## Document History

### Document Version 1.4

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<th>Version</th>
<th>Date</th>
<th>Authors</th>
<th>Description of Change</th>
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<td>1.1</td>
<td>July 7, 2021</td>
<td>Peter G.</td>
<td>Initial release</td>
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<tr>
<td>1.2</td>
<td>September 23, 2021</td>
<td>Peter G.</td>
<td>Add further Recovery mode instructions.</td>
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<tr>
<td>1.3</td>
<td>October 19, 2021</td>
<td>Peter G.</td>
<td>Add checklist and additional instructions.</td>
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<tr>
<td>1.4</td>
<td>March 16, 2022</td>
<td>Peter G.</td>
<td>Replace diagrams, add Compliance chapter, update links</td>
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Introduction

This user guide provides instructions to flash, setup, and start using a Clara AGX Developer Kit.

Disclaimer: The Clara AGX Developer Kit is not an approved medical device and is not intended for clinical use.
After receiving the Clara AGX Developer Kit, ensure the following actions are taken before developing on the kit. Each action is described in its corresponding section of this user guide.

- Read through the **Hardware Setup** requirements and precautions.
- Familiarize yourself with the **System Overview**: the main components and system I/O.
- Power up the system.
- Flash and update the Clara AGX Developer Kit using SDK Manager.
- Switch from iGPU to dGPU mode and reinstall the dGPU mode packages.
- Set up the 250GB SSD storage and Docker.
Hardware Setup

Requirements

- A Clara AGX Developer Kit
- A compatible power cable
  - The NVIDIA Clara AGX Developer Kit Developer Kit may not include a power cable compatible with your local electrical requirements.
  - A compatible cable should meet the following requirements:
    - Provides a certified local 3-prong AC power plug
    - Provides a C13 connector
    - Supports ratings of 100-120VAC/6A, 200-240VAC/3A, or higher with a minimum wire thickness of 18AWG and insulation rating of 300V or higher.
- An Ubuntu 18.04 host system (for use during flashing)
- A standard USB-A to USB-C or USB-C to USB-C cable with data enabled (for use during flashing)
- Connection to the Internet for the host system before and during flashing, and for the Clara AGX Developer Kit after flashing
- A keyboard, mouse, and monitor with HDMI for the Clara AGX Developer Kit

Precautions

- Only connect and disconnect a PCIe card (e.g. miniSAS or dGPU) when the system is powered down.
- Apply extra care when plugging and removing PCIe cards to avoid stress on the PCIe connectors (wearing, bending, breaking).
- The rightmost USB connector is USB 2.0 (even if the color is blue). The other two USB connectors are USB 3.0.
System Overview

Main Components

The Clara AGX Developer Kit contains the following major components:

- AGX Xavier 32 GB Module
- RTX 6000 discrete GPU
- ConnectX-6 IC
- 250GB Removeable SSD

Tech Specs

<p>| | |</p>
<table>
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<td>CPU</td>
<td>8-core Carmel ARM v8.2 64-bit CPU, 8MB L2 + 4MB L3</td>
</tr>
<tr>
<td>Memory</td>
<td>32GB 256-Bit LPDDR4x</td>
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</table>
GPU
RTX6000 | 24 GB GDDR6 | 672 GB/s | 4,608 CUDA cores | 576 Tensor Cores

Storage
250GB SSD

I/O
USB2.0 | (2x) USB3.0 | USB-C | HDMI In/Out | (4x) DisplayPort | 1/10/100 GbE

Expansion
PCle x8 (single slot width) to Xavier | PCle x8 (single slot width) to RTX6000

Power Supply
750W | 100-240V

Dimensions
227mm W x 149mm H x 332mm L

I/O and external interfaces

1) Power cable connection
2) Power switch
3) PCIe slots for customer cards
4) dGPU
   a) Reference the [GPU section](#) below to determine which display output to use.
5) 100 GbE QSFP28 Ethernet connector to NVIDIA ConnectX-6
6) 10 GbE RJ45 Ethernet connector to NVIDIA ConnectX-6
   a) The 10GbE connector only supports 10 GbE speeds.
7) 1 GbE RJ45 Ethernet connector to Xavier module
8) USB 3.0 ports (2x)
9) USB 2.0 port (1x)
10) HDMI out
   a) Reference the [GPU section](#) below to determine which display output to use.
11) HDMI in: Connect to instruments that output HDMI to the platform
12) Debug USB-C port: Connect to the Linux host system for flashing and serial port connections.

13) x8 PCIe slot (x16 physical) for customer card, to Xavier Module
14) x8 PCIe slot (x16 physical) for customer card, to RTX6000
   a) Used for cards supporting GPU Direct RDMA data transfer to RTX6000 GPU

15) SD card slot

16) Recovery button

17) Reset button

18) Main secondary compartment fan connector (there is an additional system fan inside the chassis)

19) Auxiliary fan connector for card fans

20) Power button

To access ports 13-19, remove the left-hand side cover. The process is illustrated below. Unscrew the two Phillips screws (21 and 22) that secure the cover at the back of the machine. Next, push and slide the cover in the direction towards the back of the machine without lifting (step 1). It should slide about 0.5 inch, or less than 1.5 cm. Finally, you should be able to lift the cover off once it has more than one degree of freedom and can be easily lifted upwards (step 2).
Getting Started

Powering up the System

1. Connect all peripherals to the system before powering up the system.
2. Connect the power cable to the system in the slot labeled (1) in the picture above.
3. Once the power is connected, press the power button (20) for approximately 1 second. It should light up.
4. If you have a display connected, you might already see the system booting on it. During flashing or re-flashing, use the HDMI out port (10) to connect to the display. Reference the GPU section below to determine how to choose between display outputs.

Note: The machine can be powered off by depressing the power button for approximately 10 seconds.

Flashing and Updating Clara AGX Developer Kit using SDK Manager

1. Register and activate an NVIDIA Developer Account here.
2. If you are running a VPN on your host system, log off before flashing the Clara AGX Developer Kit.
3. Using a VM as your host machine isn’t officially supported, but it is possible with certain VMs such as VMWare Workstation 16. If using a VM, ensure the USB port that connects to the USB-C port on the Clara AGX Developer Kit is routed to the VM.
4. From the host system, download and install the latest version of NVIDIA SDK Manager. Instructions for downloading and setting up NVIDIA SDK Manager can be found here.
5. Connect the Clara AGX Developer Kit to the host system via USB-C (12).
6. From the NVIDIA SDK Manager, download and flash the Clara AGX Developer Kit. See the step-by-step instructions for more details.

Note: The Clara Holoscan SDK includes DeepStream 6.0 EA, but DeepStream 5.1 may also appear as a standalone Additional SDK in SDK Manager. Only one version of DeepStream may be installed at the same time, so ensure DeepStream 5.1 is unselected during the Clara Holoscan SDK installation.
a) If you joined the Clara Holoscan SDK program after your initial SDK Manager login, you will need to log out and log in again on SDK Manager for the permissions to take effect.

b) If the SDK Manager does not see the Clara AGX Developer Kit, it may need to be placed in Recovery mode. Follow these steps to place the Clara AGX Developer Kit in recovery mode:
   i) Power off the unit.
   ii) Remove the left-hand side cover to expose ports 13-19.
   iii) Hold down the Recovery button (16) while pressing the Power button (20) to turn on the unit.
   iv) Release the Power Button, then the Recovery button.

c) If Recovery mode doesn’t help, try resetting the unit:
   i) While the unit is powered on, press the Recovery button (16) + Reset button (17), then release both buttons.

7. Use the default credentials (shown below) when the NVIDIA SDK Manager is preparing to flash the Clara AGX Developer Kit. If Automatic Setup fails, try switching to Manual Setup.
   a) Username: ubuntu
   b) Password: ubuntu

Switching between iGPU and dGPU

The Clara AGX Developer Kit can use either the Xavier AGX module GPU (iGPU, – integrated GPU) or the RTX6000 add-in card GPU (dGPU, – discrete GPU). You can only use one type of GPU at a time.

By default, the Clara AGX Developer Kit uses the iGPU. Switching between the iGPU and dGPU is performed using the `nvgpuswitch.py` script contained in the `/usr/local/bin` directory.

To switch from the iGPU to the dGPU, follow these steps:

1. Connect the Clara AGX Developer Kit to the internet using one of the following methods:
   a) An Ethernet cable connected to a router or Wi-Fi extender;
      i) The 10 GbE RJ45 Ethernet connector only supports 10 GbE speeds
   b) A USB Wi-Fi receiver.
      i) Not all USB Wi-Fi receivers will work out of the box on the Clara AGX Developer Kit.
      ii) The TP-Link Archer T2U Nano USB Wi-Fi Adapter has been tested with the Clara AGX Developer Kit.

2. To view the currently installed drivers and their version, use the query command:
   
   ```
   $ nvgpuswitch.py query
   iGPU (nvidia-l4t-cuda, 32.5.0-20201012161040)
   ```

3. To install the dGPU drivers, use the install command with the dGPU parameter (note that `sudo` must be used to install drivers):
   
   ```
   $ sudo nvgpuswitch.py install dGPU
   ```
The install command will print out the list of commands that will be executed as part of the driver install, then continue to execute those commands. This aids with debugging if any of the commands fail to execute for any reason. The following arguments may also be provided with the install command:

- **d** Does a dry run, showing the commands that would be executed by the install but does not execute them.
- **v** Enable verbose output (used with `-d` to describe each of the commands that would be run).
- **-i** Run commands interactively (asks before running each command).
- **-l [LOG]** Writes a log of the install to the file `LOG`.

4. The dGPU driver install may be verified using the query command:

```
$ nvgpuswitch.py query
dGPU (cuda-drivers, 455.32.00-1)
```

**Note:** CUDA installs its runtime binaries such as nvcc into its own versioned path that is not included by the default `$PATH` environment variable. Because of this, attempts to run commands like nvcc will fail on dGPU unless the CUDA 11.1 path is added to the `$PATH` variable. To add the CUDA 11.1 path for the current user, add the following line to `$HOME/.bashrc` after the switch to dGPU:

```
$ export PATH=/usr/local/cuda-11.1/bin:$PATH
```

After the dGPU drivers have been installed, rebooting the system will complete the switch to dGPU. At this point, the Ubuntu desktop will be output via DisplayPort on the dGPU, so the display cable must be switched from the onboard HDMI (10) to DisplayPort on the dGPU (4). If the output connection isn’t switched, the terminal screen will hang during booting.

If at any time you want to switch back to iGPU, use the install command with the iGPU parameter:

```
$ sudo nvgpuswitch.py install iGPU
```

After the iGPU drivers have been installed, rebooting the system will complete the switch back to iGPU. At this point the Ubuntu desktop will be output via the onboard HDMI, so the display cable must be switched from the DisplayPort on the dGPU (4) to the onboard HDMI (10). If the output connection isn’t switched, the terminal screen will hang during booting.

**Note:** The GPU settings will persist through reboots until it is changed again with nvgpuswitch.py.

## Reinstalling dGPU Mode Clara Holoscan SDK Packages

After rebooting the system, refer to the [Switching Between iGPU and dGPU; Reinstalling Clara Holoscan SDK Packages](#) section in the Clara Holoscan SDK [Documentation](#) for instructions on how to reinstall the libraries and samples needed to run sample applications.
Setting up SSD Storage

Make sure you have followed the **Storage Setup (m2 SSD)** instructions in the [Clara Holoscan SDK Documentation](#) to mount the 250 GB SSD onto your system and move the docker storage to the SSD. Without this step, you will likely quickly fill up the root directory with Docker image pull operations, since a complete installation of the Clara SDK leaves only about 10GB of storage remaining in the root 32GB.

Completing Docker Setup

Complete the Docker [Post-installation steps for Linux](#) before starting to develop your applications using Docker.

Additional Resources

For other documentation and release notes, see the [Clara Holoscan SDK page](#).

For further Jetson documentation, see [L4T documentation](#).

For technical discussion and questions, post to the Clara Holoscan SDK [Developer Forum](#).
Compliance Information

United States

Federal Communications Commission (FCC)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including any interference that may cause undesired operation of the device.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

TUV Rheinland/cTUVus

Canada

Innovation, Science and Economic Development Canada (ISED)

CAN ICES-003(B)/NMB-003(B)

This device complies with Industry Canada’s license-exempt RSSs. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d’Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

European Union

European Conformity; Conformité Européenne (CE)

This device complies with the following Directives:

• EMC Directive 2014/30/EU
• Low Voltage Directive 2014/35/EU
• RoHS Directive 2011/65/EU

The full text of EU declaration of conformity is available at the following internet address: www.nvidia.com/support
A copy of the Declaration of Conformity to the essential requirements may be obtained directly from NVIDIA GmbH (Bavaria Towers – Blue Tower, Einsteinstrasse 172, D-81677 Munich, Germany).

**Great Britain (England, Wales and Scotland)**

**UK Conformity Assessed**

This device complies with the following Regulations:

- SI 2016/1091: Electromagnetic Compatibility (EMC)
- SI 2016/1101: The Low Voltage Electrical Equipment (Safety)
- SI 2012/3032: The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (As Amended)

A copy of the Declaration of Conformity to the essential requirements may be obtained directly from NVIDIA Ltd. (100 Brook Drive, 3rd Floor Green Park, Reading RG2 6UJ, United Kingdom).

**Japan**

**Voluntary Control Council for Interference (VCCI)**
日本工業規格 JIS C 0950:2008 により、2006年7月1日以降に販売される特定分野の電気および電子機器について、製造者による含有物質の表示が義務付けられます。

機器名称：NVIDIA Clara AGX Developer Kit

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注:

1. 「0」は、特定化学物質の含有率が日本工業規格 JIS C 0950:2008 に記載されている含有率基準値より低いことを示します。

2. 「除外項目」は、特定化学物質が含有マークの除外項目に該当するため、特定化学物質について、日本工業規格 JIS C 0950:2008 基づく含有マークの表示が不要であることを示します。

Product Model Number: NVIDIA Clara AGX Developer Kit

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Notes:

1. “0” indicates that the level of the specified chemical substance is less than the threshold level specified in the standard, JIS C 0950: 2008.

2. “Exempt” indicates that the specified chemical substance is exempt from marking and it is not required to display the marking for that specified chemical substance per the standard, JIS C 0950: 2008.

3. “Exceeding 0.1wt%” or “Exceeding 0.01wt%” is entered in the table if the level of the specified chemical substance exceeds the threshold level specified in the standard, JIS C 0950: 2008.
Australia and New Zealand

Australian Communications and Media Authority

This product meets the applicable EMC requirements for Class B, I.T.E equipment and applicable radio equipment requirements.

China

China Compulsory Certificate

China RoHS Material Content Declaration

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本表格依据 SJ/T 11364-2014 的规定编制
The table according to SJ/T 11364-2014

O : 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572-2011 标准规定的限量要求以下。
O: Indicates that this hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572-2011.
X: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572-2011 标准规定的限量要求。
X: Indicates that this hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in GB/T 26572-2011.
此表中所有名称中含“X”的部件均符合欧盟RoHS立法。
All parts named in this table with an “X” are in compliance with the European Union’s RoHS Legislation.

注：环保使用期限的参考标识取决于产品正常工作的温度和湿度等条件
Note: The referenced Environmental Protection Use Period Marking was determined according to normal operating use conditions of the product such as temperature and humidity.

South Korea

Radio Research Agency (RRA)
Korean Agency for Technology and Standards (KATS)

R-R-NVA-E3904

B급 기기
(가정용 방송 통신기자재)
이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

Korea RoHS Material Content Declaration

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<th>주소: 서울특별시 강남구 영동대로 511, 2101호 (삼성동, 코엑스무역타워)</th>
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<tbody>
<tr>
<td>세부모델명(번호)</td>
<td>해당없음</td>
<td>제품출시일</td>
<td>해당없음</td>
</tr>
<tr>
<td>제품의 중량</td>
<td>해당없음</td>
<td>제조, 수입업자</td>
<td>앤비디아</td>
</tr>
</tbody>
</table>

엔비디아의 그래픽 카드제품은 전기 전자제품 및 자동차의 자원순환에 관한 법률 시행령 제 11조 제 1항에 의거한 법 시행규칙 제 3조에에따른 유해물질함유 기준을 확인 및 평가한 결과, 이를 준수하였음을 공표합니다.

구비서류: 없음

작성방법

① 제품의 종류는 "전기.전자제품 및 자동차의 자원순환에관한 법률 시행령" 제 8조 제 1항 및 제 2항에 따른 품목별로 구분하여 기재합니다.

② 전기 전자 제품의 경우 모델명 (번호), 자동차의 경우, 제원관리번호를 기재합니다.

③ 해당제품의 제조업자 또는 수입업자를 기재합니다.

---

Confirmation and Evaluation Form Concerning the Adherence to Acceptable Standards of Hazardous Materials Contained in Products

<table>
<thead>
<tr>
<th>Statement Prepared by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company Name:</td>
</tr>
<tr>
<td>Name of Company Representative:</td>
</tr>
<tr>
<td>Corporate Identification Number:</td>
</tr>
</tbody>
</table>

| Address | 2788 San Tomas Expressway, Santa Clara, CA 95051 |

<table>
<thead>
<tr>
<th>Product Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Category:</td>
</tr>
<tr>
<td>Name of Product:</td>
</tr>
<tr>
<td>Detailed Product</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>Weight of Product:</td>
</tr>
</tbody>
</table>

This for is publicly certify That NVIDIA Company has undergone the confirmation and evaluation procedures for the acceptable amounts of hazardous materials contained in graphic card according to the regulations stipulated in Article 3 of the ‘Status on the Recycling of Electrical and Electronic Products, and Automobiles’ and that company has graphic card adhered to the Enforcement Regulations of Article 11, Item 1 of the statute.

Attachment: None

* Preparing the Form

① Please indicate the product category according to the categories listed in Article 8, Items 1and 2 of the ‘ Enforcement Ordinance of the Statute on the Recycling of Electrical, Electronic and Automobile Materials’

② For electrical and electronic products, please indicate the Model Name (and number). For automobiles, please indicate the Vehicle Identification Number.

③ Please indicate the name of manufacturer and/or importer of the product.

---

**Taiwan**

**Bureau of Standards, Metrology & Inspection (BSMI)**

![BSMI Logo]

This device complies with CNS 13438 (2006) Class B.

**Taiwan RoHS Material Content Declaration**
### 限用物質含有情況標示聲明書  
Declaration of the presence condition of the Restricted Sustances Marking

<table>
<thead>
<tr>
<th>單元 Parts</th>
<th>限用物質及其化學符號 Restricted substances and its chemical symbols</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>鉛 (Pb)</td>
</tr>
<tr>
<td>PCB板 PCB</td>
<td>O</td>
</tr>
<tr>
<td>被動電子零件 Passive components</td>
<td>-</td>
</tr>
<tr>
<td>主動電子零件 Active components</td>
<td>-</td>
</tr>
<tr>
<td>處理器 Processor</td>
<td>0</td>
</tr>
<tr>
<td>內存 Memory</td>
<td>0</td>
</tr>
<tr>
<td>結構件以及風扇 Mechanical parts and Fan</td>
<td>0</td>
</tr>
<tr>
<td>線材/連接器 Cables/Connectors</td>
<td>-</td>
</tr>
<tr>
<td>焊接金屬 Soldering material</td>
<td>O</td>
</tr>
<tr>
<td>助焊劑、錫膏、標籤及耗材 Flux, Solder Paste, label and other consumable materials</td>
<td>O</td>
</tr>
</tbody>
</table>

備考1：O：系指該限用物質未超出百分比含量基準值。  
Note 1：O：indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.  
備考2：-：系指該項限用物質為排外項目。  
Note 2：-：indicates that the restricted substance corresponds to the exemption.  

此表中所有名稱中含 “-” 的部件均符合歐盟 RoHS 立法。
All parts named in this table with an “-” are in compliance with the European Union’s RoHS Legislation.

Note: The referenced Environmental Protection Use Period Marking was determined according to normal operating use conditions of the product such as temperature and humidity.
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