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A.1. Checking the Device Type

A.2. Downgrading the Firmware

Appendix B. DGX Software Stack
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 released twice a year, typically around February and August, for two years after the first release. Updates are provided between releases and thereafter for the entire support duration.

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. You cannot select which upgrades to make or limit upgrades to the non-latest DGX OS 5.x release.

**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

The following are the key features of DGX OS Release 5:

- Supports all NVIDIA servers as well as DGX Station and DGX Station A100 in a single ISO image.
- Based on Ubuntu 20.04
- Includes drive encryption for added security.

UPDATE ADVISEMENT

- **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. Failure to do so will result in the GPUs not getting recognized.

- **NGC Containers**
  With DGX OS 5, customers should update their NGC containers to container release 20.10 or later if they are using multi-node training. For all other use cases, refer to the NCG Framework Containers Support Matrix.

  Refer to the NVIDIA Deep Learning 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 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.

CURRENT VERSIONS

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>
<tbody>
<tr>
<td>GPU Driver</td>
<td>R450: 450.172.01 R470: 470.103.01</td>
<td>Refer to the NVIDIA Data Center GPU documentation.</td>
</tr>
<tr>
<td>CUDA Toolkit</td>
<td>11.4</td>
<td>Refer to the NVIDIA CUDA Toolkit Release Notes.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Note</strong>: For DGX servers, CUDA is updated only if it has been previously installed.</td>
</tr>
<tr>
<td>Docker Engine</td>
<td>docker-ce-* 20.10.11</td>
<td>Refer to v20.10.11.</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong>: If needed, the following components require separate installation via <code>sudo apt install</code>.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>docker-ce-rootless-extras 20.10.11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>docker-scan-plugin 0.9.0</td>
<td></td>
</tr>
<tr>
<td>NVIDIA Container Toolkit</td>
<td>nvidia-container-runtime: 3.7.0-1</td>
<td>Refer to the NVIDIA Container Toolkit documentation.</td>
</tr>
<tr>
<td></td>
<td>nvidia-container-toolkit: 1.7.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nvidia-docker2: 2.8.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>libnvidia-container1: 1.7.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>libnvidia-container-tools: 1.7.0-1</td>
<td></td>
</tr>
<tr>
<td>NVSM</td>
<td>21.09.14</td>
<td>Refer to the NVIDIA System Management Documentation.</td>
</tr>
<tr>
<td>DCGM</td>
<td>2.3.2</td>
<td>Refer to the DCGM Release Notes.</td>
</tr>
<tr>
<td>NGC CLI</td>
<td>2.2.0</td>
<td>Refer to the NGC CLI Documentation.</td>
</tr>
<tr>
<td>Mellanox OFED</td>
<td>MLNX 5.4-3.1.0.0</td>
<td>Refer to MLNX_OFED v5.4-3.1.0.0</td>
</tr>
<tr>
<td>GPUDirect Storage (GDS)</td>
<td>v1.0</td>
<td>Refer to GDS Documentation</td>
</tr>
<tr>
<td>MIG Configuration Tool</td>
<td>nvidia-mig-manager 0.1.2-1</td>
<td>Refer to the following NVIDIA mig-parted github pages:</td>
</tr>
</tbody>
</table>
## DGX OS 5 Releases

### DGX OS Software

<table>
<thead>
<tr>
<th>Component</th>
<th>Version</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>nvipmitool</td>
<td>1.0.60</td>
<td></td>
</tr>
<tr>
<td>nvidia-peer-memory/nvidia-peer-memory DKMS</td>
<td>1.2.0</td>
<td>NVIDIA/mig-parted/tree/master/deployments/systemd</td>
</tr>
</tbody>
</table>

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>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ConnectX-4</td>
<td>12.28.2006</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>16.31.1014</td>
<td></td>
</tr>
<tr>
<td>ConnectX-6</td>
<td>20.31.1014</td>
<td></td>
</tr>
</tbody>
</table>

In addition to upgrading to the versions described in this section, 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 updates in DGX OS 5, see [Update History](#).

### 2.1. New Features in DGX OS Release 5.2

Here are the new features in DGX OS 5.2 (see also the [Update History](#) for important changes made since the initial release):

- Updated NVSM to 21.09.14
- Updated DCGM to 2.3.2
- Added DGX Software Stack installation method

The DGX Software Stack provides the option to install a vanilla version of Ubuntu 20.04 and then separately install the additional NVIDIA software (NVIDIA DGX Software Stack). This option is available for DGX servers (DGX A100, DGX-2, DGX-1). The DGX Software Stack is a stream-lined version of the software stack incorporated into the DGX OS ISO image, and includes meta-packages to simplify the installation process. Refer to the [DGX Software Stack for Ubuntu Installation Guide](http://docs.nvidia.com/dgx/dgx-ubuntu-install-guide/index.html) for instructions.

**UPDATE ADVISEMENT**

- **IMPORTANT**: This release incorporates the following updates.
DGX OS 5 Releases

- NVIDIA MLNX_OFED 5.4
  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.

2.2. New Features in DGX OS Release 5.1

Here are the new features in DGX OS 5.1 (see also the Update History for important changes made since the initial release):

- Added NVIDIA GPU driver Release 470.
  
  Note: When upgrading DGX OS, the system remains on the installed GPU driver branch. For example, the GPU driver branch on the system does not automatically switch from R450 to R470. Refer to the Changing Your GPU Branch section of the DGX OS User Guide for instructions on switching GPU driver branches.

- Supports the CUDA Toolkit up to 11.4 natively, or newer versions via the compatibility module.

- Updated the Docker Engine to 20.10.

- Incorporates NVIDIA MLNX_OFED 5.4.

- Updated NVSM
  
  - Added ability to generate a test alert/email.
  
  - NVSM dump/show health includes firmware version information (incorporates ‘nvsm show -level all’ in the command).

- NVSM binds port 273 to 127.0.0.1 to limit external communications.
  To open other ports for IPV4 or IPV6, edit nvsm.config (bindaddress) and then restart NVSM

- Added NVML libraries

- Includes MOFED 5.4

- Added NGC CLI

- Added MIG Configuration Tool to define MIG partitions and provide a systemd service to make MIG partitions persist across reboots.
  
  - MIG is disabled by default
  
  - The MIG configuration file overrides any MIG-related nvidia-smi commands. Use nvidia-mig-parted instead of nvidia-smi for MIG configuration.

- arp_ignore=1 and arp_announce=2 are now set on all InfiniBand configured interfaces.
DGX OS 5 Releases

- Added LLDPd for validating network cabling
  The default configuration is now set to use the PortID of the interface name rather than the MAC address.
- Supports GPUDirect Storage 1.0 [Refer to GDS Documentation for installation instructions]

**UPDATE ADVISEMENT**

- **IMPORTANT:** This release incorporates the following updates.
  - NVIDIA MLNX_OFED 5.4
    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.

2.3. **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):

- NVIDIA GPU driver Release 450.
- Supports the CUDA Toolkit up to 11.0 natively, or newer versions via the compatibility module.
- Incorporates NVIDIA MLNX_OFED 5.1.
- 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
- Updated the default InfiniBand network naming policy.
  The InfiniBand interfaces, enumerated as ibx in previous releases, now enumerate as ibp<sub>x</sub>y (similar to Ethernet enp<sub>x</sub>y). Refer to the DGX A100 User Guide for the new naming.

**UPDATE ADVISEMENT**

- **IMPORTANT:** This release incorporates the following updates.
  - NVIDIA MLNX_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.

2.4. Update History

This section provides information about the updates to DGX OS 5.

The updates listed include:

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

Refer to Installing the DGX OS [Reimaging the System] for instructions on how to install DGX OS from the ISO image.

Refer to Performing Package Updates for instructions on how to update DGX OS with all the latest DGX OS 5 updates from the network repositories.

2.4.1. Update: February 17, 2022

- Installer version updated to 5.2.0.
- Added DGX Software Stack installation method
  The DGX Software Stack provides the option to install a vanilla version of Ubuntu 20.04 and then separately install the additional NVIDIA software (NVIDIA DGX Software Stack). This option is available for DGX servers (DGX A100, DGX-2, DGX-1). The DGX Software Stack is a stream-lined version of the software stack incorporated into the DGX OS ISO image, and includes meta-packages to simplify the installation process. Refer to the DGX Software Stack for Ubuntu Installation Guide [http://docs.nvidia.com/dgx/dgx-ubuntu-install-guide/index.html] for instructions.

- The following changes were made to the Ubuntu repositories:
  - **R470 NVIDIA GPU Driver**: 470.103.01
  - **R450 NVIDIA GPU Driver**: 470.172.01

  - **Note**: When upgrading DGX OS, the system remains on the installed GPU driver branch. For example, the GPU driver branch on the system does not automatically switch from R450 to R470. Refer to the Changing Your GPU Branch section of the DGX OS User Guide for instructions on switching GPU driver branches.

- The following changes were made to the NVIDIA repositories:
  - **DCGM**: 2.3.2
  - **NVSM**: 21.09.14
  - **Docker CE**: 20.10.11
  - **nvidia-peer-memory/nvidia-peer-memory DKMS**: 1.3.0

- The **DGX OS 5.2.0 ISO** has been released.
Here are the contents of the DGX OS 5.2.0 ISO

<table>
<thead>
<tr>
<th>Component</th>
<th>Version</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ubuntu</td>
<td>20.04 LTS</td>
<td>Refer to the <a href="https://ubuntubox.com/">Ubuntu 20.04 Desktop Guide</a></td>
</tr>
<tr>
<td>Ubuntu kernel</td>
<td>5.4.0-xx-generic</td>
<td>See <a href="https://www.nvidia.com/content/lts">linux 5.4.0-80.90</a></td>
</tr>
<tr>
<td>GPU Driver</td>
<td>R450: 450.172.01</td>
<td>Refer to the <a href="https://docs.nvidia.com/datacenter/gpu/index.html">NVIDIA Data Center GPU documentation</a></td>
</tr>
<tr>
<td></td>
<td>R470: 470.103.01</td>
<td>Note: Updating from R450 to R470 does not happen automatically when updating DGX OS 5, but requires separate steps. Refer to the Changing Your GPU Branch section of the DGX OS User Guide for instructions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Refer to the <a href="https://docs.nvidia.com/datacenter/gpu/index.html">Changing Your GPU Branch</a> section of the DGX OS User Guide for instructions.</td>
</tr>
<tr>
<td>CUDA Toolkit</td>
<td>11.4</td>
<td>Refer to the <a href="https://docs.nvidia.com/cuda/index.html">NVIDIA CUDA Toolkit Release Notes</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Note: CUDA is installed from the ISO only on DGX Station systems, including DGX Station A100.</td>
</tr>
<tr>
<td>Docker Engine</td>
<td>20.10.11</td>
<td>Refer to <a href="https://docs.nvidia.com/containerization/Docker.html">v20.10.11</a></td>
</tr>
<tr>
<td>NVIDIA Container Toolkit</td>
<td>nvidia-container-runtime: 3.5.0-1</td>
<td>Refer to the <a href="https://docs.nvidia.com/containerization/index.html">NVIDIA Container Toolkit documentation</a></td>
</tr>
<tr>
<td></td>
<td>nvidia-container-toolkit: 1.7.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nvidia-docker2: 2 8.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>libnvidia-container1: 1.7.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>libnvidia-container-tools: 1.7.0-1</td>
<td></td>
</tr>
<tr>
<td>NVSM</td>
<td>21.09.14</td>
<td>Refer to the <a href="https://docs.nvidia.com/system_management/index.html">NVIDIA System Management Documentation</a></td>
</tr>
<tr>
<td>DCGM</td>
<td>2.3.2</td>
<td>Refer to the <a href="https://docs.nvidia.com/datacenter/management/index.html">DCGM Release Notes</a></td>
</tr>
<tr>
<td>NGC CLI</td>
<td>2.2.0</td>
<td>Refer to the <a href="https://docs.nvidia.com/datacenter/ngc/index.html">NGC CLI Documentation</a></td>
</tr>
<tr>
<td>Mellanox OFED</td>
<td>MLNX 5.4-1.0.3.0</td>
<td>Refer to the <a href="https://docs.nvidia.com/networking/index.html">MLNX_OFED v5.4-1.0.3.0</a></td>
</tr>
<tr>
<td>MIG Configuration Tool</td>
<td>0.1.2-1</td>
<td>Refer to the following NVIDIA mig-parted github pages: <a href="https://github.com/">https://github.com/</a></td>
</tr>
</tbody>
</table>

---

DGX OS Software

RN-08254-001 _v5.2_ | 9
<table>
<thead>
<tr>
<th>Component</th>
<th>Version</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>nvipmitool</td>
<td>1.0.60</td>
<td></td>
</tr>
<tr>
<td>nvidia-peer-memory/nvidia-peer-memory DKMS</td>
<td>1.3.0</td>
<td></td>
</tr>
</tbody>
</table>

2.4.2. **Update: December 14, 2021**

- Installer version updated to 5.1.1.
- The following changes were made to the Ubuntu repositories:
  - **R470 NVIDIA GPU Driver**: 470.82.01
- The following changes were made to the NVIDIA repositories:
  - **DCGM**: 2.3.1
  - **NVSM**: 21.09.10
  - **MOFED**: MLNX 5.4-3.1.0.0
  - **Docker CE**: 20.10.11
  - **nvidia-container stack**:
    - nvidia-docker2-2.8.0-1
    - nvidia-container-runtime-3.7.0-1
    - nvidia-container-toolkit-1.7.0-1
    - libnvidia-container-tools-1.7.0-1
    - libnvidia-container1-1.7.0-1
  - **nvipmitool**: 1.0.6.0
  - **nvidia-peer-memory/nvidia-peer-memory DKMS**: 1.2.0

2.4.3. **Update: October 26, 2021**

- The following changes were made to the Ubuntu repositories:
  - **NVIDIA GPU Driver**: 450.156.00

2.4.4. **DGX OS 5.1 Release: August 26, 2021**

- The following updates were made to the NVIDIA repositories
  - Docker Engine: 20.10.7
  - NVSM: 21.07.15
- DCGM: 2.2.9
- nvidia-container-runtime: 3.5.0-1
- NVIDIA MLNX_OFED: 5.4-1.0.3.0
- [New] NGC CLI: 2.2.0
- [New] MIG Configuration Tool: 0.1.2-1
- The following changes were made to the Ubuntu repositories
  - Added the release 470 GPU Driver: 470.57.02

**Note:** When upgrading DGX OS, the system remains on the installed GPU driver branch. For example, the GPU driver branch on the system does not automatically switch from R450 to R470. Refer to the Changing Your GPU Branch section of the DGX OS User Guide for instructions on switching GPU driver branches.

- The **DGX OS 5.1.0 ISO** has been released.

Here are the contents of the DGX OS 5.1.0 ISO

<table>
<thead>
<tr>
<th>Component</th>
<th>Version</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ubuntu</td>
<td>20.04 LTS</td>
<td>Refer to the Ubuntu 20.04 Desktop Guide.</td>
</tr>
<tr>
<td>Ubuntu kernel</td>
<td>5.4.0-81</td>
<td>See linux 5.4.0-80.90.</td>
</tr>
<tr>
<td>GPU Driver</td>
<td>R450: 450.142.00</td>
<td>Refer to the NVIDIA Data Center GPU documentation.</td>
</tr>
<tr>
<td></td>
<td>R470: 470.57.02</td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> Updating from R450 to R470 does not happen automatically when updating DGX OS 5, but requires separate steps. Refer to the Changing Your GPU Branch section of the DGX OS User Guide for instructions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CUDA Toolkit</td>
<td>11.4</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>20.10.7</td>
<td>Refer to v20.10.7.</td>
</tr>
<tr>
<td>NVIDIA Container Toolkit</td>
<td>nvidia-container-runtime: 3.5.0-1</td>
<td>Refer to the NVIDIA Container Toolkit documentation.</td>
</tr>
<tr>
<td>Component</td>
<td>Version</td>
<td>Additional Information</td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>nvidia-container-toolkit</td>
<td>1.5.1-1</td>
<td>Refer to the NVIDIA System Management Documentation.</td>
</tr>
<tr>
<td>nvidia-docker2</td>
<td>2.6.0-1</td>
<td>Refer to the DCGM Release Notes.</td>
</tr>
<tr>
<td>libnvidia-container1</td>
<td>1.4.0-1</td>
<td>Refer to the NVIDIA System Management Documentation.</td>
</tr>
<tr>
<td>libnvidia-container-tools</td>
<td>1.4.0-1</td>
<td>Refer to the NVIDIA System Management Documentation.</td>
</tr>
<tr>
<td>NVSM</td>
<td>21.07.15</td>
<td>Refer to the NVIDIA System Management Documentation.</td>
</tr>
<tr>
<td>DCGM</td>
<td>2.2.9</td>
<td>Refer to the DCGM Release Notes.</td>
</tr>
<tr>
<td>NGC CLI</td>
<td>2.2.0</td>
<td>Refer to the NGC CLI Documentation</td>
</tr>
<tr>
<td>Mellanox OFED</td>
<td>MLNX 5.4-1.0.3.0</td>
<td>Refer to MLNX_OFED v5.4-1.0.3.0</td>
</tr>
<tr>
<td>MIG Configuration Tool</td>
<td>0.1.2-1</td>
<td>Refer to the following NVIDIA mig-parted github pages: <a href="https://github.com/NVIDIA/mig-parted">https://github.com/NVIDIA/mig-parted</a> and <a href="https://github.com/NVIDIA/mig-parted/tree/master/deployments/systemd">https://github.com/NVIDIA/mig-parted/tree/master/deployments/systemd</a></td>
</tr>
</tbody>
</table>

2.4.5. Update: June 30, 2021

- The following changes were made to the NVIDIA repositories:
  - **GPUDirect Storage**: Added support for GPUDirect Storage v1.0 release. 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](https://docs.nvidia.com/gpudirect-storage/troubleshooting-guide/index.html#troubleshoot-install).
  - **NVSM** for GPUDirect Storage: Updated to 21.03.11 only when installing GPUDirect Storage
  - **MOFED** for GPUDirectStorage: Updated to 5.3-1.0.5.0 only when installing GPUDirect Storage.

2.4.6. Update: June 20, 2021

- The following changes were made to the Ubuntu repositories:
  - **NVIDIA GPU Driver**: 450.142.00

2.4.7. Update: June 2, 2021

- The following changes were made to the Ubuntu repositories:
DGX OS 5 Releases

2.4.8. 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>ConnectX-5</td>
<td>16.29.1016</td>
</tr>
<tr>
<td>ConnectX-6</td>
<td>20.29.1016</td>
</tr>
</tbody>
</table>

To force a downgrade, see [Downgrading Firmware for Mellanox ConnectX-4 Cards](#) for more information.

2.4.9. 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.

2.4.10. 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](#).

2.4.11. 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.

### 2.4.12. 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

### 2.4.13. Update: March 2, 2021

The following changes were made to the NVIDIA repositories:

- Added support for the DGX Station A100.
- **DCGM**: 2.0.14
- **NVSM**: 20.09.20

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</td>
<td>20.04.1 LTS</td>
<td>Refer to the Ubuntu 20.04 Desktop Guide and Ubuntu Server Guide.</td>
</tr>
<tr>
<td>Ubuntu kernel</td>
<td>5.4.0-58-generic</td>
<td>See Linux 5.4.0-58-generic.</td>
</tr>
<tr>
<td>GPU Driver</td>
<td>450.80.02</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. Note: 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>Component</td>
<td>Version</td>
<td>Additional Information</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>NVIDIA Container Toolkit</td>
<td>libnvidia-container: 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-docker: 2.2.5.0-1</td>
<td></td>
</tr>
<tr>
<td>NVSM</td>
<td>20.09.17</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 5.1-2.5.8.0</td>
<td>Refer to MLNX_OFED v5.1-2.5.8.0.</td>
</tr>
</tbody>
</table>

2.4.14. Update: February 23, 2021

The following change was made to NVIDIA repositories:

- **NVSM**: 20.09.17

2.4.15. Update: January 20, 2021

The following change was made in the Ubuntu repositories:

- **NVIDIA GPU Driver**: 450.102.04

2.4.16. 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>
</thead>
<tbody>
<tr>
<td>ConnectX-4</td>
<td>12.28.2006</td>
</tr>
<tr>
<td></td>
<td>To force a downgrade, see Downgrading Firmware for Mellanox ConnectX-4 Cards for more information.</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.
2.4.17. 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</td>
<td>20.04 LTS</td>
<td>Refer to the <a href="#">Ubuntu 20.04 Desktop Guide</a>.</td>
</tr>
<tr>
<td>Ubuntu kernel</td>
<td>5.4.0-52-generic</td>
<td>See <a href="#">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="#">NVIDIA Tesla documentation</a>.</td>
</tr>
<tr>
<td>CUDA Toolkit</td>
<td>11.0</td>
<td>Refer to the <a href="#">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="#">v10.03.14</a>.</td>
</tr>
<tr>
<td>NVIDIA Container Toolkit</td>
<td></td>
<td>Refer to the <a href="#">NVIDIA Container Toolkit documentation</a>.</td>
</tr>
<tr>
<td></td>
<td>libnvidia-container1: 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>
<tr>
<td></td>
<td>nvidia-container-toolkit: 1.3.0-1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>nvidia-docker: 2 2.5.0-1</td>
<td></td>
</tr>
<tr>
<td>NVSM</td>
<td>20.07.40</td>
<td>Refer to the <a href="#">NVIDIA System Management Documentation</a>.</td>
</tr>
<tr>
<td>DCGM</td>
<td>2.0.13</td>
<td>Refer to the <a href="#">DCGM Release Notes</a>.</td>
</tr>
<tr>
<td>NVIDIA System Tools</td>
<td>20.09-1</td>
<td></td>
</tr>
<tr>
<td>Mellanox OFED</td>
<td>MLNX 5.1-2.4.6.0</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 3. Known Issues Summary

This section provides summaries of the issues in DGX OS 5

**Known Issues for DGX Server:**
- Unsupported Installation Options Appear in the ISO GRUB Menu
- EFI Boot Manager Lists Ubuntu as a Boot Option
- Duplicate EFI Variable May Cause `efibootmgr` to Fail
- 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
- `nvsm show health` Reports Firmware as Not Authenticated
- Running NGC Containers Older than 20.10 May Produce “Incompatible MOFED Driver” Message
- System May Slow Down When Using `mpirun`
- Software Power Cap Not Reported Correctly by `nvidia-smi`
- Forced Reboot Hangs the OS
- Applications that call the `cuCTXCreate` API Might Experience a Performance Drop

**Known Issues for DGX Station:**
- Applications that call the `cuCTXCreate` API Might Experience a Performance Drop
- NVIDIA Desktop Shortcuts Not Updated After a DGX OS Release Upgrade

**Known Issues for DGX Station A100:**
- Unable to Set a Separate/xinerama Mode through the `xorg.conf` File or through `nvidia-settings`

**Known Limitations (Issues that will not be fixed)**
- No RAID Partition Created After ISO Install
- NSCQ Library and Fabric Manager Might Not Install When Installing a New NVIDIA Driver
- System Services Startup Messages Appear Upon Completion of First-Boot Setup
- [DGX A100]: Hot-plugging of Storage Drives is not Supported
Known Issues Summary

- **[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

Resolve Issues
See DGX OS Resolved Issues Details.

3.1. Known Issues Details
This section provides details for known issues in DGX OS 5.x.

3.1.1. Unsupported Installation Options Appear in the ISO GRUB Menu

**Issue**
When installing DGX OS from the ISO, selecting one of the following GRUB menu options results in errors beginning with error : No such file or directory.

- Install DGX OS 5.x.0 Without MLNX Drivers
- Install DGX OS 5.x.0 Without Nvidia Drivers

**Explanation**
Currently, the options Without MLNX Drivers and Without Nvidia Drivers are not support and should not be selected.

3.1.2. nvidia-release-upgrade May Report That Not All Updates Have Been Installed and Exit

**Issue**
When running the nvidia-release-upgrade command on systems running DGX OS 4.99.x, it may exit and tell users: "Please install all available updates for your release before upgrading" even though all upgrades have been installed.
Explanations

To recover, issue the following command:

```bash
sudo apt install -y nvidia-fabricmanager-450/bionic-updates --allow-downgrades
```

After running the command, proceed with the regular upgrade steps:

```bash
sudo apt update
sudo apt full-upgrade -y
sudo apt install -y nvidia-release-upgrade
sudo nvidia-release-upgrade
```

3.1.3. EFI Boot Manager Lists Ubuntu as a Boot Option

Issue

Reported in release 5.1.0.

The GRUB menu may list “ubuntu” as a boot option in addition to the “DGX OS” boot option beginning with DGX OS 5.1.0. Either may be used to boot the DGX system to the DGX OS.

Explanation

The “ubuntu” option will be removed in a future software release.

3.1.4. Duplicate EFI Variable May Cause efibootmgr to Fail

Issue

Reported in release 5.1.0.

On some DGX-2 systems, the 'efibootmgr' command may fail with the following signature:

```
$ sudo efibootmgr
No BootOrder is set; firmware will attempt recovery
```

Explanation

This happens when the SBIOS presents duplicate EFI variables. Because of this, efivarfs will not be fully populated which may ultimately cause efibootmgr to fail.

To work around:

1. Flash the BIOS with the latest SBIOS revision using the BMC.

**Important:** Do not power cycle the system after clicking Cancel at the Firmware update completed dialog.

2. From the command line, issue the following command to read the “Restore PLDM Flag”.
   
   ```bash
   $ sudo ipmitool raw 0x03 0x0D
   ```

   This flag is cleared after reading, meaning that the system will not restore the PLDM table after the subsequent power cycle.

3. Power-cycle the system.

### 3.1.5. 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.

### 3.1.6. 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.
3.1.7. **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.

3.1.8. **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.
3.1.9. 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:

```
export NCCL_DEBUG=WARN
misc/ibvwrap.cc:284 NCCL WARN Call to 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:

```
export NCCL_IB_DISABLE=1
```

3.1.10. System May Slow Down When Using mpiexec

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:

```
kernl: 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](requires login to the NVIDIA Enterprise Support portal).

### 3.1.11. 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.

### 3.1.12. 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.

### 3.1.13. 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.

### 3.1.14. 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.
   ```bash
   cd /home/your-user-login-id/Desktop
   ```

2. Remove the existing NVIDIA desktop shortcuts.
   ```bash
   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.
   ```bash
   cp -rf /etc/skel/Desktop/Getting Started/ ..
   ```
3.1.15. 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
   Option         "AllowEmptyInitialConfiguration" "True"
+ SubSection     "Display"
+   Depth       24
+ EndSubSection
+EndSection
+Section "Device"
+ Identifier     "Device0 (1)"
+ Driver         "nvidia"
+ BusID          "PCI:2:0:0"
+ VendorName     "NVIDIA Corporation"
+ Screen          1
+EndSection
+Section "Screen"
+ Identifier     "Screen0 (1)"
+ Device         "Device0 (1)"
+ Monitor        "Monitor0"
+ DefaultDepth    24
```
3.2. DGX OS Resolved Issues Details

Here are the issues that are 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

3.2.1. NVSM Platform Displays as Unsupported

Issue

Reported in release 5.0.

In DGX Station, when you run

```bash
$ nvsm show version
```

instead of displaying **DGX Station**, the platform field displays **Unsupported**.

Explanation

You can ignore this message.
3.2.2. **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.

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

**Issue**

Reported in release 4.99.9. Fixed in release 5.1

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.
3.2.4. **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.

3.2.5. **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.
   ```
   $ mdadm --run /dev/md?*
   ```
2. Wait a few seconds for the RAID and crypt to be discovered.
3. Exit.
   ```
   $ exit
   ```

3.2.6. **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`.

### 3.2.7. 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.

### 3.3. Known Limitations Details

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

#### 3.3.1. No RAID Partition Created After ISO Install

**Issue**

After using the DGX OS ISO to install the DGX OS, there is no `/raid` partition created.

**Explanation**

This occurs if you reboot the system right after the installation is completed. To create the data RAID, the DGX OS installer sets up a `systemd` service to create the `/raid` partition on first boot. If you reboot before you give that service a chance to finish, the `/raid` partition may not be properly set up.

To create the `/raid` partition, issue the following.

```
$ sudo configure_raid_array.py -c -f
```
3.3.2. 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.

3.3.3. System Services Startup Messages Appear Upon Completion of First-Boot Setup

**Issue**

After completing the first-boot setup process and getting to the login prompt, system services startup messages appear.

**Explanation**

Some services cannot be started until after the initial configuration process is completed. Starting the services at the Ubuntu prompt avoids the need for an additional reboot to complete the setup process.

Once completed, the service messages do not appear at subsequent system reboots.

3.3.4. [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.
3.3.5. [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.

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

3.3.6. [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-active 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.
   
   ```
   ps -ef | grep "/sbin/agetty -o -p -- \u --keep-baud 115200,38400,9600 ttyS0 vt220"
   ```

2. Kill the process.
   
   ```
   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

   ```
   /sbin/agetty -o -p -- \u --keep-baud 115200,38400,9600 ttyS0 vt220
   ```
3.3.7.  [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.
   ```
   # sudo /opt/MegaRAID/storcli/storcli64 /c0/e<enclosure_id>/s<drive_slot> set good
   ```
2. Run the script to recreate the array.
   ```
   # sudo /usr/bin/configure_raid_array.py -c -f
   ```

3.3.8.  [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.

3.3.9.  [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
   ```

3.3.10. [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.

3.3.11. [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

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.

```
$ 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.

   ```
   $ ls
   ```

   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.

   ```
   $ 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
   ```
Appendix B. DGX Software Stack

This section lists the DGX software packages and kernel parameters in the DGX Software Stack.

**NVIDIA DGX Software Packages**

This table lists all packages that are installed as part of the corresponding meta package:

<table>
<thead>
<tr>
<th>DGX A100</th>
<th>DGX-2</th>
<th>DGX-1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>dgx-a100-system-configurations</strong></td>
<td><strong>dgx2-system-configurations</strong></td>
<td><strong>dgx1-system-configurations</strong></td>
</tr>
<tr>
<td>dgx-release</td>
<td>dgx-release</td>
<td>dgx-release</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>nv-ast-modeset</td>
</tr>
<tr>
<td>nvidia-crashdump</td>
<td>nvidia-crashdump</td>
<td>nvidia-crashdump</td>
</tr>
<tr>
<td>-</td>
<td>nv-enable-nvme-hot-plug</td>
<td>-</td>
</tr>
<tr>
<td>nv-hugepage</td>
<td>nv-hugepage</td>
<td>nv-hugepage</td>
</tr>
<tr>
<td>nv-iommu-pt</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>nv-ipmi-devintf</td>
<td>nv-ipmi-devintf</td>
<td>nv-ipmi-devintf</td>
</tr>
<tr>
<td>nv-limits</td>
<td>nv-limits</td>
<td>nv-limits</td>
</tr>
<tr>
<td>nv-update-disable</td>
<td>nv-update-disable</td>
<td>nv-update-disable</td>
</tr>
<tr>
<td>nvidia-acs-disable</td>
<td>nvidia-acs-disable</td>
<td>-</td>
</tr>
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<td>nvidia-kernel-defaults</td>
<td>nvidia-kernel-defaults</td>
<td>nvidia-kernel-defaults</td>
</tr>
<tr>
<td>nvidia-nvme-smartd</td>
<td>nvidia-nvme-smartd</td>
<td>-</td>
</tr>
<tr>
<td>nvidia-pci-bridge-power</td>
<td>nvidia-pci-bridge-power</td>
<td>nvidia-pci-bridge-power</td>
</tr>
<tr>
<td>nvidia-redfish-config</td>
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<td>-</td>
</tr>
<tr>
<td>nvidia-relaxed-ordering-gpu</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>nvidia-relaxed-ordering-nvme</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>nvgpu-services-list</td>
<td>nvgpu-services-list</td>
<td>nvgpu-services-list</td>
</tr>
</tbody>
</table>
### DGX A100

<table>
<thead>
<tr>
<th>Package</th>
<th>Description</th>
<th>DGX-2</th>
<th>DGX-1</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>dgx-a100-system-tools</code></td>
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</tr>
<tr>
<td>dgx-release</td>
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<td></td>
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<tr>
<td>ipmitool</td>
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</tr>
<tr>
<td>nv-common-apis</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>nv-env-paths</td>
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<td></td>
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</tr>
<tr>
<td>nvidia-mig-manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nvidia-raid-config</td>
<td></td>
<td></td>
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<tr>
<td>nvme-cli</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>tpm2-tools</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><code>dgx-a100-system-tools-extra</code></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>msecli</td>
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</table>

### DGX-2

<table>
<thead>
<tr>
<th>Package</th>
<th>Description</th>
<th>DGX-2</th>
<th>DGX-1</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>dgx-release</td>
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</tr>
<tr>
<td>ipmitool</td>
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<tr>
<td>nv-common-apis</td>
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<tr>
<td>nv-env-paths</td>
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<tr>
<td>nvidia-raid-config</td>
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<tr>
<td>nvme-cli</td>
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<tr>
<td>tpm2-tools</td>
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<tr>
<td><code>dgx2-system-tools-extra</code></td>
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<tr>
<td>msecli</td>
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</tbody>
</table>

### DGX-1

<table>
<thead>
<tr>
<th>Package</th>
<th>Description</th>
<th>DGX-2</th>
<th>DGX-1</th>
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<td><code>dgx1-system-tools</code></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>dgx-release</td>
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<tr>
<td>ipmitool</td>
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<tr>
<td>nv-common-apis</td>
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<tr>
<td>nv-env-paths</td>
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<tr>
<td>nvidia-raid-config</td>
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<tr>
<td><code>dgx1-system-tools-extra</code></td>
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<tr>
<td>msecli</td>
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</tbody>
</table>

### nvidia-mlnx-ofed-misc

<table>
<thead>
<tr>
<th>Package</th>
<th>Description</th>
<th>DGX-2</th>
<th>DGX-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>mlnx-fw-updater</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>mlnx-pxe-setup</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>nvidia-mlnx-config</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>nvidia-peer-memory-meta</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>nvidia-peermem-loader</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Additional packages

- `nv-docker-options`
- `nvidia-logrotate`
- `nvidia-motd`
- `nvidia-ipmisol`

The following table lists all packages that will be installed as part of the system configuration package with more details:

<table>
<thead>
<tr>
<th>Package</th>
<th>Description</th>
<th>1</th>
<th>2</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>dgx-release</td>
<td>Release information</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>nv-ast-modeset</td>
<td>Disable the Aspeed display driver. It can cause issues with connected monitors. The AST2xxx is the BMC used in our servers. [DGX-1, DGX-2, DGX A100, DGX Station A100]</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>Package</td>
<td>Description</td>
<td>1</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>nv-enable-nvme-hot-plug</td>
<td>Configure kernel parameters for NVMe hot plug (see also kernel section below).</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nv-hugepage</td>
<td>Sets the &quot;transparent_hugepage=madvise&quot; kernel parameter.</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>nv-iommu-pt</td>
<td>Sets iommu=pt for AMD Rome platforms.</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nv-ipmi-devintf</td>
<td>Add the ipmi_devintf module for accessing the BMC using the ipmi tool.</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>nv-limits</td>
<td>Increase the process resource limits for users (ulimits nofile 50000)</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>nv-update-disable</td>
<td>Disable automatic system upgrades. Users need to explicitly upgrade their systems using apt.</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>nvgpu-services-list</td>
<td>Lists GPU-consuming services in .json format, such as DCGM or NVSM, and required by the firmware update mechanism.</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>nvidia-acs-disable</td>
<td>Disables the PCIe ACS capability to allow for better GPU-direct performance in bare-metal use cases on DGX A100.</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nvidia-crashdump</td>
<td>Tools to manage kernel crash dumps. They are disabled by default.</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>nv-docker-options</td>
<td>Increases SHMEM and other resources.</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>nvidia-ipmisol [optional]</td>
<td>Enables serial output through the BMC (SOL - Serial over Lan)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
| nvidia-kernel-defaults | Disable ARP for security improvements
net.ipv4.conf
.all.arp_announce = 2
.all.arp_ignore = 1
.default.arp_announce = 2
.default.arp_ignore = 1 | R | R | R |
<p>| nvidia-logrotate      | Modify the logrotate configuration                                           | O | O | O |
| nvidia-motd           | Modify message-of-the-day (MOTD) to display NVSM health monitoring alerts and release information. | O | O | O |
| nvidia-nvme-smartd    | Enables SMART monitoring on NVME devices. By default, smartd will skip NVME devices. | R | R |   |</p>
<table>
<thead>
<tr>
<th>Package</th>
<th>Description</th>
<th>1</th>
<th>2</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>nvidia-pci-bridge-power</td>
<td>Sets the bridge power control setting to “on” for all PCI bridges.</td>
<td>R</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>nvidia-relaxed-ordering-gpu</td>
<td>Sets a reg-key to enable PCIe relaxed-ordering in the GPUs.</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nvidia-relaxed-ordering-nvme</td>
<td>Installs a script that users can call to enable relaxed-order in NVME devices.</td>
<td>R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nvidia-redfish-config</td>
<td>Configures the redfish interface with an interface name and IP address. The interface name is “bmc_redfish0”, while the IP address is read from DMI type 42.</td>
<td>R</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Legend**
- **1**: DGX-1
- **2**: DGX-2
- **A**: DGX A100
- **R**: Required package
- **O**: Optional package

**DGX Kernel Parameters**

<table>
<thead>
<tr>
<th>Kernel Parameter</th>
<th>Description</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>ast.modeset=0</td>
<td>Disable the Aspeed display driver. The AST2xxx is the BMC used in our servers. [DGX-1, DGX-2, DGX A100, DGX Station A100]</td>
<td>nv-ast-modeset</td>
</tr>
<tr>
<td>crashkernel=1G::0M</td>
<td>Don’t reserve any memory for crash dumps (when crash is disabled = default)</td>
<td>nvidia-crashdump</td>
</tr>
<tr>
<td>crashkernel=1G::512M</td>
<td>Reserve 512MB for crash dumps (when crash is enabled)</td>
<td>nvidia-crashdump</td>
</tr>
<tr>
<td>pci=realloc=on</td>
<td>Allows kernel to reallocate PCI resources if allocations done by BIOS are insufficient. This and pcie_ports=native are both required for NVME hot-plug on DGX2.</td>
<td>nv-enable-nvme-hot-plugth</td>
</tr>
<tr>
<td>Kernel Parameter</td>
<td>Description</td>
<td>Package</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>pcie_ports=native</td>
<td>Use Linux native services for PME, AER, DPC, PCIe hotplug. I.e. not firmware first. This and pci=realloc=on are both required for NVME hot-plug on DGX2.</td>
<td>nv-enable-nvme-hot-plug</td>
</tr>
<tr>
<td>transparent_hugepage=madvise</td>
<td>Disable huge pages system-wide and only enable them inside MADV_HUGEPAGE madvise regions to prevent applications from allocating more memory resources than necessary.</td>
<td>nv-hugepage</td>
</tr>
<tr>
<td>iommu=pt</td>
<td>Enable pass through mode only and disable DMA translations. This enables optimizations for the CPU inside the DGX A100.</td>
<td>nv-iommu-pt</td>
</tr>
<tr>
<td>console=ttyS1,115200n8</td>
<td>Set console to serial port 1, using 115200 baud, no parity, 8 data bits. [DGX-2]</td>
<td>nvidia-ipmisol</td>
</tr>
<tr>
<td>console=ttyS0,115200n8</td>
<td>Set console to serial port 0, using 115200 baud, no parity, 8 data bits</td>
<td>nvidia-ipmisol</td>
</tr>
</tbody>
</table>
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