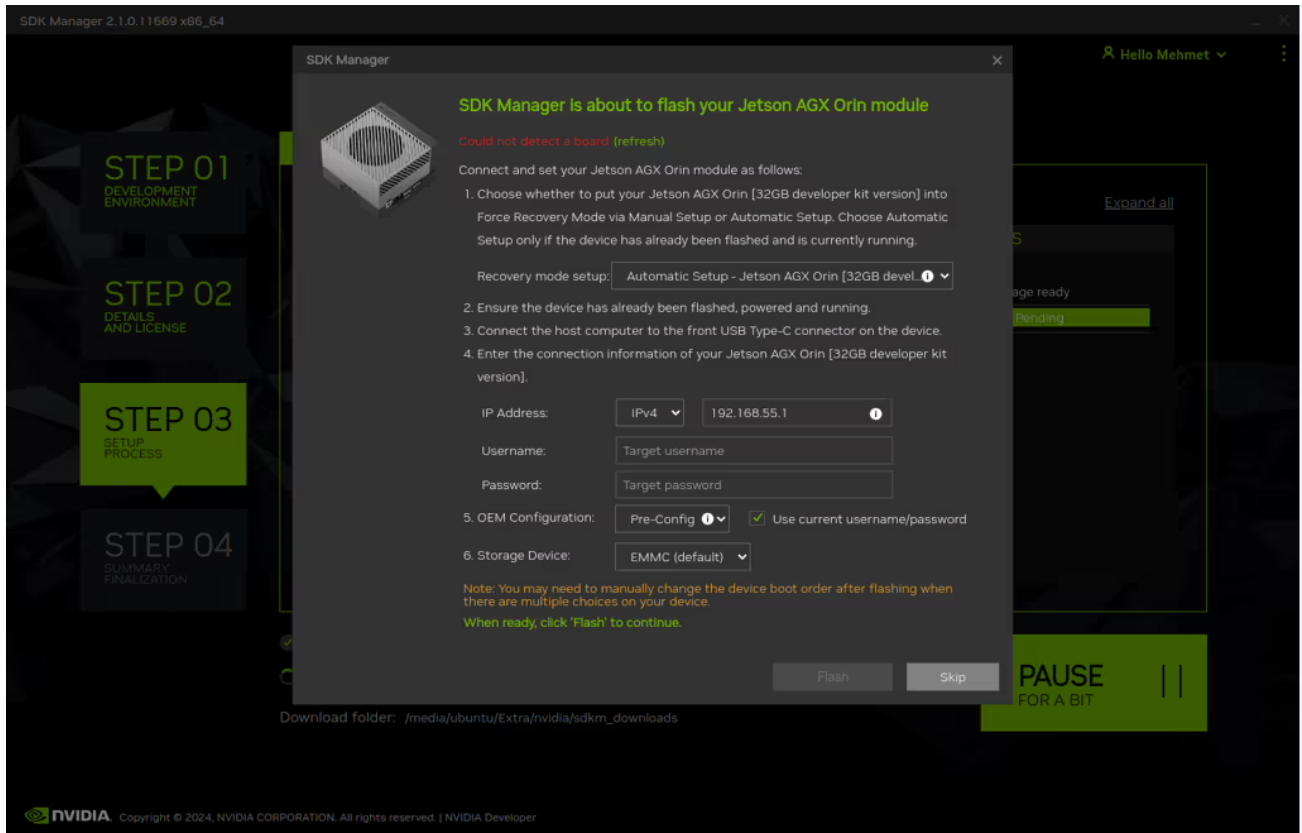
The SDK Manager will ask the username's password. Fill it and continue.



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:

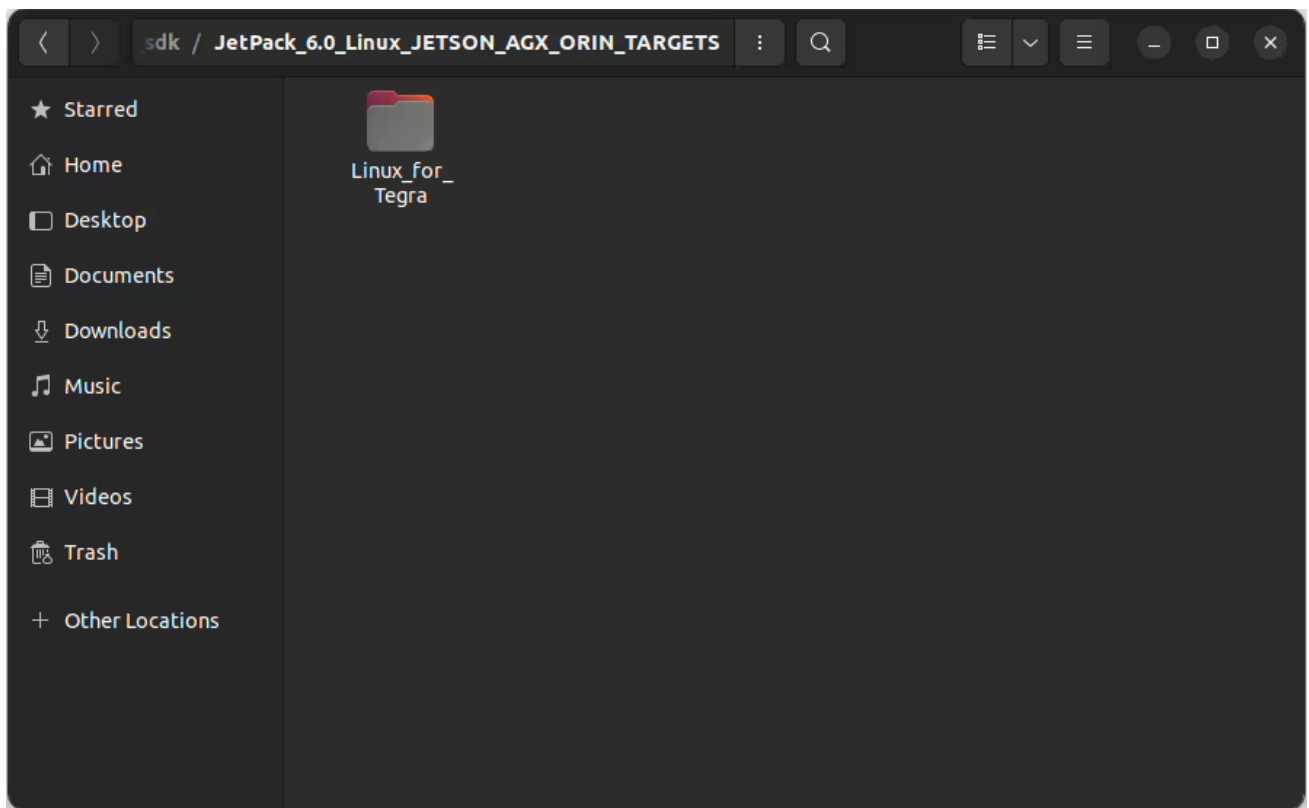
AGX Orin or AGX Orin Industrial: `~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARGETS/`

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](#))

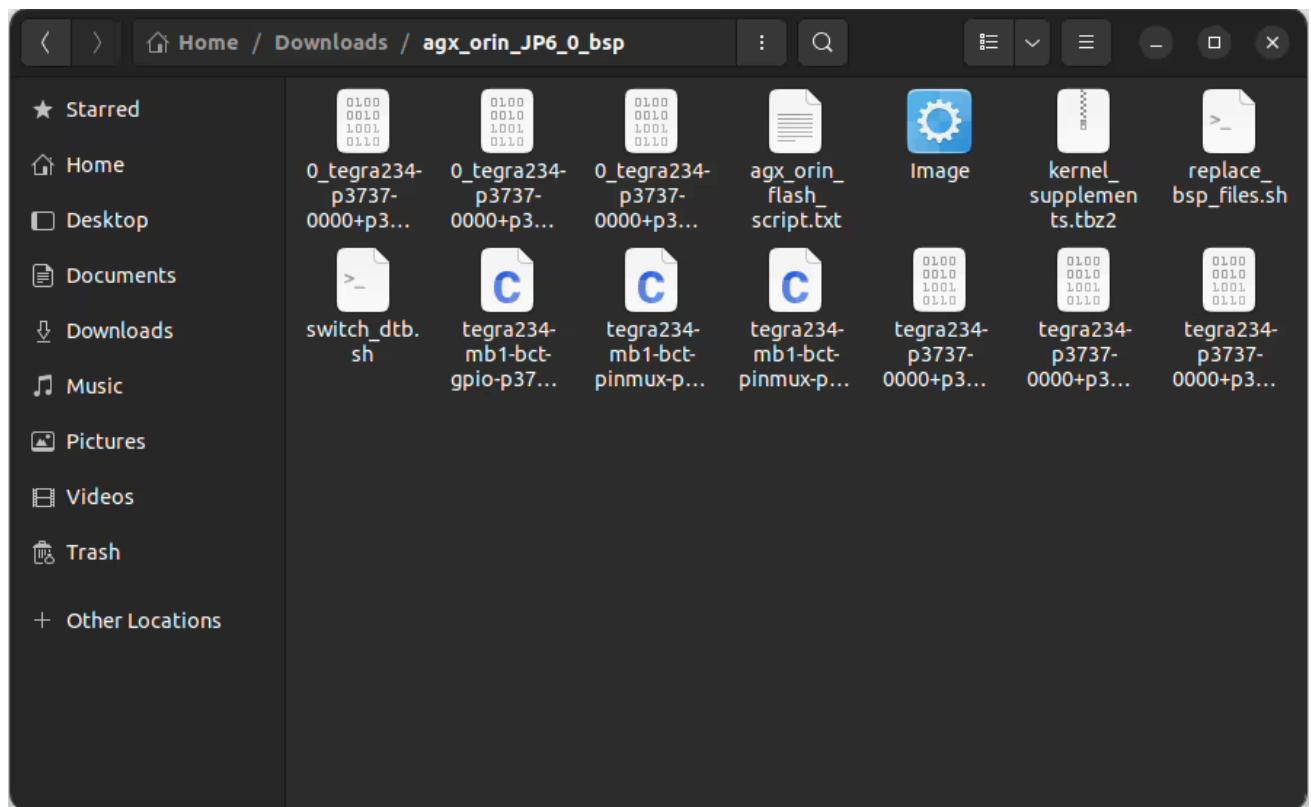
For JetPack-6.1:

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

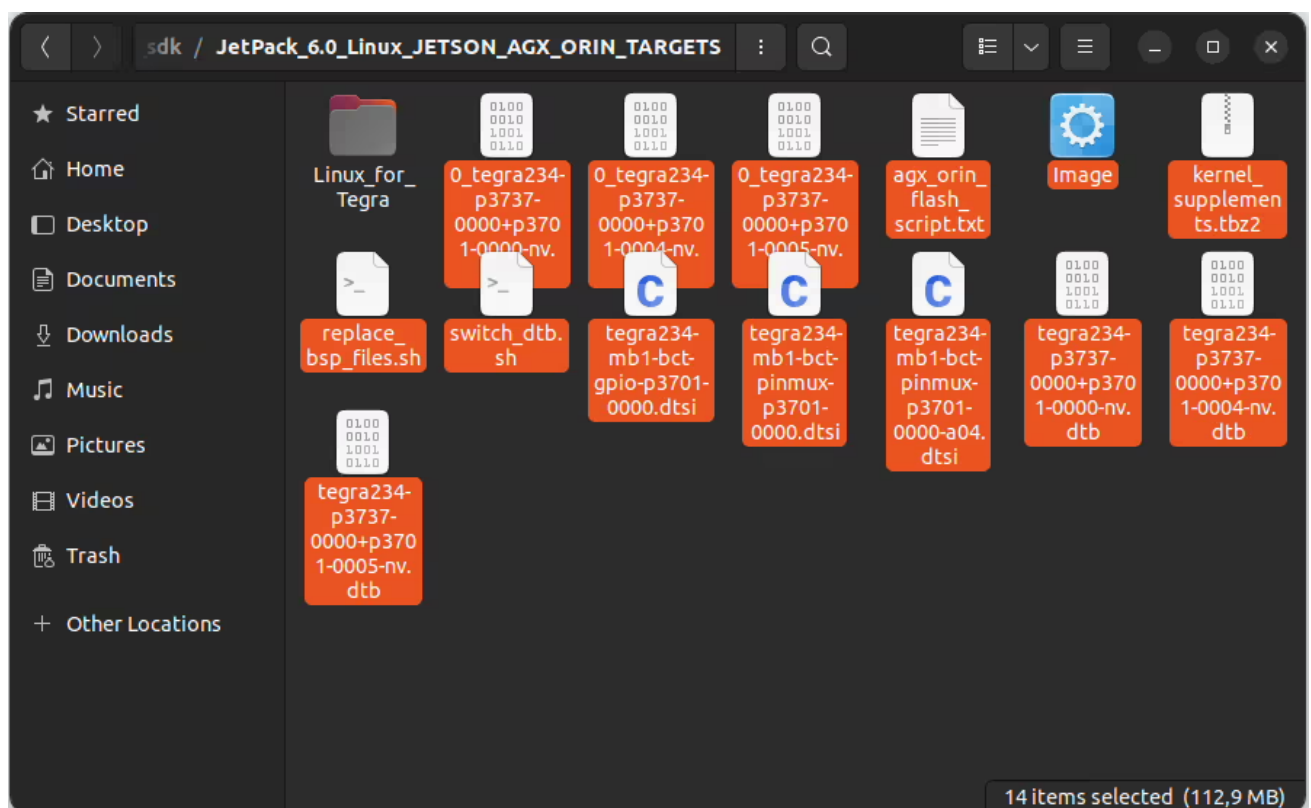
For JetPack-6.2:

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

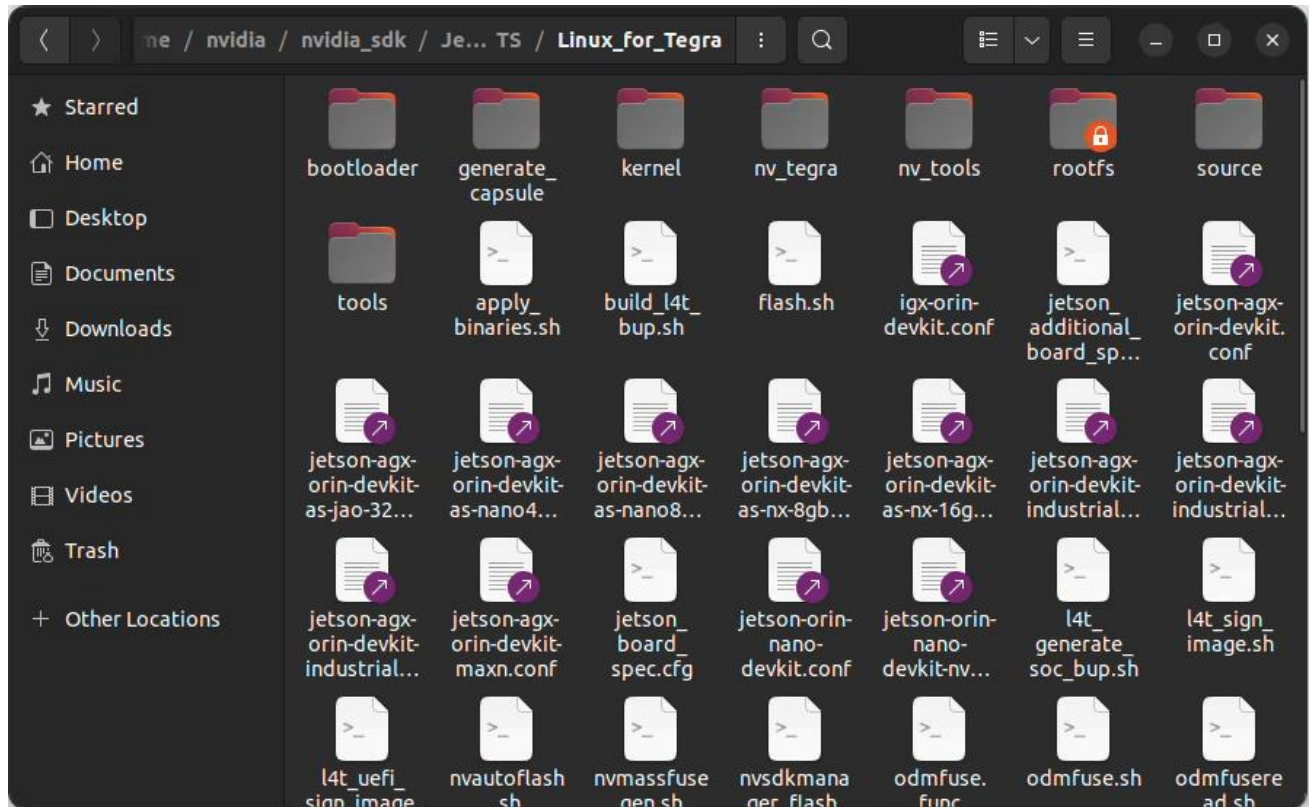
**Hint:** The following steps have done for AGX Orin, but they are the same for the other Jetson module types (only the BSP files and flashing commands are different).



Copy all files to the target HW image folder.

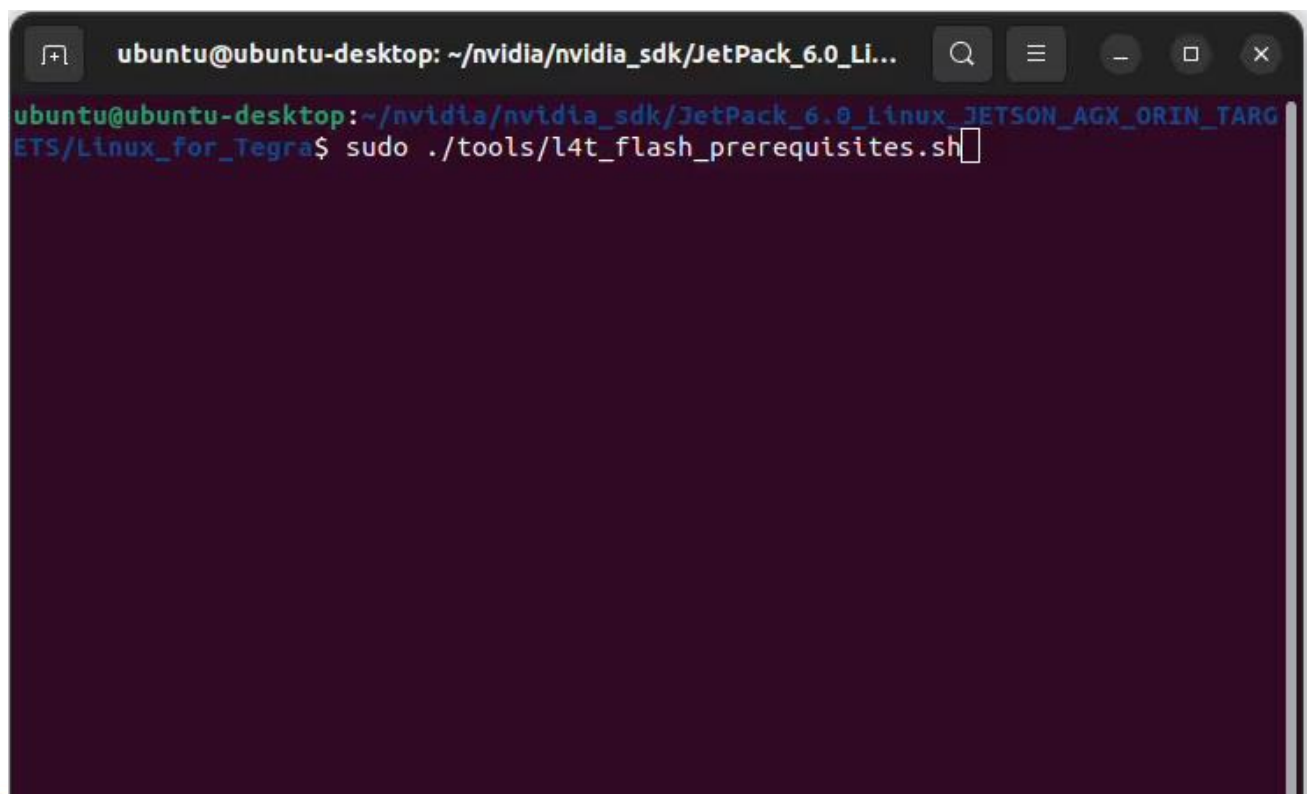


Open a terminal from the "Linux\_for\_Tegra" folder



Create the system binaries with these commands below:

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

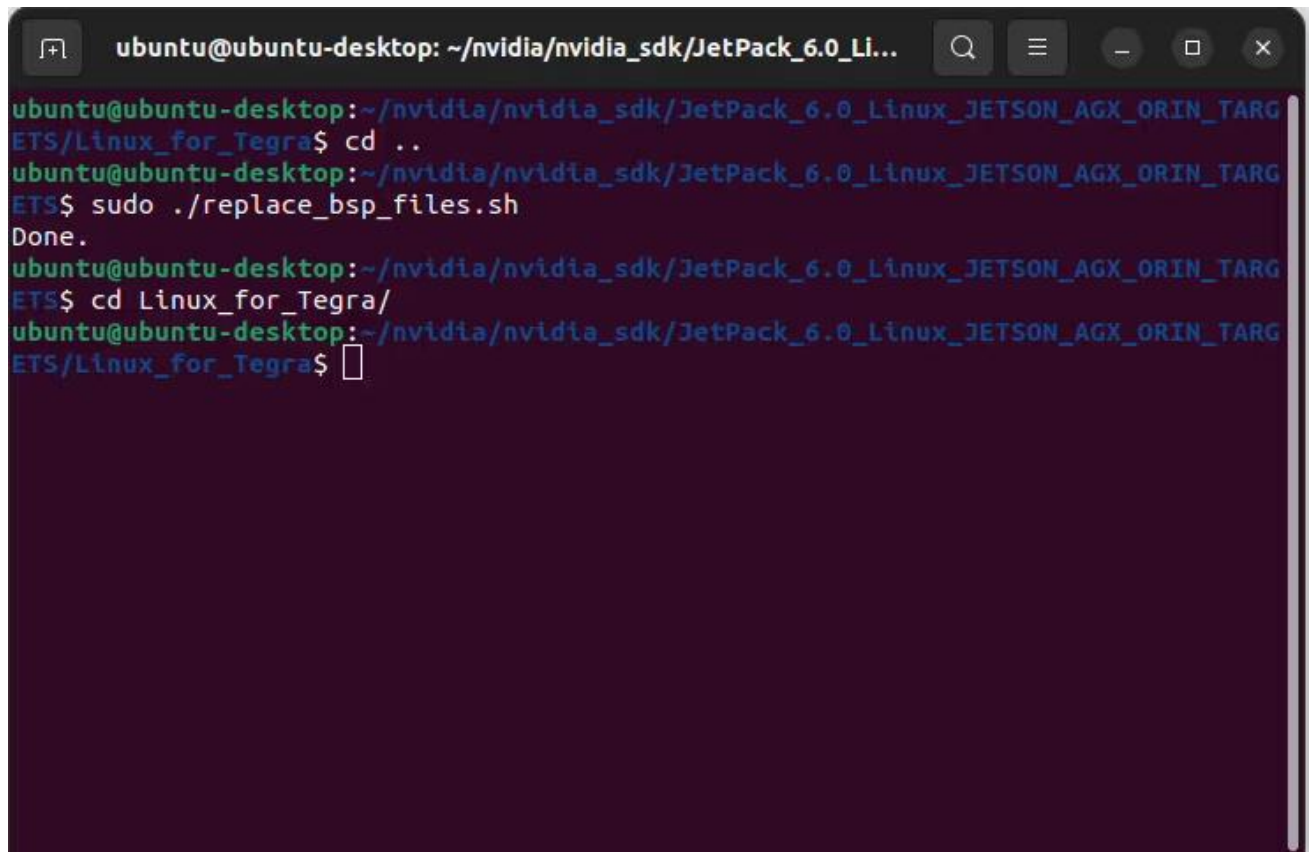


```
ubuntu@ubuntu-desktop: ~/nvidia/nvidia_sdk/JetPack_6.0_Li...
device-tree-compiler is already the newest version (1.6.1-1).
dosfstools is already the newest version (4.2-1build3).
lz4 is already the newest version (1.9.3-2build2).
python3-yaml is already the newest version (5.4.1-1ubuntu1).
whois 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).
sshpas 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_TARG
ETS/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_f
or_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_TARG
ETS/Linux_for_Tegra$
```

Apply the interface configurations with the following commands below:

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



```
ubuntu@ubuntu-desktop: ~/nvidia/nvidia_sdk/JetPack_6.0_Li...  
ubuntu@ubuntu-desktop:~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARG  
ETS/Linux_for_Tegra$ cd ..  
ubuntu@ubuntu-desktop:~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARG  
ETS$ sudo ./replace_bsp_files.sh  
Done.  
ubuntu@ubuntu-desktop:~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARG  
ETS$ cd Linux_for_Tegra/  
ubuntu@ubuntu-desktop:~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARG  
ETS/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 NV300-1LS64.

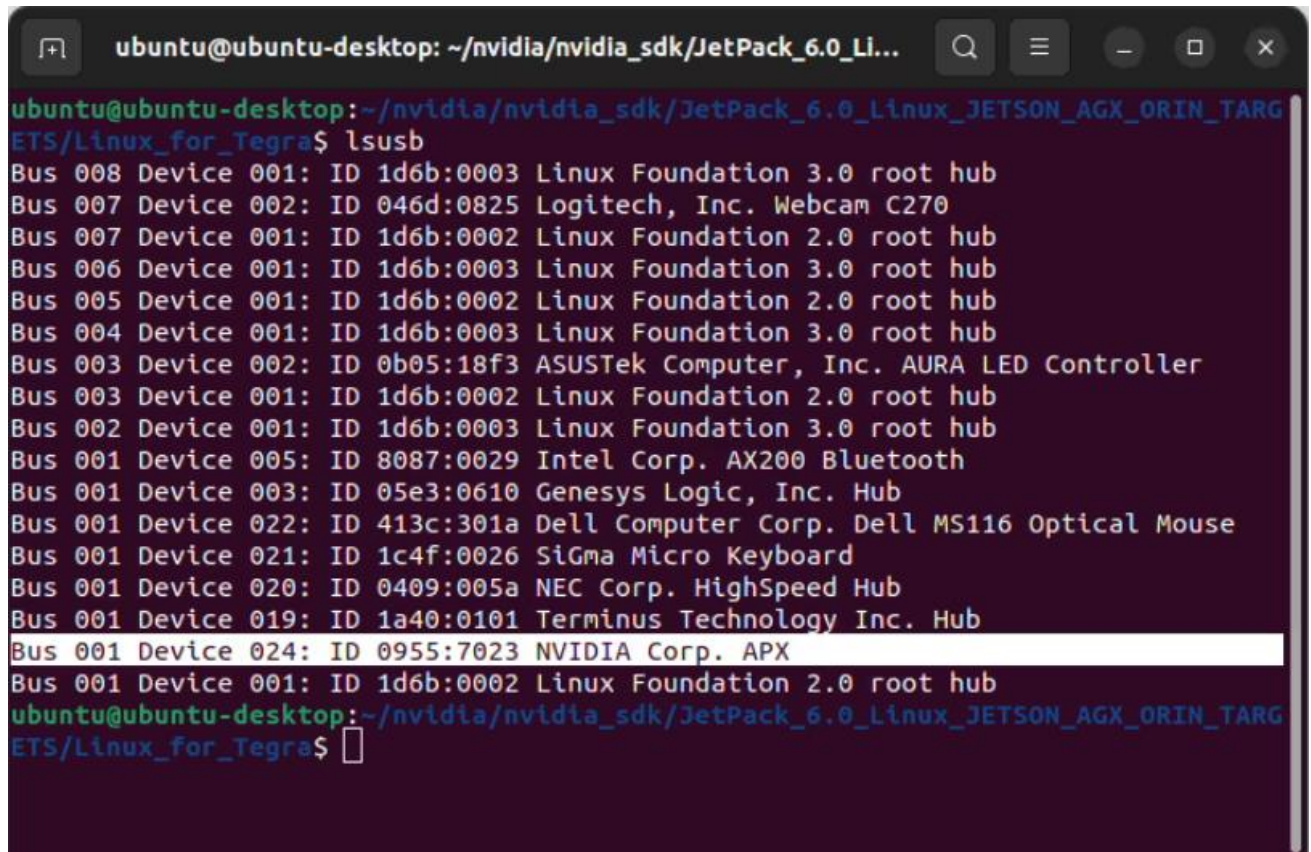
While the NV300-1LS64's power connector plugged in,

- 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



```
ubuntu@ubuntu-desktop: ~/nvidia/nvidia_sdk/JetPack_6.0_Li...
ubuntu@ubuntu-desktop:~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARG
ETS/Linux_for_Tegra$ lsusb
Bus 008 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 007 Device 002: ID 046d:0825 Logitech, Inc. Webcam C270
Bus 007 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 006 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 005 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 004 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 003 Device 002: ID 0b05:18f3 ASUSTek Computer, Inc. AURA LED Controller
Bus 003 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 005: ID 8087:0029 Intel Corp. AX200 Bluetooth
Bus 001 Device 003: ID 05e3:0610 Genesys Logic, Inc. Hub
Bus 001 Device 022: ID 413c:301a Dell Computer Corp. Dell MS116 Optical Mouse
Bus 001 Device 021: ID 1c4f:0026 SiGma Micro Keyboard
Bus 001 Device 020: ID 0409:005a NEC Corp. HighSpeed Hub
Bus 001 Device 019: ID 1a40:0101 Terminus Technology Inc. Hub
Bus 001 Device 024: ID 0955:7023 NVIDIA Corp. APX
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
ubuntu@ubuntu-desktop:~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARG
ETS/Linux_for_Tegra$
```

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
```

```
ubuntu@ubuntu-desktop: ~/nvidia/nvidia_sdk/JetPack_6.0_Li...
ubuntu@ubuntu-desktop:~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARG
ETS/Linux_for_Tegra$ lsusb
Bus 008 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 007 Device 002: ID 046d:0825 Logitech, Inc. Webcam C270
Bus 007 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 006 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 005 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 004 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 003 Device 002: ID 0b05:18f3 ASUSTek Computer, Inc. AURA LED Controller
Bus 003 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 005: ID 8087:0029 Intel Corp. AX200 Bluetooth
Bus 001 Device 003: ID 05e3:0610 Genesys Logic, Inc. Hub
Bus 001 Device 022: ID 413c:301a Dell Computer Corp. Dell MS116 Optical Mouse
Bus 001 Device 021: ID 1c4f:0026 SiGma Micro Keyboard
Bus 001 Device 020: ID 0409:005a NEC Corp. HighSpeed Hub
Bus 001 Device 019: ID 1a40:0101 Terminus Technology Inc. Hub
Bus 001 Device 024: ID 0955:7023 NVIDIA Corp. APX
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
ubuntu@ubuntu-desktop:~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARG
ETS/Linux_for_Tegra$ sudo ./flash.sh jetson-agx-orin-devkit 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 NV300-1LS64 (language, keyboard type, location, username & password etc.).

```
ubuntu@ubuntu-desktop: ~/nvidia/nvidia_sdk/JetPack_6.0_Li...
pt
[ 691.8354 ] Bootloader version 01.00.0000
[ 692.0381 ] Writing partition A_MEM_BCT with mem_coldboot_sigheader.bct.encrypt
[ 243712 bytes ]
[ 692.0387 ] [.....] 100%
[ 695.0769 ] tegradevflash_v2 --write B_MEM_BCT mem_coldboot_sigheader.bct.encrypt
pt
[ 695.0774 ] Bootloader version 01.00.0000
[ 695.8982 ] Writing partition B_MEM_BCT with mem_coldboot_sigheader.bct.encrypt
[ 243712 bytes ]
[ 695.8987 ] [.....] 100%
[ 698.9364 ] Flashing completed

[ 698.9365 ] Coldbooting the device
[ 698.9371 ] tegrarcm_v2 --chip 0x23 0 --ismb2
[ 698.9376 ] MB2 version 01.00.0000
[ 699.7903 ] Coldbooting the device
[ 699.7909 ] tegrarcm_v2 --chip 0x23 0 --reboot coldboot
[ 699.7913 ] MB2 version 01.00.0000
*** The target generic has been flashed successfully. ***
Reset the board to boot from internal eMMC.

ubuntu@ubuntu-desktop:~/nvidia/nvidia_sdk/JetPack_6.0_Linux_JETSON_AGX_ORIN_TARG
ETS/Linux_for_Tegra$
```

**[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):.

```
nvidia@nvidia-desktop: ~  
nvidia@nvidia-desktop:~$ cat /boot/extlinux/extlinux.conf  
TIMEOUT 30  
DEFAULT primary  
  
MENU TITLE L4T boot options  
  
LABEL primary  
    MENU LABEL primary kernel  
    LINUX /boot/Image  
    INITRD /boot/initrd  
    FDT /boot/dtb/kernel tegra234-p3737-0000+p3701-0005-nv.dtb  
    APPEND ${cbootargs} root=/dev/mmcblk0p1 rw rootwait rootfstype=ext4 mminit  
_loglevel=4 console=ttyTCU0,115200 console=ttyAMA0,115200 firmware_class.path=/e  
tc/firmware fbcon=map:0 net.ifnames=0 nospectre_bhb video=efifb:off console=tty0  
  
# When testing a custom kernel, it is recommended that you create a backup of  
# the original kernel and add a new entry to this file so that the device can  
# fallback to the original kernel. To do this:  
#  
# 1, Make a backup of the original kernel  
#     sudo cp /boot/Image /boot/Image.backup  
#  
# 2, Copy your custom kernel into /boot/Image
```

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.

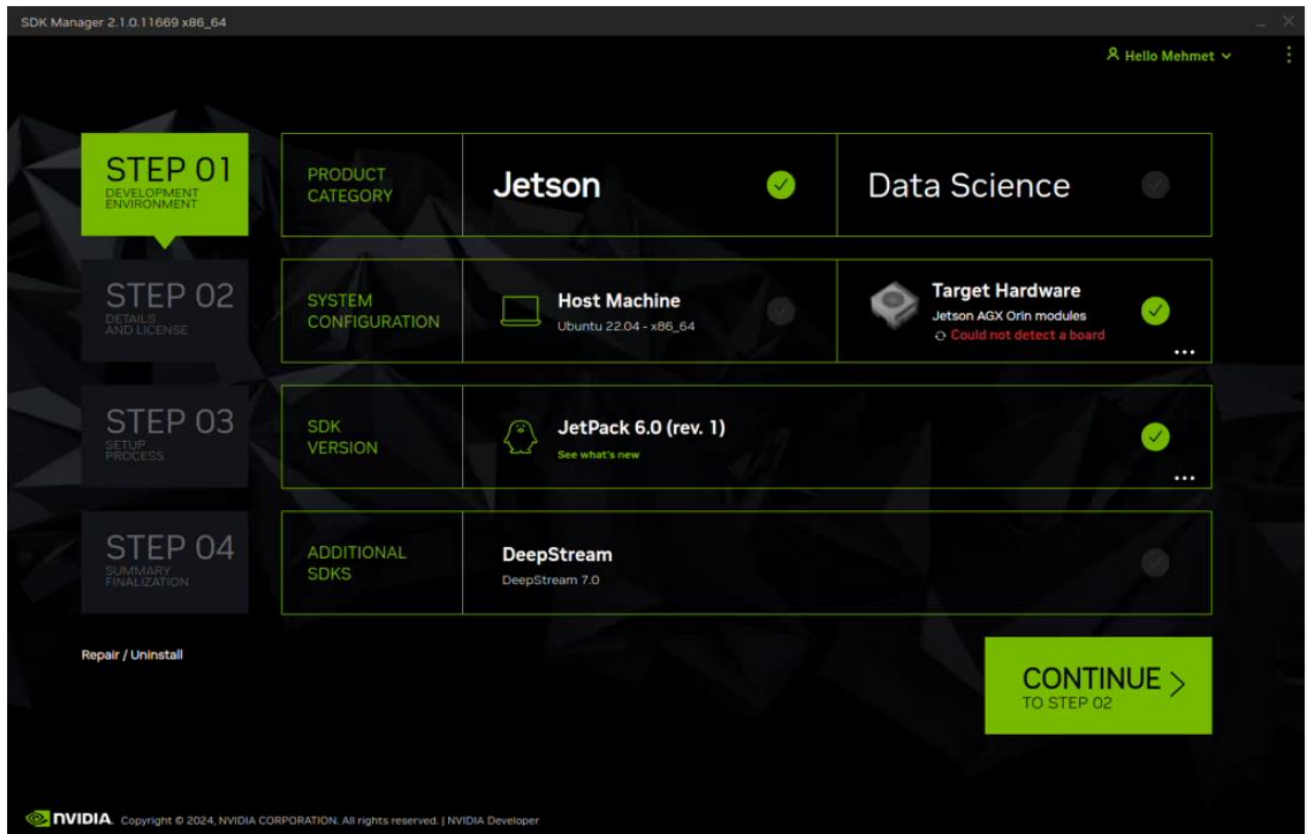
```
sudo switch_dtb.sh
```

```
nvidia@nvidia-desktop: ~  
nvidia@nvidia-desktop:~$ sudo switch_dtb.sh  
Base DTB: kernel_tegra234-p3737-0000+p3701-0005-nv.dtb  
New DTB: tegra234-p3737-0000+p3701-0005-nv.dtb  
Done.  
Rebooting...  
█
```

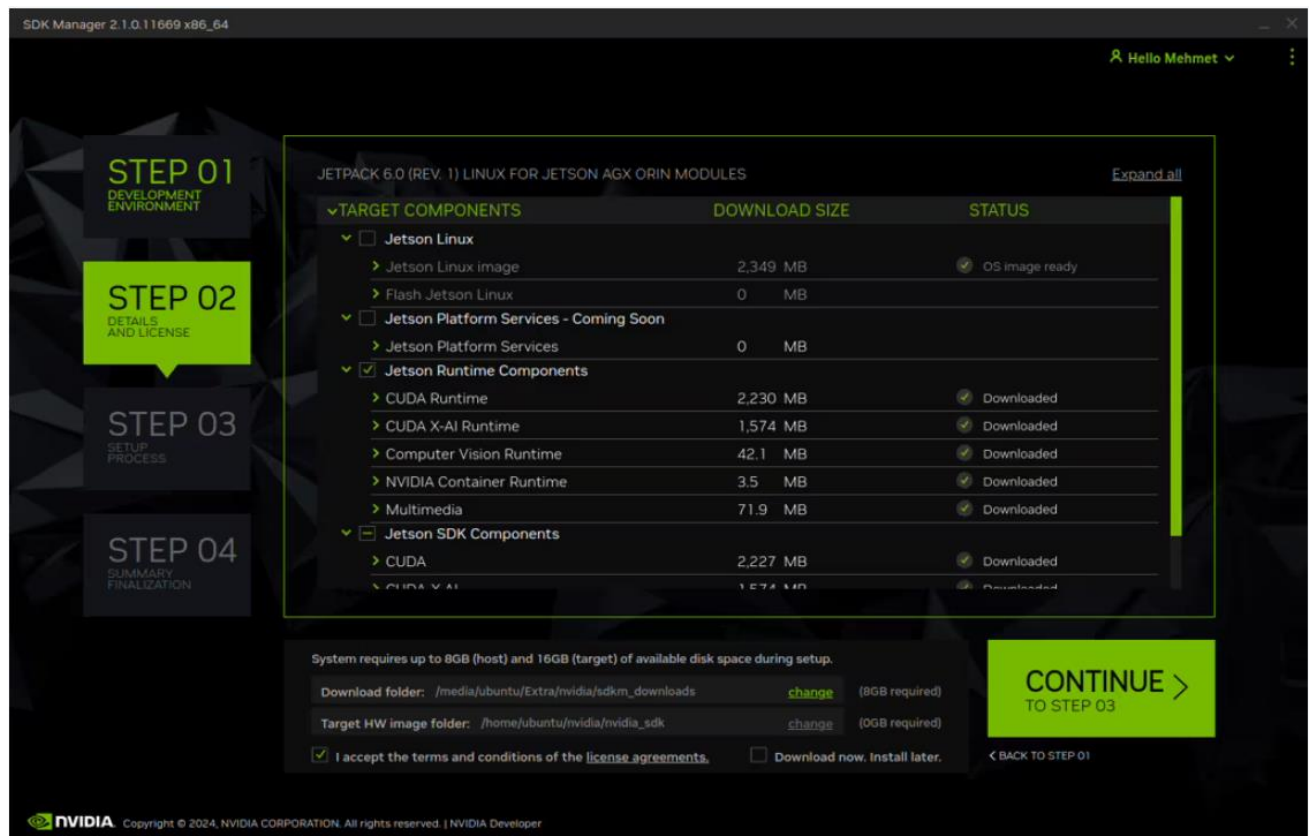
## Jetson SDK Components Installation

Connect the NV300-1LS64 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).

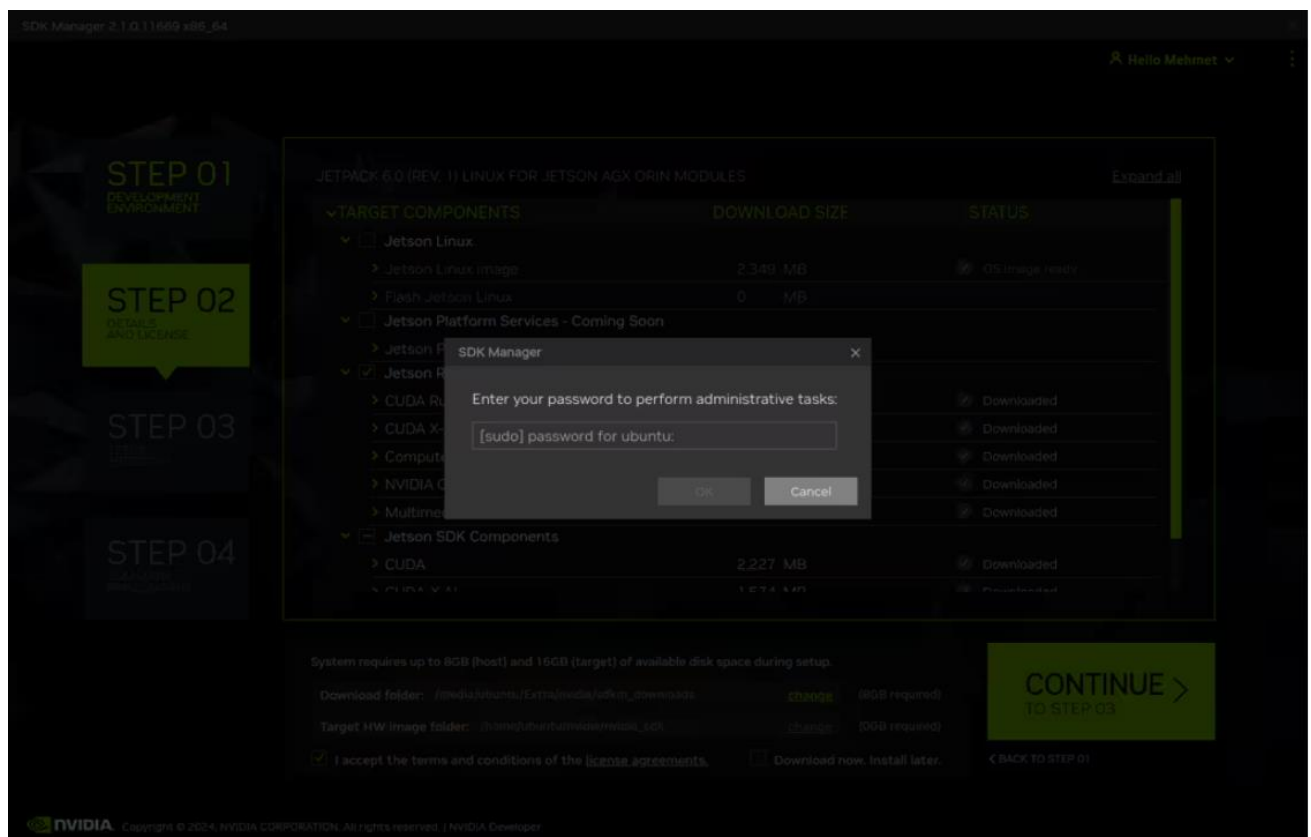
Then, continue to Step 2.



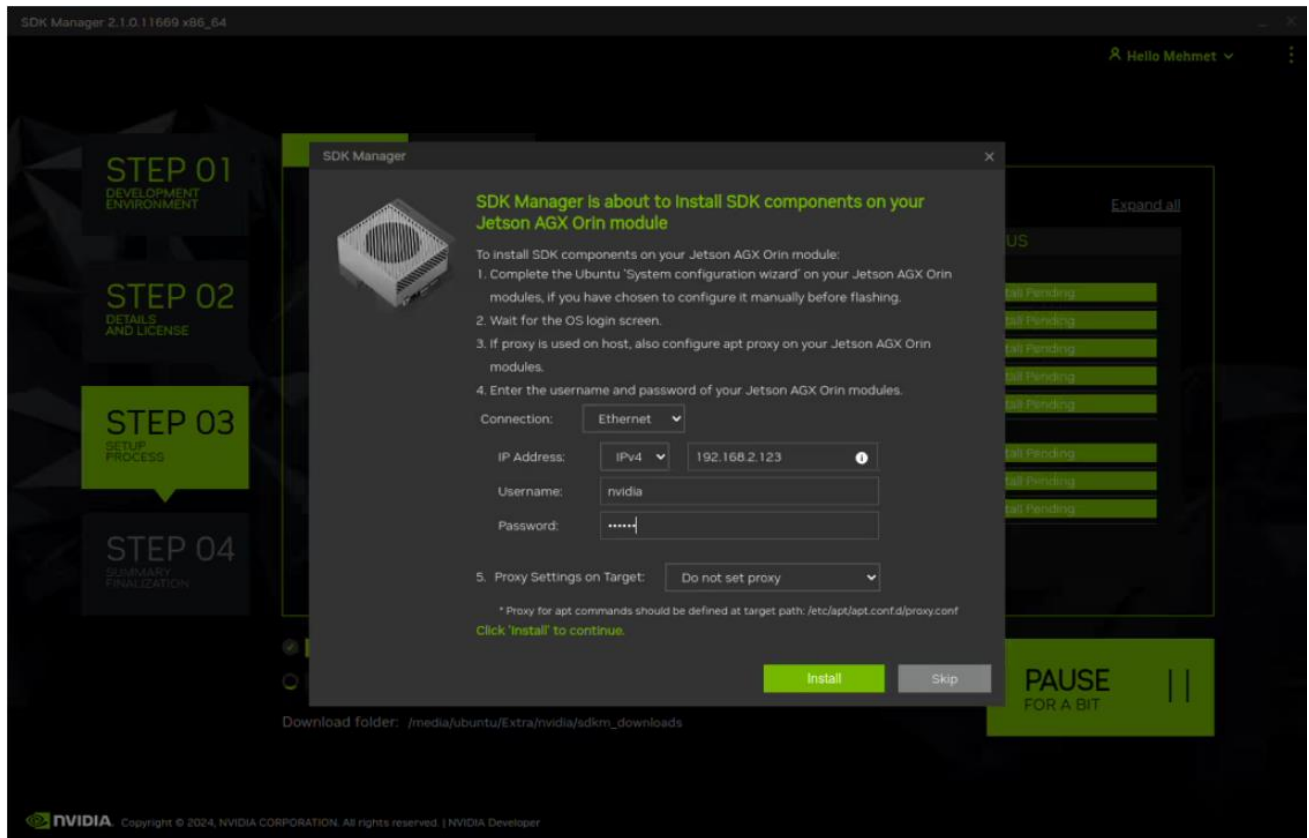
Choose at least “Jetson Runtime Components” (“Jetson SDK Components” are optional. It depends on your use case), accept the terms & conditions and continue to Step 3.



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 NV300-1LS64 becomes ready.

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

## 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.

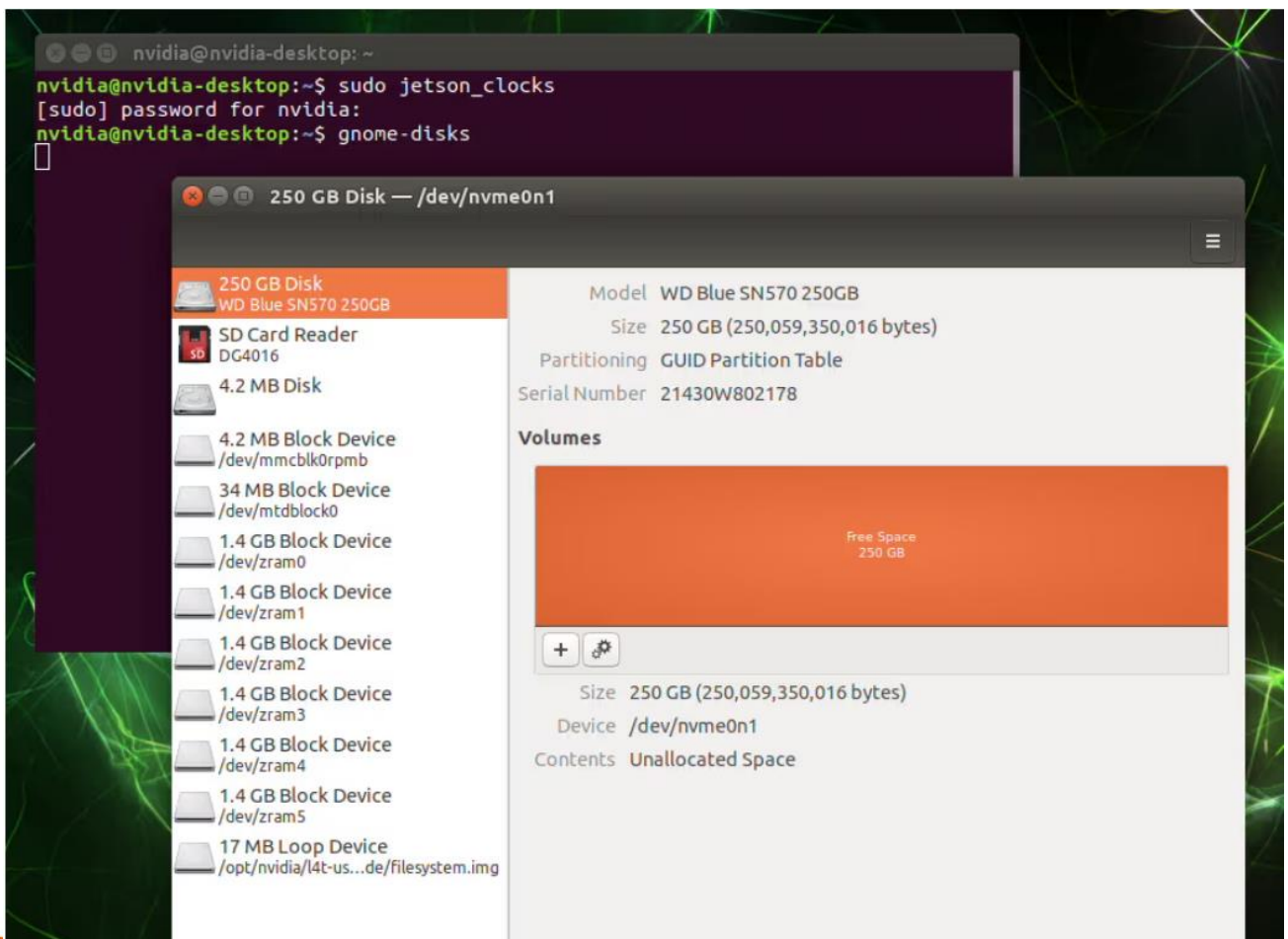
First, connect your M.2 compatible storage device to M.2 connector and connect the basic interfaces (Ethernet, HDMI, keyboard, mouse) then power on.

Open a terminal and type these commands below:

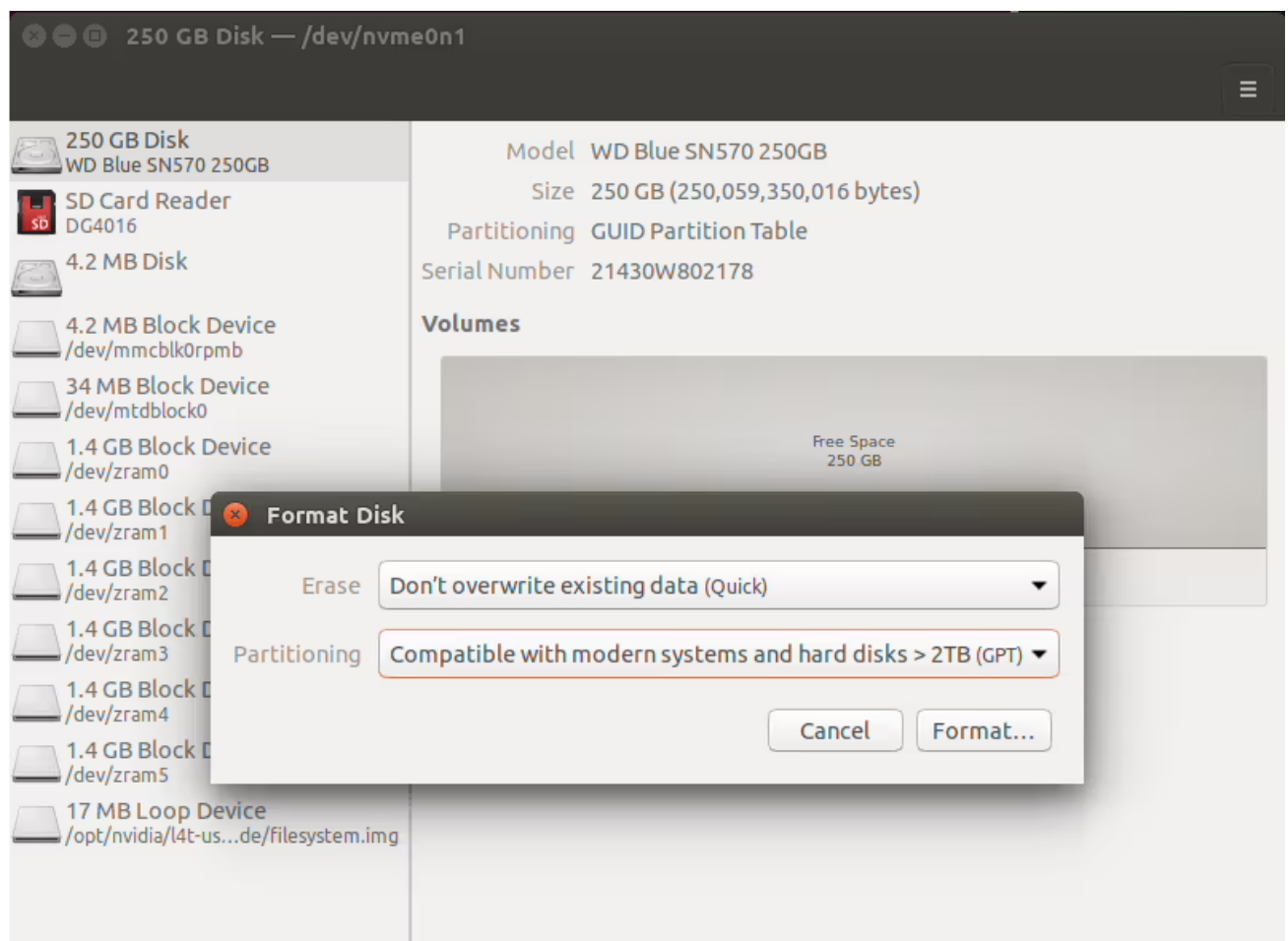
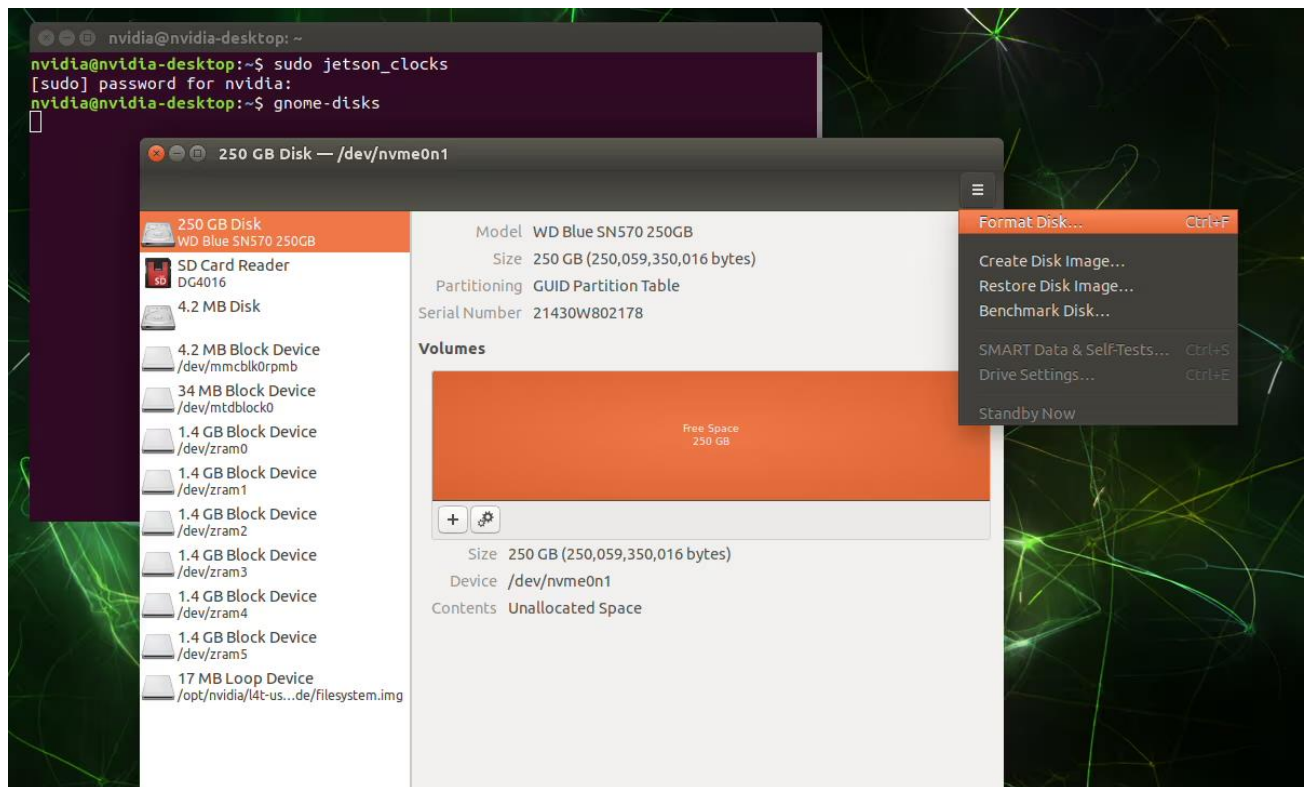
```
sudo jetson_clocks
gnome-disks
```

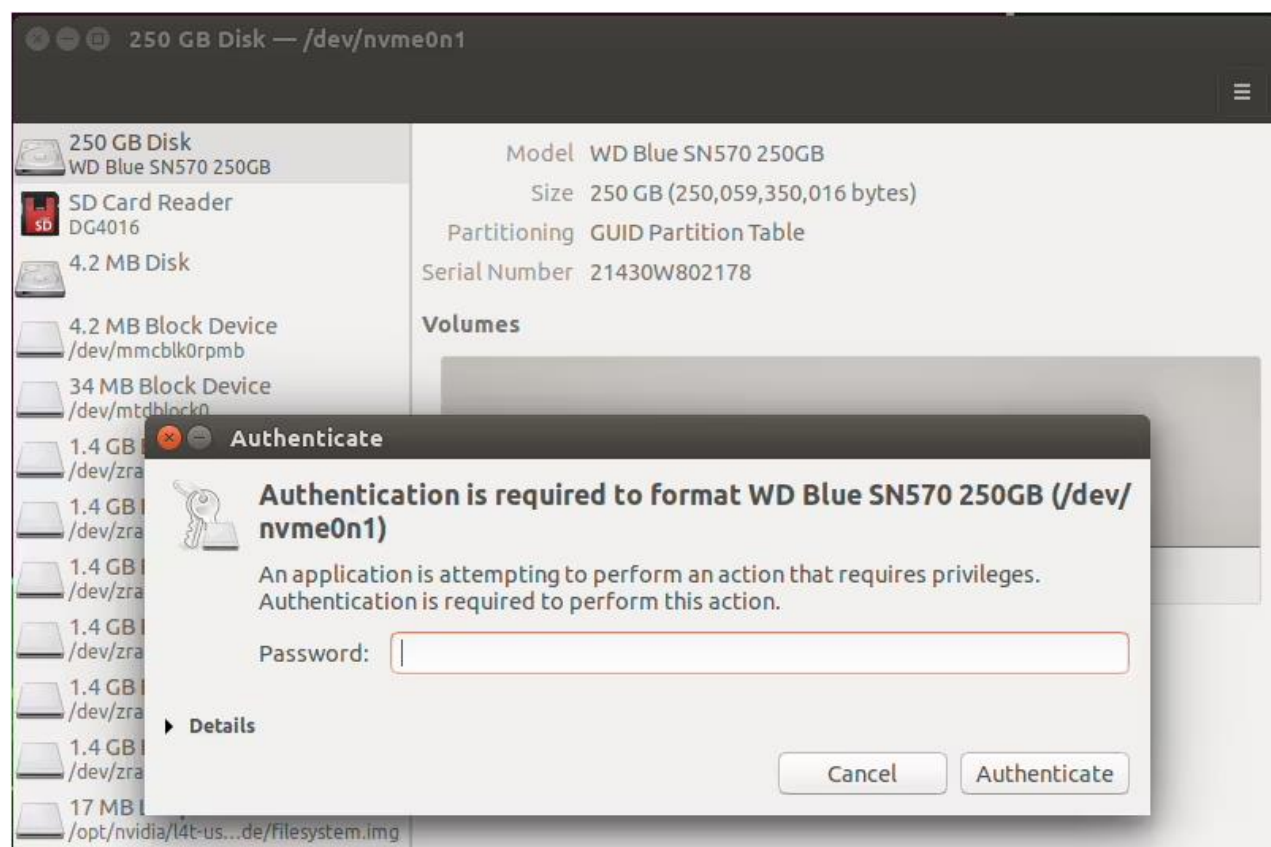
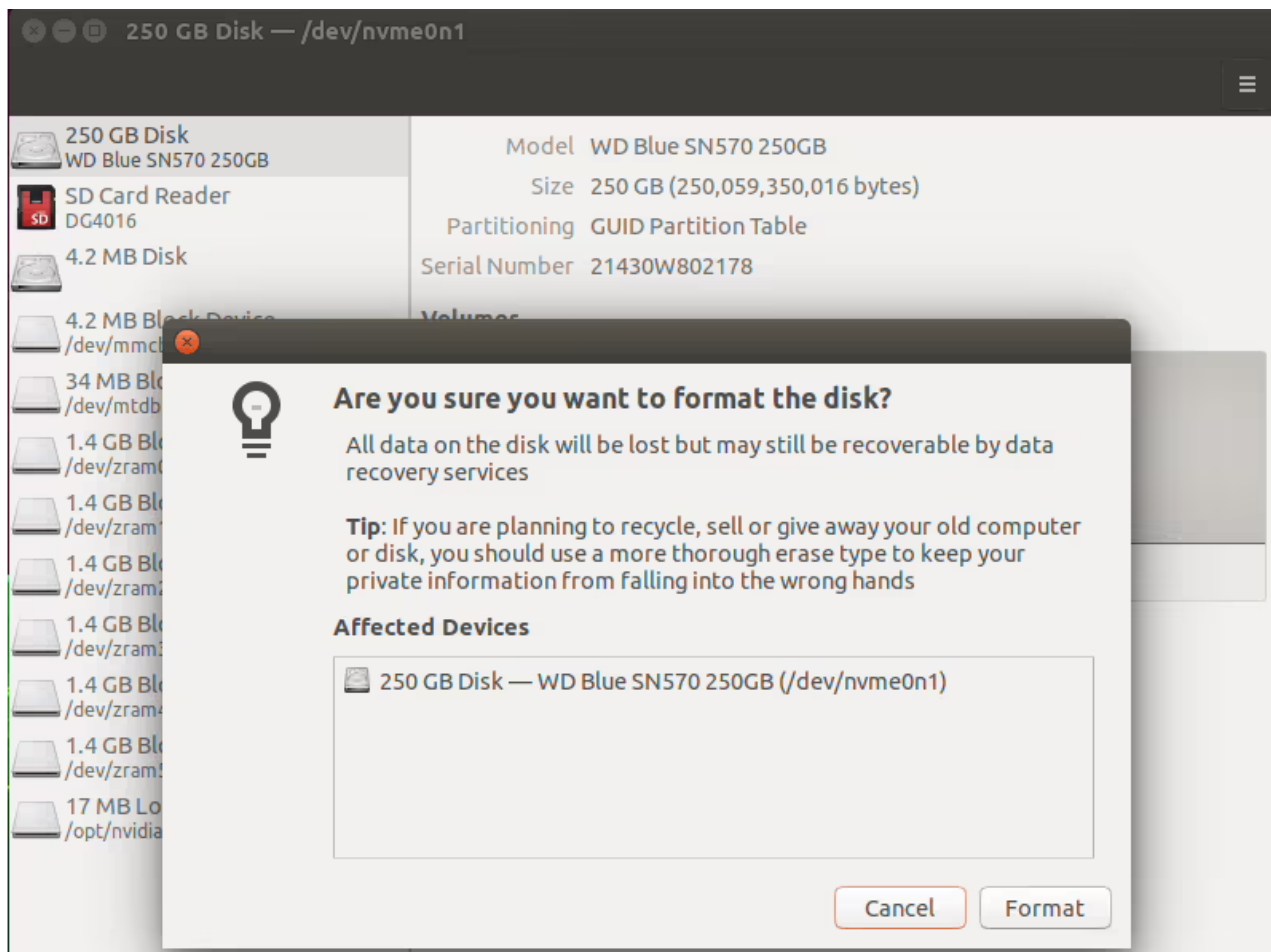
```
nvidia@nvidia-desktop: ~  
nvidia@nvidia-desktop:~$ sudo jetson_clocks  
[sudo] password for nvidia:  
nvidia@nvidia-desktop:~$
```

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

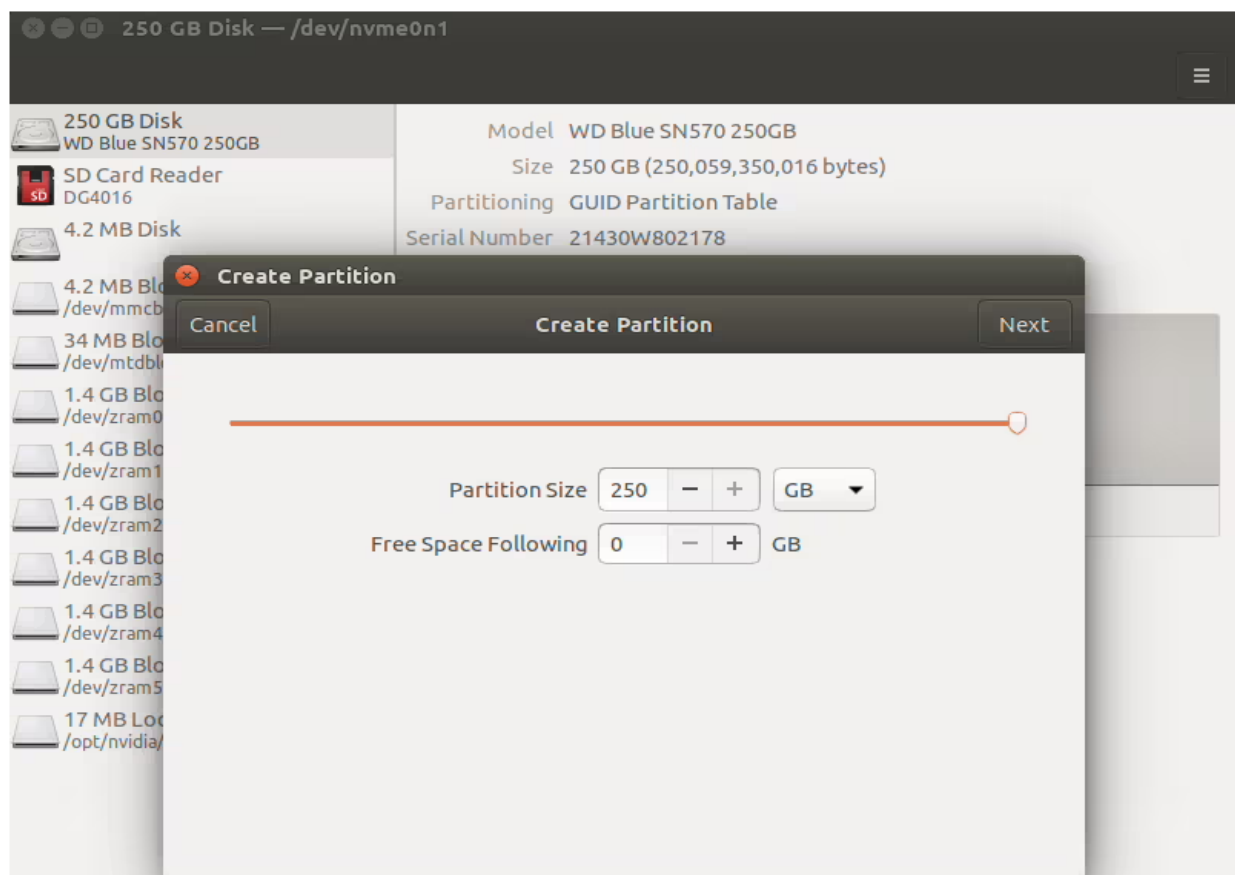
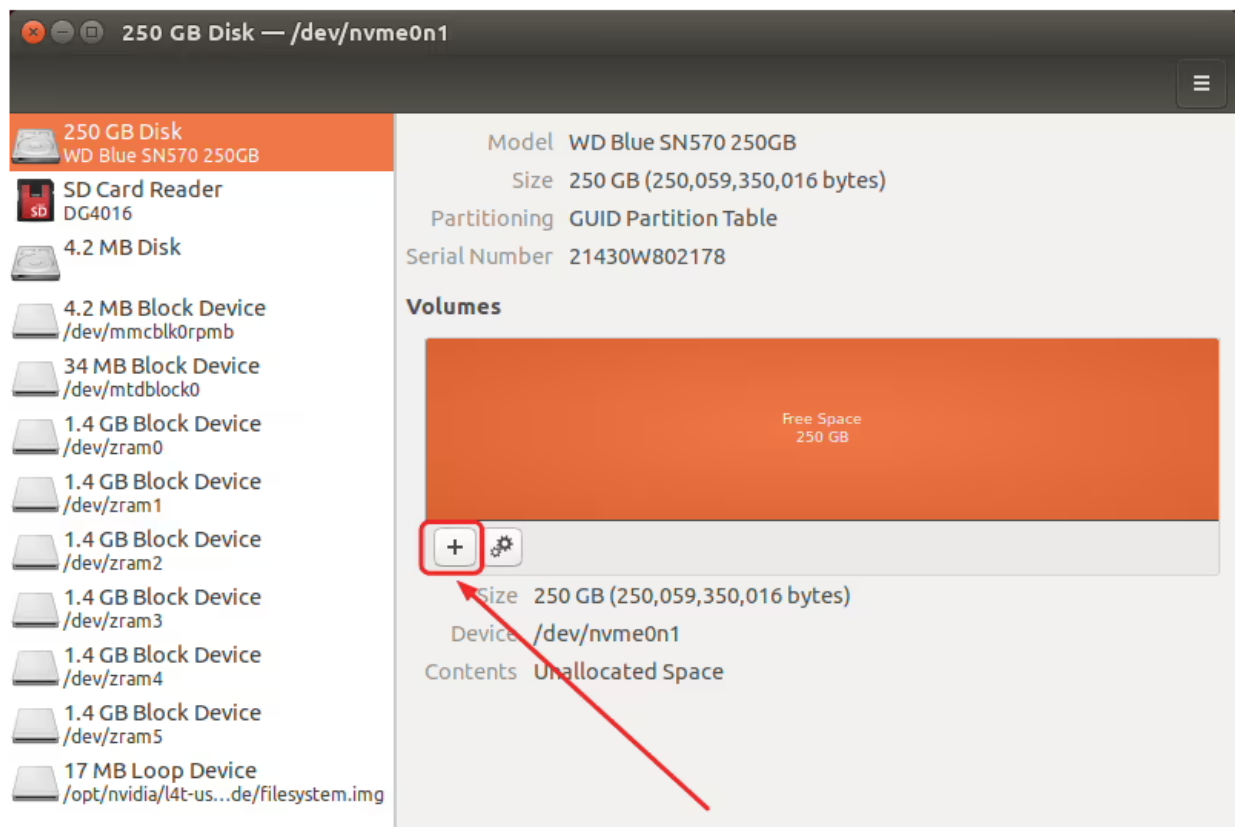


Format the whole disk before creating the storage.

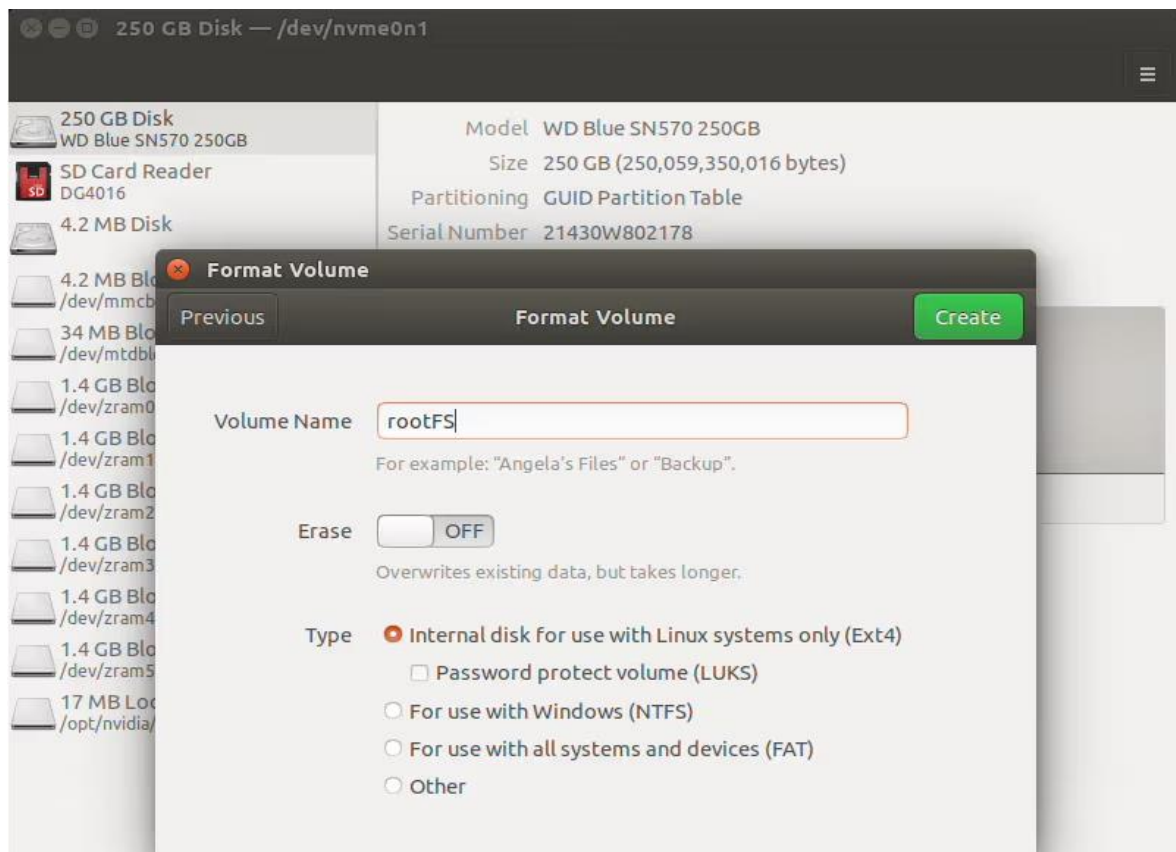




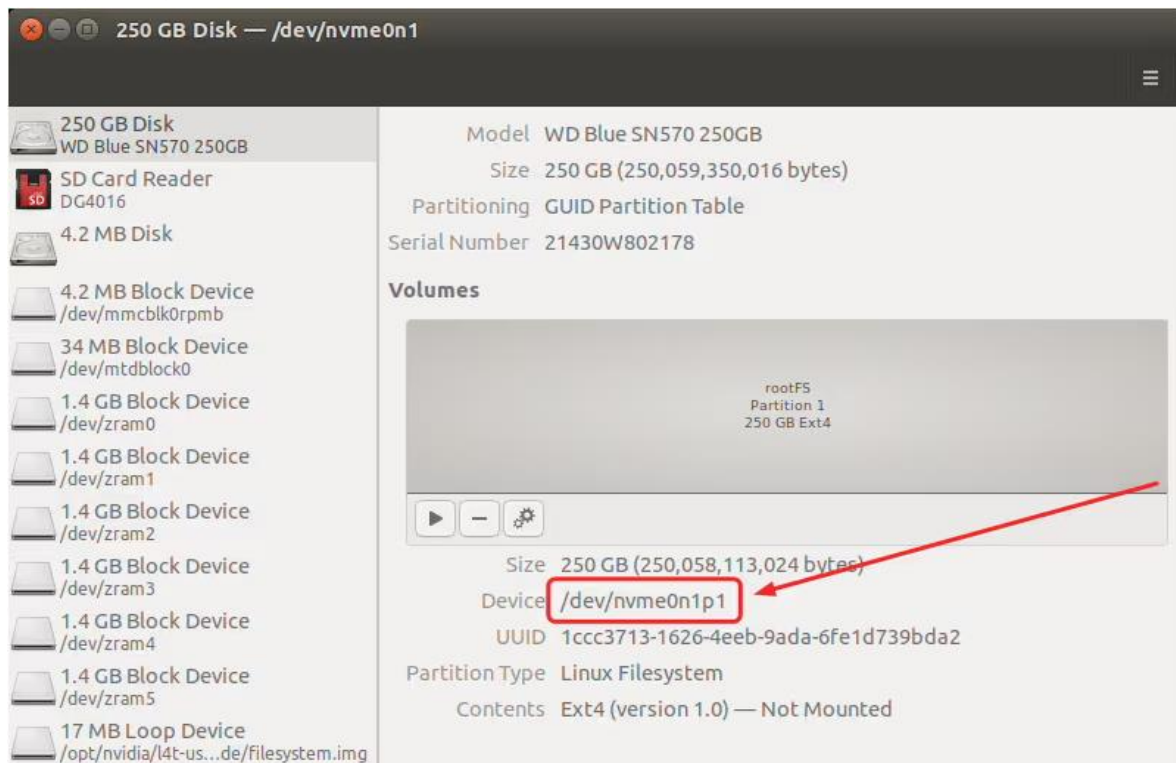
Then, create a new partition from SSD storage.



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`).



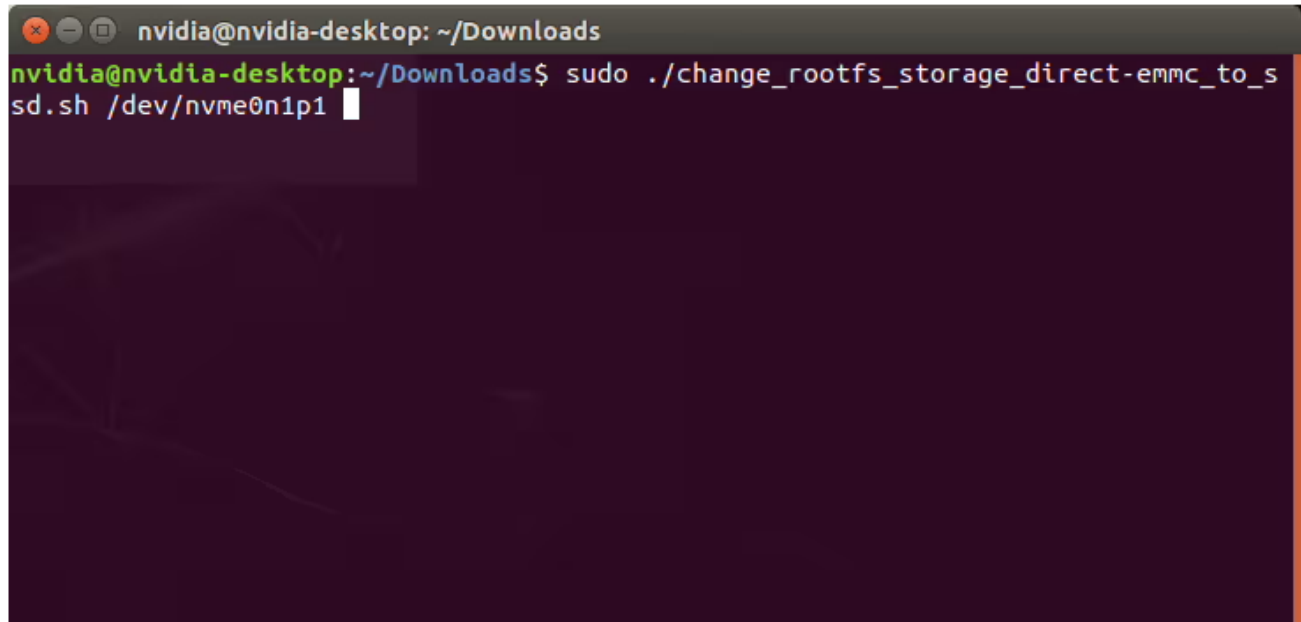
## Copying the Root File System

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}
```

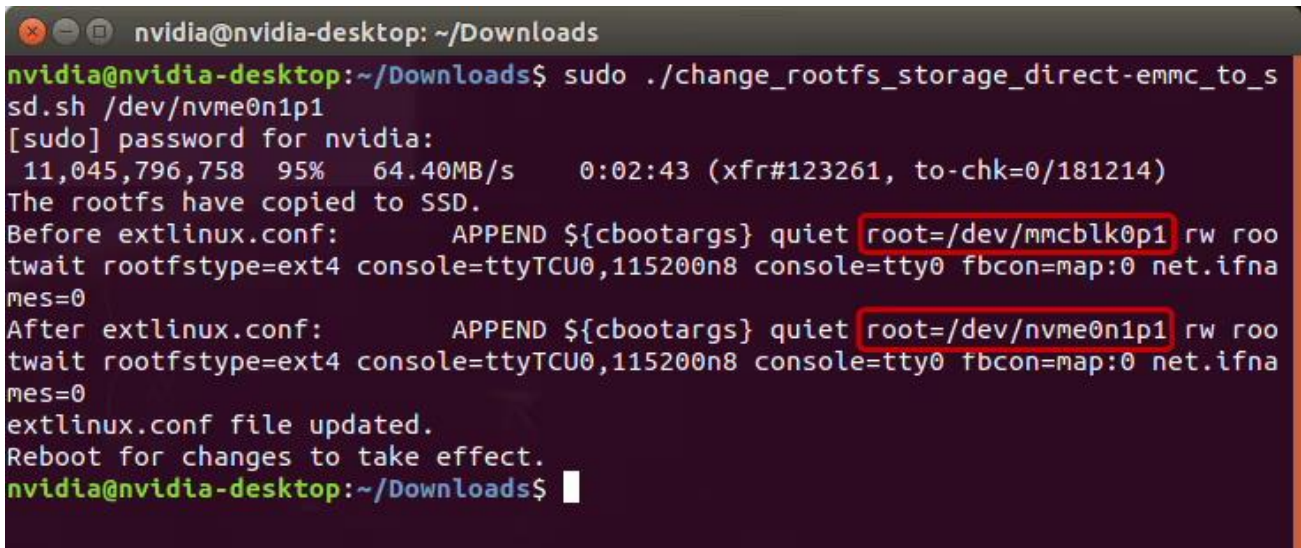
In our setup, we typed this command below:

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



A terminal window titled 'nvidia@nvidia-desktop: ~/Downloads' shows the command `sudo ./change_rootfs_storage_direct-emmc_to_ssd.sh /dev/nvme0n1p1` being entered. The prompt is `nvidia@nvidia-desktop:~/Downloads$`.

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



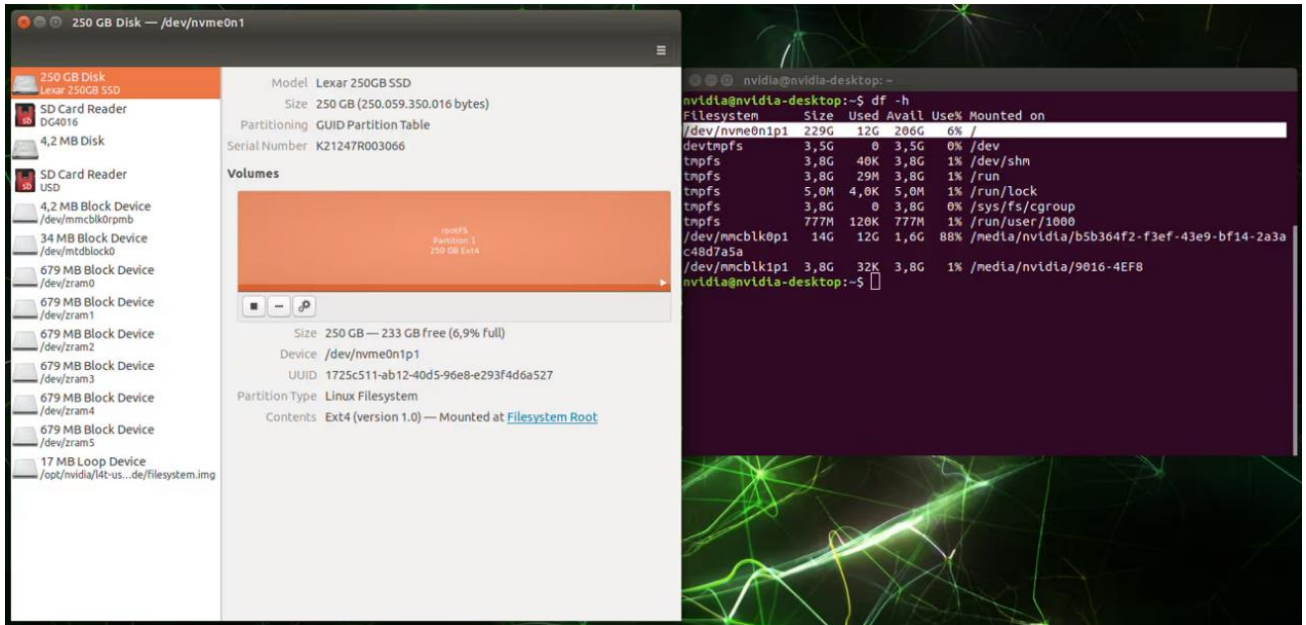
A terminal window titled 'nvidia@nvidia-desktop: ~/Downloads' shows the command `sudo ./change_rootfs_storage_direct-emmc_to_ssd.sh /dev/nvme0n1p1` being entered. The prompt is `nvidia@nvidia-desktop:~/Downloads$`. The output shows the progress of the file system copy: `[sudo] password for nvidia:`, `11,045,796,758 95% 64.40MB/s 0:02:43 (xfr#123261, to-chk=0/181214)`, and `The rootfs have copied to SSD.` It then shows the configuration changes in `extlinux.conf`: `Before extlinux.conf: APPEND ${cbootargs} quiet root=/dev/mmcblk0p1 rw rootwait rootfstype=ext4 console=ttyTCU0,115200n8 console=tty0 fbcon=map:0 net.ifnames=0` and `After extlinux.conf: APPEND ${cbootargs} quiet root=/dev/nvme0n1p1 rw rootwait rootfstype=ext4 console=ttyTCU0,115200n8 console=tty0 fbcon=map:0 net.ifnames=0`. The output also shows `extlinux.conf file updated.` and `Reboot for changes to take effect.` The prompt is `nvidia@nvidia-desktop:~/Downloads$`.

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.