DGX OS Software

Release Notes
# DGX OS Releases and Versioning

Chapter 1. DGX OS Releases and Versioning

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Chapter 1. DGX OS Releases and Versioning

This information helps you understand the DGX OS release numbering convention and your options to upgrade your DGX OS software.

DGX OS Releases

DGX OS is a customized Linux distribution that is based on Ubuntu Linux. It includes platform-specific configurations, diagnostic and monitoring tools, and the drivers that are required to provide the stable, tested, and supported OS to run AI, machine learning, and analytics applications on DGX systems.

DGX OS is typically released twice a year and is often aligned with major feature enhancements of the components and new hardware introductions.

Release Versions

The DGX OS release numbering convention is MAJOR.MINOR, and it defines the following types of releases:

- **Major releases** are typically based on Ubuntu releases, which include new kernel versions and new features that are not always backwards compatible.
  
  For example:
  
  - DGX OS 5.x releases are based on Ubuntu 20.04.
  - DGX OS 4.x is based on Ubuntu 18.04.

- **Minor releases** include mostly new NVIDIA features and accumulated bug fixes and security updates.
  
  These releases are incremental and always include all previous software changes.
  
  - In DGX OS 4 and earlier, minor releases were also typically aligned with NVIDIA Graphics Drivers for Linux releases.
  - In DGX OS 5, you now have the option to install newer NVIDIA Graphic Drivers independently of the DGX OS release.
DGX OS Release Mechanisms

This section provides information about the DGX OS release mechanisms that are available to install or upgrade to the latest version of the DGX OS.

The ISO Image

DGX OS is released as an ISO image that includes the necessary packages and an autonomous installer. Updated versions of the ISO image are also released that:

‣ Provide bug fixes and security mitigations.
‣ Improve the installation experience.
‣ Provide hardware configuration support.

You should always use the latest ISO image, except when you need to restore the system to an earlier version.

WARNING: This image allows you to install or reimage a DGX system to restore the system to a default state, but the process erases all of the changes that you applied to the OS.

The Linux Software Repositories

Upgrades to DGX OS are provided through the software repositories. Software repositories are storage locations from which your system retrieves and installs OS updates and applications. The repositories used by DGX OS are hosted by Canonical for the Ubuntu OS and NVIDIA for DGX specific software and other NVIDIA software. Each repository is a collection of software packages that are intended to install additional software and to update the software on DGX systems.

New versions of these packages, which contain bug fixes and security updates, provide an update to DGX OS releases. The repositories are also updated to include hardware enablement, which might add support for a new system or a new hardware component, such as a network card or disk drive. This update does not affect existing hardware configurations.

System upgrades are cumulative, which means that your systems will always receive the latest version of all of the updated software components.

Important: We recommend that you do not update only individual components.

Before you update a system, refer to the DGX OS Software Release Notes for a list of the available updates. For more information on displaying available updates and upgrade instructions, refer to the DGX OS 5 User Guide.
Chapter 2. DGX OS 5 Releases

2.1. DGX OS Release 5.0

2.1.1. New Features in DGX OS Release 5.0

Here are the new features in DGX OS 5.0 (see also the Update History for important changes made since the initial release):

- First release to support all NVIDIA DGX servers as well as DGX Station
- Ubuntu 20.04 LTS
- NVIDIA GPU driver Release 450.
- Supports the CUDA Toolkit up to 11.0 natively, or newer versions via the compatibility module.
- Added rootfs encryption option, configurable during the re-imaging process.
- Added option to password protect the GRUB menu, configurable during the first boot process.
- Updated NVSM
- Added support for custom drive partitioning
- Added monitoring of firmware health
- Includes MOFED 5.1.
- Updated the default InfiniBand network naming policy.

   The InfiniBand interfaces, enumerated as `ibx` in previous releases, now enumerate as `ibp{x}s{y}` (similar to Ethernet `enp{x}s{y}`). Refer to the DGXA100 User Guide for the new naming.

Update Advisement

- **IMPORTANT**: This release is a major DGX OS release and incorporates the following updates.
  - Ubuntu 20.04 LTS
DGX OS 5 Releases

- Mellanox OFED 5.1

Customers are advised to consider these updates and any effect they may have on their application. For example, some MOFED-dependent applications may be affected.

A best practice is to upgrade on select systems and verify that your applications work as expected before deploying on more systems.

- NVIDIA KVM not Supported

This release does not support the Linux Kernel-based Virtual Mode (KVM) on DGX systems.

**Note:** NVIDIA KVM is available only with DGX-2 systems. DGX-2 customers that require this feature should stay with the latest DGX OS Server 4.x release.

- Update DGX OS on DGX A100 prior to updating VBIOS

DGX A100 systems running DGX OS earlier than version 4.99.8 should be updated to the latest version before updating the VBIOS to version 92.00.18.00.0 or later (via the DGX A100 firmware update container version 20.05.12.x). Failure to do so will result in the GPUs not getting recognized.

- NGC Containers

With DGX OS 5.0, customers should update their NGC containers to container release 20.10 if they are using multi-node training. For all other use cases, refer to the NGC Framework Containers Support Matrix.

Refer to the [NVIDIA Deep Learning Frameworks](https://docs.nvidia.com/deeplearning/frameworks) documentation for information about the latest container releases and how to access the releases.

- Ubuntu Security Updates

Customers are responsible for keeping the DGX server up to date with the latest Ubuntu security updates using the `apt full upgrade` procedure. See the [Ubuntu Wiki Upgrades](https://wiki.ubuntu.com/) web page for more information. Also, the Ubuntu Security Notice site ([https://usn.ubuntu.com/](https://usn.ubuntu.com/)) lists known Common Vulnerabilities and Exposures (CVEs), including those that can be resolved by updating the DGX OS software.

## 2.1.2. Current Version

Here is a current list of the main DGX software stack component versions in the software repositories:

<table>
<thead>
<tr>
<th>Component</th>
<th>Version</th>
<th>Additional Information</th>
</tr>
</thead>
</table>
| GPU Driver     | 450.119.04 | Refer to the [NVIDIA Data Center GPU](https://docs.nvidia.com/datacenter/gpu/).
<p>| CUDA Toolkit   | 11.0     | Refer to the <a href="https://docs.nvidia.com/cuda/">NVIDIA CUDA Toolkit</a> Release Notes. |</p>
<table>
<thead>
<tr>
<th>Component</th>
<th>Version</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Docker Engine</td>
<td>19.03.14</td>
<td>Refer to v19.03.14. Only CUDA is updated if it has been previously installed.</td>
</tr>
<tr>
<td>NVIDIA Container Toolkit</td>
<td></td>
<td>Refer to the NVIDIA Container Toolkit documentation.</td>
</tr>
<tr>
<td>libnvidia-container1: 1.3.0-1</td>
<td></td>
<td>Refer to v19.03.14. Only CUDA is updated if it has been previously installed.</td>
</tr>
<tr>
<td>libnvidia-container-tools: 1.3.0-1</td>
<td></td>
<td>Refer to the NVIDIA Container Toolkit documentation.</td>
</tr>
<tr>
<td>nvidia-container-runtime:</td>
<td></td>
<td>Refer to the NVIDIA Container Toolkit documentation.</td>
</tr>
<tr>
<td>3.4.0-1</td>
<td></td>
<td>Refer to the NVIDIA Container Toolkit documentation.</td>
</tr>
<tr>
<td>nvidia-container-toolkit:</td>
<td></td>
<td>Refer to the NVIDIA Container Toolkit documentation.</td>
</tr>
<tr>
<td>1.3.0-1</td>
<td></td>
<td>Refer to the NVIDIA Container Toolkit documentation.</td>
</tr>
<tr>
<td>nvidia-docker: 2.2.5.0-1</td>
<td></td>
<td>Refer to the NVIDIA Container Toolkit documentation.</td>
</tr>
<tr>
<td>NVSM</td>
<td>20.09.26</td>
<td>Refer to the NVIDIA System Management Documentation.</td>
</tr>
<tr>
<td>DCGM</td>
<td>2.0.14</td>
<td>Refer to the DCGM Release Notes.</td>
</tr>
<tr>
<td>NVIDIA System Tools</td>
<td>20.09-1</td>
<td></td>
</tr>
<tr>
<td>Mellanox OFED</td>
<td>MLNX 5.1-2.6.2.0</td>
<td>Refer to MLNX_OFED v5.1-2.6.2.0.</td>
</tr>
<tr>
<td>GPUDirect Storage (GDS)</td>
<td>0.95v1</td>
<td>Refer to GDS Documentation.</td>
</tr>
<tr>
<td>Preview</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In addition to upgrading to the versions described in the table, performing an over-the-network update will also upgrade the Ubuntu 20.04 LTS version and Ubuntu kernel, depending on when the upgrade is performed.

For a list of the updates to DGX OS 5.0, see Update History.

### 2.1.3. Update History

This section provides information about the updates to DGX OS 5.0.

The updates listed include:

- Major component updates in the NVIDIA repositories.
- NVIDIA driver updates in the Ubuntu repository

#### 2.1.3.1. Update: May 27, 2021

- The following changes were made to the NVIDIA repositories:
  - **NVSM**: 20.09.26
  - **MOFED**: MLNX 5.1-2.6.2.0
Incorporates mlnx-fw-updater 5.2-1.0.4.0. When the update is made, the Mellanox FW updater updates the ConnectX card firmware as follows:

<table>
<thead>
<tr>
<th>Card</th>
<th>Firmware Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConnectX-4</td>
<td>12.28.2006</td>
</tr>
<tr>
<td></td>
<td>To force a downgrade, see <a href="#">Downgrading Firmware for Mellanox ConnectX-4 Cards</a> for more information.</td>
</tr>
<tr>
<td>ConnectX-5</td>
<td>16.29.1016</td>
</tr>
<tr>
<td>ConnectX-6</td>
<td>20.29.1016</td>
</tr>
</tbody>
</table>

The following ISO has been released:

**DGX OS 5.0.5**

Here are the contents of the DGX OS 5.0.5 ISO:

<table>
<thead>
<tr>
<th>Component</th>
<th>Version</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ubuntu</td>
<td>20.04.2 LTS</td>
<td>Refer to the Ubuntu 20.04 Desktop Guide and Ubuntu Server Guide.</td>
</tr>
<tr>
<td>Ubuntu kernel</td>
<td>5.4.0-72-generic</td>
<td>See <a href="#">linux 5.4.0-72-generic</a>.</td>
</tr>
<tr>
<td>GPU Driver</td>
<td>450.119.04</td>
<td>Refer to the NVIDIA Tesla documentation.</td>
</tr>
<tr>
<td>CUDA Toolkit</td>
<td>11.0</td>
<td>Refer to the NVIDIA CUDA Toolkit Release Notes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> CUDA is installed from the ISO only on DGX Station systems, including DGX Station A100.</td>
</tr>
<tr>
<td>Docker Engine</td>
<td>19.03.14</td>
<td>Refer to v19.03.14.</td>
</tr>
<tr>
<td>NVIDIA Container Tookit</td>
<td>libnvidia-container1: 1.3.0-1</td>
<td>Refer to the NVIDIA Container Toolkit documentation.</td>
</tr>
<tr>
<td></td>
<td>libnvidia-container-tools: 1.3.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nvidia-container-runtime: 3.4.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nvidia-container-toolkit: 1.3.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nvidia-docker2: 2.5.0-1</td>
<td></td>
</tr>
<tr>
<td>NVSM</td>
<td>20.09.26</td>
<td>Refer to the NVIDIA System Management Documentation.</td>
</tr>
<tr>
<td>DCGM</td>
<td>2.0.14</td>
<td>Refer to the DCGM Release Notes.</td>
</tr>
<tr>
<td>NVIDIA System Tools</td>
<td>20.09-1</td>
<td></td>
</tr>
<tr>
<td>Mellanox OFED</td>
<td>MLNX 5.1-2.6.2.0</td>
<td>Refer to MLNX_OFED v5.1-2.6.2.0. Includes mlnx-fw-updater 5.2-1.0.4.0</td>
</tr>
</tbody>
</table>
2.1.3.2. Update: May 06, 2021

The following change was made in the DGX repositories:

- **NVIDIA GPU Driver**: 450.119.04
  
  Unsigned precompiled 450.119.04 kernel modules have been added to the DGX repository which provides a fix for issue [Driver Version Mismatch Reported](#). They will be removed once signed precompiled 450.119.04 kernel modules are provided by Canonical.

  **Important**: Do not update if your system has Secure Boot enabled. Since these are unsigned drivers, systems with Secure Boot enabled will fail to load the drivers.

2.1.3.3. Update: April 20, 2021

The following change was made in the Ubuntu repositories:

- **NVIDIA GPU Driver**: 450.119.03
  
  See known issue [Driver Version Mismatch Reported](#).

2.1.3.4. Update: April 13, 2021

The following changes were made to the NVIDIA repositories:

- **GPUDirect Storage**: Added support for [GPUDirect Storage](#) as a Technical Preview.
  
  GPUDirect Storage requires manual installation. For more information and installation instructions, refer to [https://docs.nvidia.com/gpudirect-storage/troubleshooting-guide/index.html#troubleshoot-install](#).

- **MOFED**: Updated to MLNX 5.1-2.6.2.0

  **Note**: There is no need to manually uninstall previous MOFED versions before getting this update.

2.1.3.5. Update: March 30, 2021

The following changes were made to the NVIDIA repositories:

- **MOFED**: MLNX 5.1-2.5.8.0.47
  
  If you have already updated to the latest Ubuntu kernel (`uname -a` reports 5.4.0-67 or later), then you need to uninstall MOFED and then reinstall it as follows.

  ```
  $ apt-get purge mlnx-ofed-all mlnx-ofed-kernel-dkms --auto-remove
  $ apt-get update
  $ apt-get install mlnx-ofed-all nvidia-peer-memory-dkms
  ```

2.1.3.6. Update: March 2, 2021

- The following changes were made to the NVIDIA repositories:
  - Added support for the DGX Station A100.
The following ISO has been released:

- **DGX OS 5.0.2**

  Supports the DGX Station A100.

Here are the contents of the DGX OS 5.0.2 ISO:

<table>
<thead>
<tr>
<th>Component</th>
<th>Version</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ubuntu kernel</td>
<td>5.4.0-58-generic</td>
<td>See <a href="https">linux 5.4.0-58-generic</a>.</td>
</tr>
<tr>
<td>GPU Driver</td>
<td>450.80.02</td>
<td>Refer to the <a href="https">NVIDIA Tesla documentation</a>.</td>
</tr>
<tr>
<td>CUDA Toolkit</td>
<td>11.0</td>
<td>Refer to the <a href="https">NVIDIA CUDA Toolkit Release Notes</a>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong>: CUDA is installed from the ISO only on DGX Station systems, including DGX Station A100.</td>
</tr>
<tr>
<td>Docker Engine</td>
<td>19.03.14</td>
<td>Refer to <a href="https">v19.03.14</a>.</td>
</tr>
<tr>
<td>NVIDIA Container Toolkit</td>
<td>libnvidia-container1: 1.3.0-1</td>
<td>Refer to the <a href="https">NVIDIA Container Toolkit documentation</a>.</td>
</tr>
<tr>
<td></td>
<td>libnvidia-container-tools: 1.3.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nvidia-container-runtime: 3.4.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nvidia-container-toolkit: 1.3.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nvidia-docker: 2.25.0-1</td>
<td></td>
</tr>
<tr>
<td>NVSM</td>
<td>20.09.17</td>
<td>Refer to the <a href="https">NVIDIA System Management Documentation</a>.</td>
</tr>
<tr>
<td>DCGM</td>
<td>2.0.14</td>
<td>Refer to the <a href="https">DCGM Release Notes</a>.</td>
</tr>
<tr>
<td>NVIDIA System Tools</td>
<td>20.09-1</td>
<td>Refer to the <a href="https">NVIDIA System Management Documentation</a>.</td>
</tr>
<tr>
<td>Mellanox OFED</td>
<td>MLNX 5.1-2.5.8.0</td>
<td>Refer to <a href="https">MLNX_OFED v5.1-2.5.8.0</a>.</td>
</tr>
</tbody>
</table>

**2.1.3.7. Update: February 23, 2021**

The following change was made to NVIDIA repositories:

- **NVSM**: 20.09.17
2.1.3.8. Update: January 20, 2021

The following change was made in the Ubuntu repositories:

- **NVIDIA GPU Driver**: 450.102.04

2.1.3.9. Update: December 11, 2020

The following changes were made in the NVIDIA repositories:

- **MOFED**: MLNX 5.1-2.5.8.0
  
  When the update is made, the Mellanox FW updater updates the ConnectX card firmware as follows:

```
<table>
<thead>
<tr>
<th>Card</th>
<th>Firmware Version</th>
</tr>
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<tbody>
<tr>
<td>ConnectX-4</td>
<td>12.28.2006</td>
</tr>
<tr>
<td>ConnectX-5</td>
<td>16.28.4000</td>
</tr>
<tr>
<td>ConnectX-6</td>
<td>20.28.4000</td>
</tr>
</tbody>
</table>
```

- **Docker**: docker-ce 19.03.14
  
  This addresses [CVE-2020-15257](https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2020-15257).

2.1.3.10. DGX OS 5.0 Release: October 31, 2020

DGX OS 5.0 was released with the DGX OS 5.0.0 ISO. Here are the contents of the DGX OS 5.0.0 ISO:

<table>
<thead>
<tr>
<th>Component</th>
<th>Version</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ubuntu kernel</td>
<td>5.4.0-52-generic</td>
<td>See <a href="https://help.ubuntu.com">linux 5.4.0-52-generic</a>.</td>
</tr>
<tr>
<td>GPU Driver</td>
<td>450.80.02</td>
<td>Refer to the <a href="https://developer.nvidia.com">NVIDIA Tesla documentation</a>.</td>
</tr>
<tr>
<td>CUDA Toolkit</td>
<td>11.0</td>
<td>Refer to the <a href="https://developer.nvidia.com">NVIDIA CUDA Toolkit Release Notes</a>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong>: CUDA is installed from the ISO only on DGX Station systems, including DGX Station A100.</td>
</tr>
<tr>
<td>Docker Engine</td>
<td>19.03.13</td>
<td>Refer to <a href="https://github.com/docker/docker">v10.03.14</a>.</td>
</tr>
<tr>
<td>NVIDIA Container Toolkit</td>
<td></td>
<td>Refer to the <a href="https://github.com/nvidia/container-toolkit">NVIDIA Container Toolkit documentation</a>.</td>
</tr>
<tr>
<td></td>
<td>libnvidia-container1:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.3.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>libnvidia-container-tools: 1.3.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nvidia-container-runtime: 3.4.0-1</td>
<td></td>
</tr>
</tbody>
</table>
2.1.4. Known Issues

This section provides a list and information about the known issues in DGX OS 5.

Here are the known issues for **DGX Server**:

- Potential Incompatibility with nvme-cli v1.12 and DGX A100 NVMe Drives
- System May Slow Down When Using mpirun
- Software Power Cap Not Reported Correctly by nvidia-smi
- Forced Reboot Hangs the OS
- NVSM Enumerates NVSwitches as 8-13 Instead of 0-5
- BMC is not Detectable After Restoring BMC to Default
- USB Errors are Logged When Shutting Down the System
- Erroneous Insufficient Power Error May Occur for PCIe Slots
- AMD Crypto Co-processor is not Supported
- nvsm show alerts Reports NVSwitch PCIe Link Width is Degraded
- cudaMemFree CUDA API Performance Regression
- nvsm show health Reports Firmware as Not Authenticated
- NVSM Fails to Show CPU Information on Non-English Locales
- Running NGC Containers Older than 20.10 May Produce “Incompatible MOFED Driver” Message
- Applications that call the cuCTXCreate API Might Experience a Performance Drop

Here are the known issues for **DGX Station**:

- Applications that call the cuCTXCreate API Might Experience a Performance Drop
- NVSM Platform Displays as Unsupported
- Missing symbolic link to /usr/local/cuda
- NVSM Fails to Show CPU Information on Non-English Locales
- NVIDIA Desktop Shortcuts Not Updated After a DGX OS Release Upgrade

Here are the issues for **DGX Station A100**:
2.1.4.1. Potential Incompatibility with nvme-cli v1.12 and DGX A100 NVMe Drives

Issue
The DGX A100 system becomes unstable if running nvme-cli v1.12 on newer NVMe drives to be shipped with DGX A100 systems beginning August 2021.

Explanation
There is a compatibility issue between nvme-cli v1.12 and the new drives.
The issue does not occur with nvme-cli v1.9 packaged with Ubuntu 20.04 as part of DGX OS 5. However, if you use a container that incorporates nvme-cli v1.12, the issue occurs.

2.1.4.2. USB Errors are Logged When Shutting Down the System

Issue
Reported in release 4.99.9.
When rebooting the system, "USB 3-1-port1" error messages appear on the console. This occurs even with no physical USB flash drive plugged in, or without the BMC ISO image mounted.

Explanation
This issue will be addressed in a future DGX OS release. The error messages can be ignored as the system will still boot.

2.1.4.3. Erroneous Insufficient Power Error May Occur for PCIe Slots

Issue
Reported in release 4.99.9.
The DGX A100 server reports "Insufficient power" on PCIe slots when network cables are connected.
Explanation
This may occur with optical cables and indicates that the calculated power of the card + 2 optical cables is higher than what the PCIe slot can provide.
The message can be ignored.

2.1.4.4. AMD Crypto Co-processor is not Supported

Issue
Reported in release 4.99.9.
The DGX A100 currently does not support the AMD Cryptograph Co-processor. When booting the system, you may see the following error message in the syslog:

```
ccp initialization failed
```

Explanation
Even if the message does not appear, CCP is still not supported. The SBIOS makes zero CCP queues available to the driver, so CCP cannot be activated.

2.1.4.5. nvsm show alerts Reports NVSwitch PCIe Link Width is Degraded

Issue
Reported in release 4.99.10.
NVSM raises alerts of Severity=Warning against PCIe links between NVSwitch and the Draco switch. The alert states “PCIe link width degraded” - the PCIe link width is expected to be x4 while the actual link width is x2.
There are six pairs of the PCIe links, so NVSM raises six such alerts in this condition.

Explanation
The Broadcom firmware for the synthetic switch advertises the Draco switch has PCIe link width capability of x4. This synthesized information is not reflecting the hardware capability which is of width x2. NVSM raises alerts based on this incorrect information.
This issue will be resolved with updated firmware to be provided in the DGX A100 Firmware Update Container after version 20.05.12.3. See the DGX A100 Firmware Update Container release notes for the latest firmware status.
2.1.4.6. **cudaMemFree CUDA API Performance Regression**

**Issue**
Reported in release 4.99.10.
In cases when NVLINK peers are enabled, there is a performance regression of cuMemFree CUDA API.

**Explanation**
The cuMemFree API is usually used during application teardown and is discouraged from being used in performance-critical paths, so the regression should not impact application end-to-end performance.

2.1.4.7. **nvsm show health Reports Firmware as Not Authenticated**

**Issue**
Reported in release 5.0.
When issuing `nvsm show health`, the output shows CEC firmware components as Not Authenticated, even when they have passed authentication.

**Example:**

```
CEC:
  CEC Version: 3.5
  EC_FW_TAG0: Not Authenticated
  EC_FW_TAG1: Not Authenticated
  BMC FW authentication state: Not Authenticated
```

**Explanation**
The message can be ignored and does not affect the overall nvsm health output status.

2.1.4.8. **Running NGC Containers Older than 20.10 May Produce “Incompatible MOFED Driver” Message**

**Issue**
Reported in release 5.0.
DGX OS 5.0 incorporates Mellanox OFED 5.1 for high performance multi-node connectivity. Support for this version of OFED was added in NGC containers 20.10, so when running on earlier versions (or containers derived from earlier versions), a message similar to the following may appear.

```
ERROR: Detected MOFED driver 5.1-2.4.6, but this container has version 4.6-1.0.1.
```
Unable to automatically upgrade this container. Multi-node communication may be unreliable or may result in crashes with this version. This incompatibility will be resolved in an upcoming release.

**Explanation**

For applications that rely on OFED (typically those used in multi-node jobs), this is an indication that an update to NGC containers 20.10 or greater is required. For most other applications, this error can be ignored.

Some applications may return an error such as the following when running with NCCL debug messages enabled:

```bash
export NCCL_DEBUG=WARN

misc/ibvwrap.cc:284 NCCL WARN Callto ibv_modify_qp failed with error No such device ...
common.cu:777 'unhandled system error'
```

This may occur even for single-node training jobs. To work around this, issue the following:

```bash
export NCCL_IB_DISABLE=1
```

## 2.1.4.9. System May Slow Down When Using `mpirun`

**Issue**

Customers running Message Passing Interface (MPI) workloads may experience the OS becoming very slow to respond. When this occurs, a log message similar to the following would appear in the kernel log:

```bash
kernel BUG at /build/linux-fQ94TU/linux-4.4.0/fs/ext4/inode.c:1899!
```

**Explanation**

Due to the current design of the Linux kernel, the condition may be triggered when `get_user_pages` is used on a file that is on persistent storage. For example, this can happen when `cudaHostRegister` is used on a file path that is stored in an ext4 filesystem. DGX systems implement `/tmp` on a persistent ext4 filesystem.

**Note:** If you performed this workaround on a previous DGX OS software version, you do not need to do it again after updating to the latest DGX OS version.

In order to avoid using persistent storage, MPI can be configured to use shared memory at `/dev/shm` (this is a temporary filesystem).

If you are using Open MPI, then you can solve the issue by configuring the Modular Component Architecture (MCA) parameters so that `mpirun` uses the temporary file system in memory.

For details on how to accomplish this, see the Knowledge Base Article [DGX System Slows Down When Using `mpirun`](https://nvidia.com) (requires login to the NVIDIA Enterprise Support portal).
2.1.4.10. Software Power Cap Not Reported Correctly by nvidia-smi

Issue
On DGX-1 systems with Pascal GPUs, nvidia-smi does not report Software Power Cap as “Active” when clocks are throttled by power draw.

Explanation
This issue is with nvidia-smi reporting and not with the actual functionality.

2.1.4.11. Forced Reboot Hangs the OS

Issue
When issuing `reboot -f` (forced reboot), I/O error messages appear on the console and then the system hangs.

The system reboots normally when issuing `reboot`.

Explanation
This issue will be resolved in a future version of the DGX OS.

2.1.4.12. NVSM Enumerates NVSwitches as 8-13 Instead of 0-5

Issue
Reported in release 4.99.9.

NVSM commands that list the NVSwitches (such as `nvsm show nvswitches`) will return the switches with 8-13 enumeration.

Example:
```
nvsm show /systems/localhost/nvswitches
/systems/localhost/nvswitches
Targets:
NVSwitch10
NVSwitch11
NVSwitch12
NVSwitch13
NVSwitch8
NVSwitch9
```
Explanation
Currently, NVSM recognizes NVSwitches as graphics devices, and enumerates them as a continuation of the GPU 0-7 enumeration.

2.1.4.13. Applications that call the cuCTXCreate API Might Experience a Performance Drop

Issue
Reported in release 5.0.
When some applications call cuCtxCreate, cuGLCtxCreate, or cuCtxDestroy, there might be a drop in performance.

Explanation
This issue occurs with Ubuntu 20.04, but not with previous versions. The issue affects applications that perform graphics/compute interoperations or have a plugin mechanism for CUDA, where every plugin creates its own context, or video streaming applications where computations are needed. Examples include ffmpeg, Blender, SimpleDrvRuntime, and cuSolverSp_LinearSolver.
This issue is not expected to impact deep learning training.

2.1.4.14. NVSM Platform Displays as Unsupported

Issue
Reported in release 5.0.
In DGX Station, when you run
```
$ nvsm show version
```
instead of displaying DGX Station, the platform field displays Unsupported.

Explanation
You can ignore this message.

2.1.4.15. Missing symbolic link to /usr/local/cuda

Issue
Reported in release 4.0.4.
Removing the NVIDIA CUDA Toolkit can cause the symbolic link to /usr/local/cuda to be removed even if multiple versions of the NVIDIA CUDA Toolkit are installed.
This issue occurs during an upgrade from a DGX OS 3 release to a DGX OS 4 release because NVIDIA CUDA Toolkit 9.0 is removed after NVIDIA CUDA Toolkit 10.1 is installed.

This issue can also occur if you remove the NVIDIA CUDA Toolkit yourself by, for example, running the `apt remove cuda-toolkit-10-0` command or a similar command.

**Explanation**

This workaround requires `sudo` privileges.

Reconfigure the `cuda-toolkit-major-minor` package for the version of NVIDIA CUDA Toolkit that you want to continue to use. For example, after an upgrade from a DGX OS 3 release to a DGX OS 4 release, reconfigure the `cuda-toolkit-10-1` package:

```
# sudo dpkg-reconfigure cuda-toolkit-10-1
```

### 2.1.4.16. NVSM Fails to Show CPU Information on Non-English Locales

**Issue**

Reported in release 4.1.0 and 5.0 update 3

If the locale is other than English, the `nvsm show cpu` command reports the target processor does not exist.

```
$ sudo nvsm show cpu
ERROR:nvsm:Not Found for target address /systems/localhost/processors
ERROR:nvsm:Target address "/systems/*/processors/*" does not exist
```

**Explanation**

To work around, set the locale to English before issuing `nvsm show cpu`.

### 2.1.4.17. NVIDIA Desktop Shortcuts Not Updated After a DGX OS Release Upgrade

**Issue**

Reported in release 4.0.4.

In DGX OS 4 releases, the NVIDIA desktop shortcuts have been updated to reflect current information about NVIDIA DGX systems and containers for deep learning frameworks. These desktop shortcuts are also organized in a single folder on the desktop.

After a DGX OS release upgrade, the NVIDIA desktop shortcuts for existing users are not updated. However, the desktop for a user added after the upgrade will have the current desktop shortcuts in a single folder.
Explanation

If you want quick access to current information about NVIDIA DGX systems and containers from your desktop, replace the old desktop shortcuts with the new desktop shortcuts.

1. Change to your desktop directory.
   
   $ cd /home/your-user-login-id/Desktop

2. Remove the existing NVIDIA desktop shortcuts.
   
   $ rm dgx-container-registry.desktop \
dgxstation-userguide.desktop \
dgx-container-registry-userguide.desktop \
nvidia-customer-support.desktop

3. Copy the folder that contains the new NVIDIA desktop shortcuts and its contents to your desktop directory.
   
   $ cp -rf /etc/skel/Desktop/Getting\ Started/ .

2.1.4.18. Unable to Set a Separate/xinerama Mode through the xorg.conf File or through nvidia-settings

Issue

Reported in release 5.0.2

In Station A100, in the BIOS, in OnBrd/Ext VGA Select=, when Auto or External is selected, the nvidia-conf-xconfig service sets up Xorg to use only the Display adapter.

Explanation

Manually edit the existing the /etc/X11/xorg.conf.d/xorg-nvidia.conf file with the following settings:

```plaintext
--- xorg-nvidia.conf 2020-12-10 02:42:25.585721167 +0530
+++ /root/working-xinerama-xorg-nvidia.conf 2020-12-10 02:38:05.368218170 +0530
@@ -8,8 +8,10 @@
Section "ServerLayout"
  Identifier     "Layout0"
  Screen      0  "Screen0"
+  Screen      1  "Screen0 (1)" RightOf "Screen0"
  InputDevice    "Keyboard0" "CoreKeyboard"
  InputDevice    "Mouse0" "CorePointer"
+  Option         "Xinerama" "1"
EndSection

Section "Files"
@@ -43,6 +45,7 @@
 Driver         "nvidia"
 BusID          "PCI:2:0:0"
 VendorName     "NVIDIA Corporation"
+ Screen          0
EndSection

Section "Screen"
@@ -51,6 +54,25 @@
 Monitor        "Monitor0"
 DefaultDepth   24
```
<table>
<thead>
<tr>
<th>Option</th>
<th>&quot;AllowEmptyInitialConfiguration&quot; &quot;True&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ SubSection</td>
<td>&quot;Display&quot;</td>
</tr>
<tr>
<td>+ Depth</td>
<td>24</td>
</tr>
<tr>
<td>+ EndSubSection</td>
<td></td>
</tr>
<tr>
<td>+ EndSection</td>
<td></td>
</tr>
<tr>
<td>+ Section &quot;Device&quot;</td>
<td></td>
</tr>
<tr>
<td>+ Identifier</td>
<td>&quot;Device0 (1)&quot;</td>
</tr>
<tr>
<td>+ Driver</td>
<td>&quot;nvidia&quot;</td>
</tr>
<tr>
<td>+ BusID</td>
<td>&quot;PCI:2:0:0&quot;</td>
</tr>
<tr>
<td>+ VendorName</td>
<td>&quot;NVIDIA Corporation&quot;</td>
</tr>
<tr>
<td>+ Screen</td>
<td>1</td>
</tr>
<tr>
<td>+ EndSection</td>
<td></td>
</tr>
<tr>
<td>+ Section &quot;Screen&quot;</td>
<td></td>
</tr>
<tr>
<td>+ Identifier</td>
<td>&quot;Screen0 (1)&quot;</td>
</tr>
<tr>
<td>+ Device</td>
<td>&quot;Device0 (1)&quot;</td>
</tr>
<tr>
<td>+ Monitor</td>
<td>&quot;Monitor0&quot;</td>
</tr>
<tr>
<td>+ DefaultDepth</td>
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<tr>
<td>Depth</td>
<td>24</td>
</tr>
<tr>
<td>EndSubSection</td>
<td></td>
</tr>
</tbody>
</table>

### 2.1.4.19. NSCQ Library and Fabric Manager Might Not Install When Installing a New NVIDIA Driver

**Issue**

When you install a new NVIDIA Driver from the Ubuntu repository, the NSCQ library and Fabric Manager might not install.

**Explanation**

The `libnvidia-nscq-XXX` packages provide the same `/usr/lib/x86_64-linux-gnu/libnvidia-nscq.so` file, so multiple packages cannot exist on your DGX system at the same time.

We recommend that you remove the old packages **before** installing the new driver branch. Refer to [Upgrading your NVIDIA Data Center GPU Driver to a Newer Branch](#) for instructions.

### 2.1.5. DGX OS Resolved Issues

Here are the issues that were resolved in the latest release.

- [DGX A100/DGX-2] Driver Version Mismatch Reported
- [DGX A100] BMC is not Detectable After Restoring BMC to Default
- [DGX A100] A System with Encrypted rootfs May Fail to Boot if one of the M.2 drives is Corrupted
- [All DGX systems]: When starting the DCGM service, a version mismatch error message similar to the following will appear:

  ```
  [78075.772392] nvidia-nvswitch: Version mismatch, kernel version 450.80.02 user version 450.51.06
  ```
[All DGX systems]: When issuing nvsm show health, the nvsmhealth_log.txt log file reports that the /proc/driver/ folders are empty.

[DGX A100]: The Mellanox software that is included in the DGX OS installed on DGX A100 system does not automatically update the Mellanox firmware as needed when the Mellanox driver is installed.

[DGX A100]: nvsm stress-test Does not Stress the System if MIG is Enabled

Reported in 4.99.10

[DGX A100]: With eight U.2 NVMe drives installed, the nvsm-plugin-pcie service reports ERROR: Device not found in mapping table” for the additional four drives (for example, in response to systemctl status nvsm*).

Reported in 4.99.11

[DGX A100]: When starting the Fabric Manager service, the following error is reported: detected NVSwitch non-fatal error 10003 on NVSwitch pci.

Reported in 4.99.9

2.1.5.1. BMC is not Detectable After Restoring BMC to Default

Issue

Reported in release 4.99.8. Fixed with BMC 0.13.06

After using the BMC Web UI dashboard to restore the factory defaults [Maintenance > Restore Factory Defaults], the BMC can no longer be detected and the system is rendered unusable.

Explanation

Do not attempt to restore the factory defaults using the BMC Web UI dashboard.

2.1.5.2. A System with Encrypted rootfs May Fail to Boot if one of the M.2 drives is Corrupted

Issue


On systems with encrypted rootfs, if one of the M.2 drives is corrupted, the system stops at the BusyBox shell when booting.

Explanation

The inactive RAID array (due to the corrupted M.2 drive) is not getting converted to a degraded RAID array.

To work around, perform the following within the BusyBox.
1. Issue the following.
   ```bash
   $ mdadm --run /dev/md?*
   ```
2. Wait a few seconds for the RAID and crypt to be discovered.
3. Exit.
   ```bash
   $ exit
   ```

2.1.5.3. **Driver Version Mismatch Reported**

**Issue**

Reported in release 5.0: 4/20/21 update

Fixed in 5/06/21 update.

After updating the DGX OS, the syslog/dmesg reports the following version mismatch:

```
nvidia-nvswitch: Version mismatch, kernel version 450.119.03 user version 450.51.06
```

**Explanation**

This occurs with driver 450.119.03 on NVSwitch systems such as DGX -2 or DGX A100, and is due to a bug that causes the NSCQ library to fail to load. This will be resolved in an updated driver version.

2.1.6. **Known Limitations**

This section lists known limitations and other issues that will not be fixed.

- [DGX A100]: Hot-plugging of Storage Drives is not Supported
- [DGX A100]: Syslog Contains Numerous “SM LID is 0, maybe no SM is running” Error Messages
- [DGX-2] Serial Over LAN Does not Work After Cold Resetting the BMC
- [DGX-2] Some BMC Dashboard Quick Links Appear Erroneously
- [DGX-2] Applications Cannot be Run Immediately Upon Powering on the DGX-2
- [DGX-1] Script Cannot Recreate RAID Array After Re-inserting a Known Good SSD
- [DGX Station A100] Suspend and Power Button Section Appears in Power Settings
- [DGX-2] NVSM Does not Detect Downgraded GPU PCIe Link

2.1.6.1. **[DGX A100]: Hot-plugging of Storage Drives not Supported**

**Issue**

Hot-plugging or hot-swapping one of the storage drives might result in system instability or incorrect device reporting.
Explanation and Workaround

Turn off the system before removing and replacing any of the storage drives.

2.1.6.2. [DGX A100]: Syslog Contains Numerous "SM LID is 0, maybe no SM is running" Error Messages

Issue

The system log (/var/log/syslog) contains multiple "SM LID is 0, maybe no SM is running" error message entries.

Explanation and Workaround

This issue is the result of the srp_daemon within the Mellanox driver. The daemon is used to discover and connect to InfiniBand SCSI RDMA Protocol (SRP) targets.

If you are not using RDMA, then disable the srp_daemon as follows.

```bash
$ sudo systemctl disable srp_daemon.service $ sudo systemctl disable srptools.service
```

2.1.6.3. [DGX-2]: Serial Over LAN Does not Work After Cold Resetting the BMC

Issue

After performing a cold reset on the BMC (ipmitool mc reset cold) while serial over LAN (SOL) is active, you cannot restart the SOL session.

Explanation and Workaround

To re-activate SOL, either

- Reboot the system, or
- Kill and then restart the process as follows.

1. Identify the Process ID of the SOL TTY process by running the following.
   ```bash
   ps -ef | grep "/sbin/agetty -o -p -- \u --keep-baud 115200,38400,9600 ttyS0 vt220"
   ```
2. Kill the process.
   ```bash
   kill <PID>
   ```
   where <PID> is the Process ID returned by the previous command.
3. Either wait for the cron job to respawn the process or manually restart the process by running
   ```bash
   /sbin/agetty -o -p -- \u --keep-baud 115200,38400,9600 ttyS0 vt220
   ```
2.1.6.4.  [DGX-2]: Some BMC Dashboard Quick Links Appear Erroneously

Issue

On the BMC dashboard, the following Quick Links appear by mistake and should not be used.

- **Maintenance->Firmware Update**
- **Settings->NvMeManagement->NvMe P3700Vpd Info**

To recreate the array in this case,

1. Set the drive back to a good state.
   ```bash
   # sudo /opt/MegaRAID/storcli/storcli64 /c0/e<enclosure_id>/s<drive_slot> set good
   ```

2. Run the script to recreate the array.
   ```bash
   # sudo /usr/bin/configure_raid_array.py -c -f
   ```

2.1.6.5.  [DGX-2]: Applications Cannot be Run Immediately Upon Powering on the DGX-2

Issue

When attempting to run an application that uses the GPUs immediately upon powering on the DGX-2 system, you may encounter the following error.

CUDA_ERROR_SYSTEM_NOT_READY

Explanation and Workaround

The DGX-2 uses a fabric manager service to manage communication between all the GPUs in the system. When the DGX-2 system is powered on, the fabric manager initializes all the GPUs. This can take approximately 45 seconds. Until the GPUs are initialized, applications that attempt to use them will fail.

If you encounter the error, wait and launch the application again.

2.1.6.6.  [DGX-1]: Script Cannot Recreate RAID Array After Re-inserting a Known Good SSD

Issue

When a good SSD is removed from the DGX-1 RAID 0 array and then re-inserted, the script to recreate the array fails.
**Explanation and Workaround**

After re-inserting the SSD back into the system, the RAID controller sets the array to offline and marks the re-inserted SSD as Unconfigured_Bad (UBad). The script will fail when attempting to rebuild an array when one or more of the SSDs are marked UBad.

To recreate the array in this case,

1. Set the drive back to a good state.
   
   ```bash
   # sudo /opt/MegaRAID/storcli/storcli64 /c0/e<enclosure_id>/s<drive_slot> set good
   ```

2. Run the script to recreate the array.
   
   ```bash
   # sudo /usr/bin/configure_raid_array.py -c -f
   ```

**2.1.6.7. [DGX Station A100] Suspend and Power Button Section Appears in Power Settings**

**Issue**

Reported in release 5.0.2.

In the Power Settings page of the DGX Station A100 GUI, the **Suspend & Power Button** section is displayed even though the options do not work.

**Explanation**

Suspend and sleep modes are not supported on the DGX Station A100.

**2.1.6.8. [DGX-2] NVSM Does not Detect Downgraded GPU PCIe Link**

**Issue**

If the GPU PCIe link is downgraded to Gen1, NVSM still reports the GPU health status as OK.

**Explanation**

NVSM does not propagate the health status from the PCIe subsystem to other subsystems. For example: If there is a PCIe link degradation that is reported for Network Adapter, NVSM does not mark the Network adapter as unhealthy.
Appendix A. Downgrading Firmware for Mellanox ConnectX-4 Cards

Explain what the concept is and why the reader should care about it in 50 words or fewer.

DGX OS 5.0.0 provides the mlnx-fw-updater package version 5.1-2.4.6.0 which automatically installs firmware version 12.28.2040 on ConnectX-4 devices.

Since 12.28.2006 is the recommended firmware version, on December 15 the updater package has been updated to install version 12.28.2006. However, if the firmware has already been updated to 12.28.2040, the updater will not install the downlevel firmware version since a newer version is already installed.

In this case, you will need to force the downgrade as explained in this section.

A.1. Checking the Device Type

You can use the mlxfwmanager tool to verify whether ConnectX-4 devices are installed on your DGX system.

Run the following command.

```bash
$ sudo mlxfwmanager
Querying Mellanox devices firmware ...
Device #1:
----------
Device Type: ConnectX4
Part Number: MCX455A-ECA_Ax
Description: ConnectX-4 VPI adapter card; EDR IB (100Gb/s) and 100GbE; single-port QSFP28; PCIe3.0 x16; ROHS R6
PSID: MT_2180110032
PCI Device Name: /dev/mst/mt4115_pciconf1
Base GUID: 248a070300945e60
Versions: Current Available
FW 12.28.2040 N/A
PXE 3.6.0102 N/A
UEFI 14.21.0017 N/A
```
A.2. Downgrading the Firmware

If the output indicates that ConnectX-4 devices are installed, you need to downgrade the firmware.

To downgrade the firmware:

1. Determine the correct firmware package name.
   a). Switch to the /opt/Mellanox/mlnx-fw-updater/firmware directory, where the updater installs the firmware files, and list the contents.
   
   ```
   [:/opt/mellanox/mlnx-fw-updater/firmware$ ls
   mlxfwmanager_sriov_dis_x86_64_4115
   mlxfwmanager_sriov_dis_x86_64_4119
   mlxfwmanager_sriov_dis_x86_64_4123
   mlxfwmanager_sriov_dis_x86_64_4127
   mlxfwmanager_sriov_dis_x86_64_41686
   mlxfwmanager_sriov_dis_x86_64_4117
   mlxfwmanager_sriov_dis_x86_64_4121
   mlxfwmanager_sriov_dis_x86_64_4125
   mlxfwmanager_sriov_dis_x86_64_41682
   ```

   b). Identify the correct package from the output.

   ```
   mlxfwmanager_sriov_dis_x86_64_4115
   mlxfwmanager_sriov_dis_x86_64_4119
   mlxfwmanager_sriov_dis_x86_64_4123
   mlxfwmanager_sriov_dis_x86_64_4127
   mlxfwmanager_sriov_dis_x86_64_41686
   mlxfwmanager_sriov_dis_x86_64_4117
   mlxfwmanager_sriov_dis_x86_64_4121
   mlxfwmanager_sriov_dis_x86_64_4125
   mlxfwmanager_sriov_dis_x86_64_41682
   ```

2. Execute the firmware package by using the -f flag.

   ```
   [:/opt/mellanox/mlnx-fw-updater/firmware$ sudo
   ./mlxfwmanager_sriov_dis_x86_64_4115 -f
   ```

   The software queries the current firmware and then updates (downgrades) the firmware.

   ```
   Querying Mellanox devices firmware ...
   ...
   ---------
   Found 2 device(s) requiring firmware update...
   Device #1: Updating FW ...
   Initializing image partition - OK
   Writing Boot image component - OK
   Done
   Device #2: Updating FW ...
   Initializing image partition - OK
   Writing Boot image component - OK
   Done
   ```

3. Reboot the system to allow the updates to take effect.

   ```
   $ sudo reboot
   ```
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