NVIDIA DGX OS 4 Server

Software Release Notes

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Chapter 1. Abstract

The NVIDIA® DGX™ servers come with a DGX OS software image. This base operating system on DGX OS servers allows customers to use their own on-site scheduling and management software to run GPU-accelerated applications in Docker containers provided by NVIDIA and in customized Docker containers.

Chapter 2. Rotating the GPG Keys

NVIDIA constantly evaluates and improves security implementations. As part of these improvements, we are rolling out changes to harden the security and reliability of our repositories. These changes require rotating the GPG keys that are used to sign the metadata and packages in those repositories. This section provides information about how to rotate the GPG keys on your system.

1. Download the new repository setup packages.

   ```
   wget https://international.download.nvidia.com/dgx/repos/bionic/pool/multiverse/
   d/dgx-repo/dgx-repo_1.0-5_amd64.deb
   wget https://international.download.nvidia.com/dgx/repos/bionic/pool/multiverse/
   n/nvidia-repo-keys/nvidia-repo-keys_22.04-1_all.deb
   ```

2. Directly install the `.deb` packages, which skips the GPG check performed in `apt`.

   If prompted, ensure that you accept the maintainer's version for all files.

   ```
   $ sudo dpkg --force-confnew -i ./nvidia-repo-keys_22.04-1_all.deb  ./dgx-
   repo_1.0-5_amd64.deb
   ```

3. Manually revoke the previous DGX and CUDA GPG keys.

   ```
   $ sudo apt-key del 629C85F2
   $ sudo apt-key del 7FA2AF80
   ```

4. Update optional repositories that were previously enabled.

   ```
   for x in $(find /etc/apt/sources.list.d -name "dgx*.list");
   do if ! grep -q "signed-by" $x;
   then sudo sed -i 's|^deb |deb [arch=amd64 signed-by=/usr/share/keyrings/
   dgx_debian_prod.gpg] |' $x; fi; done
   ```

Chapter 3. DGX OS Server Releases and Versioning

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

DGX OS Server 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 6.x releases are based on Ubuntu 22.04
  - 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 and OS 6, 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 6.x release.

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

Before you update a system, please refer to 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 6 User Guide.

Chapter 4. Current NVIDIA DGX OS 4 Server Software

This section lists the NVIDIA® DGX™ OS 4 Server software images and updates that have been released for the NVIDIA DGX-1, and DGX-2 systems. To determine the version of the DGX OS Server software on your system, enter the following command.

```
$ grep VERSION /etc/dgx-release
```

This will show the version installed on the system from the ISO image (`DGX_SWBUILD_VERSION`) and any subsequent updates performed on the system (`DGX_OTA_VERSION`). The latest version listed is the currently installed version.

Release 4.14 (DGX-1, DGX-2)

> **ATTENTION:** If your system is running a version **earlier** than DGX OS 4.12, you need to update the keys on the system. Refer to Rotating the GPG Key for more information about how to rotate the keys

- Changes since Version 4.13.0:
  - Updated the NVIDIA Release 450 GPU driver to 450.203.03
  - Updated NVSM (for Release 450 driver package) to 20.09.40
  - Updated DCGM (for Release 450 driver package) to 2.4.5
  - Updated NCCL to 2.13.4
  - Updated MLNX OFED to 4.9-4.1.7.0
  - Updated NVIDIA Container Toolkit (`nvidia-container-runtime`) to 3.10.0-1
  - Updated the Docker Engine to 20.10.17
  - Updated DLFW (BM) to 22.06

Update History

This section provides information about the updates to DGX OS 4.14 since the initial release. These updates are available from the public repositories.

Refer to Performing the Updates for instructions on how to update DGX OS with all the latest DGX OS 4.14 updates from the NVIDIA public repositories.

Update: December 12, 2022

Updated the NVIDIA Release 450 GPU driver to: 450.216.04

- Initial release: **4.14.0**

  See the following for additional changes, update instructions, and known issues.

  DGX OS Server 4.14 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.14-relnotes-update-guide.pdf)

Update Advisement

- NVIDIA GPU Cloud Containers

In conjunction with DGX OS Server v4.14, customers should update their NVIDIA GPU Cloud containers to the latest container release. '

Refer to the *NVIDIA Deep Learning Frameworks* documentation website (http://docs.nvidia.com/deeplearning/dgx/index.htm) for information about the latest container releases and https://docs.nvidia.com/deeplearning/dgx/user-guide/index.html for instructions on how to access the containers.

- Ubuntu Security Updates

Customers are responsible for keeping the DGX server up to date with the latest Ubuntu security updates by using

```
$ sudo apt full upgrade
```

Refer to the Ubuntu Wiki Upgrades web page for more information. The Ubuntu Security Notice site **(**https://usn.ubuntu.com/**) also** lists known Common Vulnerabilities and Exposures (CVEs),including those that can be resolved by updating the DGX OS software.

Refer to the *NVIDIA Deep Learning Frameworks* documentation website (http://docs.nvidia.com/deeplearning/dgx/index.htm) for information about the latest container releases and https://docs.nvidia.com/deeplearning/dgx/user-guide/index.html for instructions on how to access the containers.

DGX OS Server Software Contents

The following tables provides version information for software that is in the DGX OS Server ISO image and the software that is installed on the system after getting subsequent updates.

Package Versions in Version 4.14.0

The following table shows the version information for software included in the DGX OS Server version 4.14.0

SW Components	Version (R450 package)
DGX Base OS	4.14

OS	Ubuntu 18.04 LTS[1]
Kernel (Ubuntu)	4.15.0-176 or later
CUDA TK	11.0.3
TRD	450.203.03 (ISO) 450.216.04 (repository)
NCCL	**2.13.4**
cuDNN	**8.4.1**
DCGM	**2.4.5**
MLNX OFED	**4.9-4.1.7.0**
MLNX FW	CX-4: 12.28.2006 CX-5: 16.28.2006 CX-6: 20.28.2006
NVSM	**20.09.40**
docker-ce	**20.10.17**
docker-ce-cli	
nvidia-container-runtime	3.10.0-1
nvidia-container-toolkit	1.10release.0-1
libnvidia-container-tools	1.10.0-1
libnvidia-container1	1.10.0-1
nvidia-docker2	2.11.0-1
KVM (DGX-2 only)	dgx-kvm-sw 19.07.0 dgx-kvm-host-utils 21.10.1 dgx-kvm-host-conf 20.12.0 dgx-kvm-image-4-13-0_4.13.0~220506-5779d5.0_amd64.deb
DLFW (BM)	**22.06**

DGX Server Firmware Version Reference

The Mellanox firmware is updated as part of the DGX OS update. The following are the updated versions for each product:

[1] If you are updating over-the-network, your kernel version might be a later version depending on when the update is performed.

Product	Network Card	Version
NVIDIA DGX-1	ConnectX-4	12.28.2006
	ConnectX-5	16.28.2006
NVIDIA DGX-2	ConnectX-5	16.28.2006
	ConnectX-6	20.28.2006

For other firmware. see the DGX-2 System Firmware Update Container Version 21.06.7 and DGX-1 System Firmware Update Container Version 21.06.8 release notes for the corresponding firmware versions available at the time of this DGX OS release.

Release 4.13 (DGX-1, DGX-2)

ATTENTION: If your system is running a version **earlier** than DGX OS 4.12, you need to update the keys on the system. Refer to Rotating the GPG Key for more information about how to rotate the keys

- Highlights
  - Updated the NVIDIA Release 450 GPU driver to 450.191.01.
  - Updated the NVSM to 20.09.37
- Initial release: **4.13.0**

  See the following for additional changes, update instructions, and known issues.

  DGX OS Server 4.13 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.13-relnotes-update-guide.pdf)

Release 4.12 (DGX-1, DGX-2)

Important: In DGX OS 4.12, the GPG keys that are used to sign the metadata and packages in those repositories need to be rotated. Refer to Rotating the GPG Keys for more information.

None of the component versions have changed in DGX OS 4.12.

Release 4.11 (DGX-1, DGX-2 only)

- Highlights
  - Updated the NVIDIA Release 450 GPU driver to 450.172.01
- Initial release: **4.11.0**

  See the following for additional changes, update instructions, and known issues.

  DGX OS Server 4.11 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.11-relnotes-update-guide.pdf)

Release 4.10 (DGX-1, DGX-2 only)

- Highlights
  - Updated the NVIDIA Release 418 GPU driver to 418.226.00.
  - Updated the NVIDIA Release 450 GPU driver to 450.156.00
- Initial release: **4.10.0**

  See the following for additional changes, update instructions, and known issues.

  DGX OS Server 4.10 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.10-relnotes-update-guide.pdf)

Release 4.9 (DGX-1, DGX-2 only)

- Highlights
  - Updated the NVIDIA Release 418 GPU driver to 418.211.00.
  - Updated the NVIDIA Release 450 GPU driver to 450.142.00
  - Improved process for updating the ConnectX card firmware.

    If updating from DGX OS 4.8 or later, the firmware for all cards are now updated in parallel instead of one at a time, significantly reducing the time to update all cards.
- Initial release: **4.9.0**

  See the following for additional changes, update instructions, and known issues.

  DGX OS Server 4.9 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.9-relnotes-update-guide.pdf)

Release 4.8 (DGX-1, DGX-2 only)

- Highlights
  - Updated the NVIDIA Release 418 GPU driver to 418.197.02.
  - Updated the NVIDIA Release 450 GPU driver to 450.119.04
- Initial release: **4.8.0**

  See the following for update instructions, additional information, and known issues.

  DGX OS Server 4.8 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.8-relnotes-update-guide.pdf)

Release 4.7 (DGX-1, DGX-2 only)

- Highlights
  - Updated the NVIDIA Release 418 GPU driver to 418.181.07.
  - Updated the NVIDIA Release 450 GPU driver to 450.102.04

- Updated NVIDIA KVM software

- Initial release: **4.7.0**

  See the following for update instructions, additional information, and known issues.

  DGX OS Server 4.7 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.7-relnotes-update-guide.pdf)

Release 4.6 (DGX-1, DGX-2 only)

- Highlights
  - Updated the NVIDIA Release 418 GPU driver to 418.165.02.
  - Updated the NVIDIA Release 450 GPU driver to 450.80.02
  - Updated the Mellanox OFED driver to 4.9
- Initial release: **4.6.0**

  See the following for update instructions, additional information, and known issues.

  DGX OS Server 4.6 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.6-relnotes-update-guide.pdf)

Release 4.5 (DGX-1, DGX-2 only)

Important: Updates to Release 4.5 are no longer available. Attempts to update to Release 4.5 will result in upgrading your DGX Server software to the latest release of DGX OS Server 4.

- Highlights
  - Updated NVIDIA GPU driver to 418.152.00.
  - Added optional repository to install the NVIDIA Release 450 GPU driver
  - Updated to Ubuntu 18.04.4 LTS
- Initial release: **4.5.0**

  See the following for update instructions, additional information, and known issues.

  DGX OS Server 4.5 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.5-relnotes-update-guide.pdf)

Release 4.4 (DGX-1, DGX-2 only)

Important: Updates to Release 4.4 are no longer available. Attempts to update to Release 4.4 will result in upgrading your DGX Server software to the latest release of DGX OS Server 4.

- Highlights
  - Updated NVIDIA GPU driver to 418.126.02.

- Updated NVSM software to version 20.01.15
- Added the ability to disable and re-enable CPU mitigations.
- Added support for PXE boot.
- Added support for Mellanox CX6 cards on DGX-1 (Tesla V100)

- Latest patch update: 4.4.1
- See the following for update instructions, additional information, and known issues.
  - DGX OS Server 4.4 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.4-relnotes-update-guide.pdf)

Release 4.3 (DGX-1, DGX-2 only)

Important: Updates to Release 4.3 are no longer available. Attempts to update to Release 4.3 will result in upgrading your DGX Server software to the latest release of DGX OS Server 4.

- Highlights
  - Updated NVIDIA GPU driver to 418.116.00.
  - Updated NVSM software to version 19.08.6
  - Updated DCGM software to version 1.7.2
  - Docker updated to version 19.03.4-ce
- See the following for update instructions, additional information, and known issues.
  - DGX OS Server 4.3 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.3-relnotes-update-guide.pdf)

Release 4.2 (DGX-1, DGX-2 only)

Important: Updates to Release 4.2 are no longer available. Attempts to update to Release 4.2 will result in upgrading your DGX Server software to the latest release of DGX OS Server 4.

- Highlights
  - Updated NVSM software to version 19.08
  - Docker update to version 19.03-ce
  - MLNX_OFED 4.6
- See the following for update instructions, additional information, and known issues.
  - DGX OS Server 4.2 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.2-relnotes-update-guide.pdf)

Release 4.1 (DGX-1, DGX-2 only)

Important: Updates to Release 4.1 are no longer available. Attempts to update to Release 4.1 will result in upgrading your DGX Server software to the latest release of DGX OS Server 4.

- Highlights
  - NVIDIA GPU Driver Release 418
    - Supports CUDA 10.1
- Latest patch update: 4.1.1
- See the following for update instructions, additional information, and known issues.
  - DGX OS Server 4.1 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.1-relnotes-update-guide.pdf)

Release 4.0 (DGX-1, DGX-2 only)

Important: Updates to Release 4.0 are no longer available. Attempts to update to Release 4.0 will result in upgrading your DGX Server software to the latest release of DGX OS Server 4.

- Highlights
  - First release to support the NVIDIA DGX-2 System
  - Ubuntu 18.04 LTS
  - NVIDIA GPU Driver Release 410
    - Supports CUDA 10.0
  - Docker CE and the NVIDIA Container Runtime for Docker are pre-installed, and the docker daemon automatically launched.
  - New NVIDIA System Management (NVSM) health monitoring software framework

    Replaces `nvsysinfo` and `nvhealth`.
- See the following for additional information and known issues for the latest version.
  - DGX OS Server v4.0.7 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.0.7-relnotes-update-guide.pdf)
  - DGX OS Server v4.0.6 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.0.6-relnotes-update-guide.pdf)
  - DGX OS Server v4.0.5 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.0.5-relnotes-update-guide.pdf)
  - DGX OS Server v4.0.4 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.0.4-relnotes-update-guide.pdf)

- DGX OS Server v4.0.3 Release Notes v03 (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.0.3-relnotes-update-guide.pdf)(DGX-2 System only)
- DGX OS Server v4.0.2 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.0.2-relnotes-update-guide.pdf) (DGX-2 System only)

Chapter 5. Updating the Software

These instructions explain how to update the DGX OS server software through an internet connection to the NVIDIA public repository. The process updates a DGX system image to the latest versions of the entire DGX software stack, including the drivers.

Perform the updates using commands on the DGX server console.

Preparing for Software Update

Connecting to the DGX server Console

Connect to the DGX server console using a direct connection or a remote connection through the BMC.

Note: SSH can be used to perform the update. However, if the Ethernet port is configured for DHCP, there is the potential that the IP address can change after the DGX server is rebooted during the update, resulting in loss of connection. If this happens, connect using either a direct connection or through the BMC to continue the update process.

WARNING: Connect directly to the DGX server console if the DGX is connected to a 172.17.xx.xx subnet. DGX OS Server software installs Docker CE, which uses the 172.17.xx.xx subnet by default for Docker containers. If the DGX server is on the same subnet, you will not be able to establish a network connection to the DGX server. Refer to the appropriate DGX-1 or DGX-2 User Guide for instructions on how to change the default Docker network settings after performing the update.

Direct Connection

1. Connect a display to the VGA connector and a keyboard to any one of the USB ports.
2. Power on the DGX server.

Remote Connection through the BMC

Refer to the appropriate user guide (DGX-1 or DGX-2) for instructions on establishing a remote connection to the BMC.

Verifying the DGX Server Connection to the Repositories

Before attempting to perform the update, verify that the DGX server network connection can access the public repositories and that the connection is not blocked by a firewall or proxy.

On DGX-1 Systems if Upgrading from Version 2.x.

Enter the following on the DGX-1 system:

```
$ wget -O f1-changelogshttp://changelogs.ubuntu.com/meta-release-lts
                $ wget -O f2-archive \
                http://archive.ubuntu.com/ubuntu/dists/xenial/Release
                $ wget -O f3-usarchive \
                http://us.archive.ubuntu.com/ubuntu/dists/xenial/Release
                $ wget -O f4-security \
                http://security.ubuntu.com/ubuntu/dists/xenial/Release
                $ wget -O f5-download \
                https://download.docker.com/linux/ubuntu/dists/xenial/Release
                $ wget -O f6-international \
                http://international.download.nvidia.com/dgx/repos/dists/xenial/
Release
```

All the `wget` commands should be successful and there should be six files in the directory with non-zero content.

On DGX-2 and DGX-1 Systems

Enter the following on the DGX system:

```
$ wget -O f1-changelogs http://changelogs.ubuntu.com/meta-release-lts
$ wget -O f2-archive http://archive.ubuntu.com/ubuntu/dists/bionic/Release
$ wget -O f3-usarchive \
http://us.archive.ubuntu.com/ubuntu/dists/bionic/Release
$ wget -O f4-security \
http://security.ubuntu.com/ubuntu/dists/bionic/Release
$ wget -O f5-international \
http://international.download.nvidia.com/dgx/repos/bionic/dists/bionic/Release
$ wget -O f6-international \
http://international.download.nvidia.com/dgx/repos/bionic/dists/bionic-\
r418+cuda10.1/Release
$ wget -O f7-international \
http://international.download.nvidia.com/dgx/repos/bionic/dists/bionic-\
r450+cuda11.0/Release
All the wget commands should be successful and there should be seven files in the
 directory with non-zero content
```

Update Path Instructions

Follow the instructions corresponding to your current DGX OS server software.

- **Updating from Release 4.1 and later**

Follow the instructions at Updating from Release 4.1 and later.

- **Updating from Release 4.0 (Version 4.0.1 or later only)**

Follow the instructions at Updating from 4.0.1 (or Later).

- **Updating from Release 3.1**

Follow the instructions at Updating from Release 3.1.

- **Updating from Release 2.x**

    1. Update from Release 2.x to the latest Release 3.1 as described in the DGX OS 3.1.8 Release Notes.

2. Update from Release 3.1

Updating from Release 4.1 and Later

See the section Connecting to the DGX Console for guidance on connecting to the console to perform the update.

Note: These instructions update all software for which updates are available from your configured software sources, including applications that you installed yourself. If you want to prevent an application from being updated, you can instruct the Ubuntu package manager to keep the current version. For more information, see Introduction to Holding Packages on the Ubuntu Community Help Wiki.

Update Instructions

1. If you have not already done so, verify that your DGX system can access the public repositories as explained in Verifying the DGX Server Connection to the Repositories.
   - **NOTE**: **R418 package/repository users -** NVIDIA strongly recommends that all users migrate to the R450 branch as R418 has reached end-of-life support. To upgrade, run the following commands:

$ **sudo apt update**

$ **sudo apt install -y dgx-bionic-r450+cuda11.0-repo**

- 1. Update the list of available packages and their versions.

$ **sudo apt update**

- 1. Review the packages that will be updated.

$ **sudo apt full-upgrade -s**

To prevent an application from being updated, instruct the Ubuntu package manager to keep the current version. See Introduction to Holding Packages.

1. Upgrade to version 4.14.0

$ **sudo apt full-upgrade**

- Answer any questions that appear.
- Most questions require a Yes or No response. When asked to select the grub configuration to use, select the current one on the system.
- Other questions will depend on what other packages were installed before the update and how those packages interact with the update.
- If a message appears indicating that `nvidia-docker.service` failed to start, you can disregard it and continue with the next step. The service will start normally at that time.
- Reboot the system.

Recovering from an Interrupted or Failed Update

If the script is interrupted during the update, such as from a loss of power or loss of network connection, then restore power or restore the network connection, whichever caused the interruption.

If the system encounters a kernel panic after you restore power and reboot the

DGX-2, you will not be able to perform the over-the-network update. You will need to re-image the DGX-2 with the latest image (see the DGX-2 User Guide for instructions) and then perform the network update.

If you are successfully returned to the Linux command line, continue following the instructions from step 2 in the Updating from Release 4.1 and later update instructions

Updating from 4.0.1 (or later)

For Release 4.0, only updates from versions 4.0.1 and later are supported with these instructions. To update from version 4.0.0, you must re-image the system.

See the section "Connecting to the DGX Console" for guidance on connecting to the console to perform the update.

Note: These instructions update all software for which updates are available from your configured software sources, including applications that you installed yourself. If you want to prevent an application from being updated, you can instruct the Ubuntu package manager to keep the current version. For more information, see Introduction to Holding Packages on the Ubuntu Community Help Wiki.

Update Instructions

1. If you have not already done so, verify that your DGX system can access the public repositories as explained in Verifying the DGX Server Connection to the Repositories.
2. Update the list of available packages and their versions.

$ **sudo apt update**

1. Install the 4.1.0 components from the repository.

$ **sudo apt install -y dgx-bionic-r418+cuda10.1-repo**

1. (Optional) Skip this step to stay with the R418 package; however, to move to the R450 package, issue the following.

$ **sudo apt install -y dgx-bionic-r450+cuda11.0-repo**

1. Update the new list of packages and their versions.

$ **sudo apt update**

1. Review the packages that will be updated.

$ **sudo apt full-upgrade -s**

To prevent an application from being updated, instruct the Ubuntu package manager to keep the current version. See Introduction to Holding Packages.

1. Upgrade to version 4.14.0.

$ **sudo apt full-upgrade**

- Answer any questions that appear.
- Most questions require a Yes or No response. When asked to select the grub configuration to use, select the current one on the system.
- Other questions will depend on what other packages were installed before the update and how those packages interact with the update.
- If a message appears indicating that `nvidia-docker.service` failed to start, you can disregard it and continue with the next step. The service will start normally at that time.
- Reboot the system.

Recovering from an Interrupted or Failed Update

If the script is interrupted during the update, such as from a loss of power or loss of network connection, then restore power or restore the network connection, whichever caused the interruption.

If the system encounters a kernel panic after you restore power and reboot the

DGX-2, you will not be able to perform the over-the-network update. You will need to re-image the DGX-2 with the latest image (see the DGX-2 User Guide for instructions) and then perform the network update.

If you are successfully returned to the Linux command line, continue following the instructions from step 2 in Updating from Version 4.0.1 (or Later) instructions.

Updating from 3.1.x

See the section "Connecting to the DGX Console" for guidance on connecting to the console to perform the update.

! CAUTION: **These instructions update all software for which updates are available from your configured software sources, including applications that you installed yourself. If you want to prevent an application from being updated, you can instruct the Ubuntu package manager to keep the current version. For more information, see Introduction to Holding Packages on the Ubuntu Community Help Wiki.**

Update Instructions

1. If you have not already done so, verify that your DGX-1 system can access the public repositories as explained in >Verifying the DGX Server Connection to the Repositories.
2. Update the list of available packages and their versions.

$ sudo apt update

- Install any updates.

$ sudo apt -y full-upgrade

- Install dgx-release-upgrade.

$ sudo apt install -y dgx-release-upgrade

Begin the update process.

$ sudo dgx-release-upgrade

If you are using a proxy server, then add the `-E` option to keep your proxy environment variables.

Example:

$ sudo -E dgx-release-upgrade

After starting the update process, respond to the presented options as follows:

- Press **y** if you are logged in to the DGX server remotely through secure shell (SSH) and are asked if you want to continue running under SSH.

Continue running under SSH?

This session appears to be running under ssh. It is not recommended to perform a upgrade over ssh currently because in case of failure it is harder to recover.

If you continue, an additional ssh daemon will be started at port '1022'.

Do you want to continue?

Continue [yN]

An additional sshd daemon is started.

- Press **Enter** in response to the following message.

Starting additional sshd

To make recovery in case of failure easier, an additional sshd will be started on port '1022'. If anything goes wrong with the running ssh you can still connect to the additional one.

If you run a firewall, you may need to temporarily open this port. As this is potentially dangerous it's not done automatically. You can open the port with e.g.:

'iptables -I INPUT -p tcp --dport 1022 -j ACCEPT'

To continue please press [ENTER]

- Press **Enter** in response to the message warning you that third-party sources are disabled.

Third party sources disabled

Some third party entries in your sources.list were disabled. You can re-enable them after the upgrade with the 'software-properties' tool or your package manager.

To continue please press [ENTER]

Press **N** if prompted about `dgx.list` configuration choices.

Configuration file '/etc/apt/sources.list.d/dgx.list'

==> Modified (by you or by a script) since installation.

==> Package distributor has shipped an updated version.

What would you like to do about it ? Your options are:

Y or I : install the package maintainer's version

N or O : keep your currently-installed version

D : show the differences between the versions

Z : start a shell to examine the situation

The default action is to keep your current version.

*** dgx.list (Y/I/N/O/D/Z) [default=N] ?

1. When prompted to resolve other configuration files, evaluate the changes before accepting the package maintainer's version, keeping the local version, or manually resolving the difference. You are also asked to confirm that you want to remove obsolete packages.
2. At the prompt to confirm starting the upgrade, press **Y** to begin.

Do you want to start the upgrade?

...

Installing the upgrade can take several hours. Once the download has finished, the process cannot be canceled.

Continue [yN] Details [d]

Press **Y** to proceed with the final reboot.

System upgrade is complete.

Restart required

To finish the upgrade, a restart is required.

If you select 'y' the system will be restarted.

Continue [yN]

After this reboot, the update process will take several minutes to perform some final installation steps.

Your system is now updated to the latest DGX OS 4 release.

- (Optional) Follow the instructions at Updating from Release 4.1 and Later if you want to install the R450 driver package.

Chapter 6. Known Issues

This chapter captures the issues related to the DGX OS software or DGX hardware at the time of the software release.

Known Software Issues

The following are known issues with the software.

- Pull container CUDA: 11.7.0-base-ubi8 failure
- DCGM Service Labelled as Deprecated
- NVSM May Raise 'md1 is corrupted' Alert
- nvsm show health Reports Empty /proc/driver Folders
- NVSM Reports "Unknown" for Number of logical CPU cores on non-English system
- InfiniBand Bandwidth Drops for KVM Guest VMs

ISSUE: Pull container CUDA: 11.7.0-base-ubi8 failure. Root cause and resolution unknown

EXPLANATION

There may be stale Docker data, or possibly older images or containers on your system which may need to be removed.

WORKAROUND

- $ sudo rpm -e nv-docker-gpus

$ sudo rpm -e nv-docker-options docker

$ sudo yum group remove -y 'NVIDIA Container Runtime'

$ sudo yum install -y docker

$ sudo yum install nv-docker-gpus

$ sudo yum group install -y 'NVIDIA Container Runtime'

$ sudo systemctl restart docker

$ sudo systemctl restart nv-docker-gpus

$ sudo docker rmi `sudo docker images -q` # may get an error if there are no images

$ sudo docker rm `sudo docker ps -aq` # may get an error if there are no containers

$ sudo docker run --security-opt label=type:nvidia_container_t --rm nvcr.io/nvidia/cuda:11.0-base nvidia-smi

Issue: DCGM Service Labelled as Deprecated

When inquiring the status of dcgm.service, it is reported as deprecated.

$ **sudo systemctl status dcgm.service**

dcgm.service - DEPRECATED. Please use nvidia-dcgm.service

Explanation

The message can be ignored.

dcgm.service is, indeed, deprecated, but can still be used without issue. The name of the DCGM service is in the process of migrating from dcgm.service to nvidia-dcgm.service. During the transition, both are included in DCGM 2.2.8.

A later version of DGX OS 4 will enable nvidia-dcgm.service by default. You can enable nvidia-dcgm.service manually (even though there is no functional difference) as follows:

$ **sudo systemctl stop dcgm.service**

$ **sudo systemctl disable dcgm.service**

$ **sudo systemctl start nvidia-dcgm.service**

$ **sudo systemctl enable nvidia-dcgm.service**

Issue: NVSM May Raise ‘md1 is corrupted’ Alert

On a system where one OS drive is used for the EFI boot partition and one is used for the root file system (each configured as RAID 1), NVSM raises 'md1 is corrupted' alerts.

Explanation

The OS RAID 1 drives are running in a non-standard configuration, resulting in erroneous alert messages. If you alter the default configuration, you must let NVSM know so that the utility does not flag the configuration as an error, and so that NVSM can continue to monitor the health of the drives.

To configure NVSM to support a custom drive partitioning, perform the following.

1. Stop NVSM services.

$ systemctl stop nvsm

1. Edit /etc/nvsm/nvsm.config and set the "use_standard_config_storage" parameter to false.

"use_standard_config_storage":false

1. Remove the NVSM database.

$ sudo rm /var/lib/nvsm/sqlite/nvsm.db

- Restart NVSM.

$ systemctl restart nvsm

Issue: nvsm show health Reports Empty /proc/driver Folders

When issuing nvsm show health, the nvsmhealth_log.txt log file reports that the /proc/driver/ folders are empty.

Example from a DGX-1

2020-09-01 20:03:05,204 INFO: Found empty path glob "/proc/driver/nvidia/*/gpus/*/information"

2020-09-01 20:03:06,206 INFO: Found empty path glob "/proc/driver/nvidia/*/gpus/*/registry"

2020-09-01 20:03:09,742 INFO: Found empty path glob "/proc/driver/nvidia/*/params"

2020-09-01 20:03:10,743 INFO: Found empty path glob "/proc/driver/nvidia/*/registry"

2020-09-01 20:03:11,745 INFO: Found empty path glob "/proc/driver/nvidia/*/version"

2020-09-01 20:03:12,747 INFO: Found empty path glob "/proc/driver/nvidia/*/warnings/*"

Explanation

This is an erroneous message as the folder content is actually loaded during the software installation. The message can be ignored. This will be resolved in a future NVSM release.

Issue: NVSM Reports "Unknown" for Number of logical CPU cores on non-English system

On systems set up for a non-English locale, the `nvsm show health` command lists the number of logical CPU cores as Unknown.

Number of logical CPU cores [None]..... Unknown

Resolution

This issue will be resolved in a later version of the DGX OS software.

Issue: InfiniBand Bandwidth Drops for KVM Guest VMs

The InfiniBand bandwidth when running on multi-GPU guest VMs is lower than when running on bare metal.

Explanation

Currently, performance when using GPUDirect within a guest VM will be lower than when used on a bare-metal system.

Known DGX-2 System Issues

The following are known issues specific to the DGX-2 server.

- DGX KVM: nvidia-vm health-check May Fail
- NVSM Does not Detect Downgraded GPU PCIe Link

Issue: DGX KVM: nvidia-vm health-check May Fail

When running nvidia-vm health-check to check the health of specific GPUs used by the DGX KVM guest VM, the command may fail.

Example:

$ sudo nvidia-vm health-check --gpu-count 1 --gpu-index 0 --fulltest run

...

ERROR: Unexpected response from blacklist "connection"

ERROR: Unexpected response from blacklist "to"

ERROR: Unexpected response from blacklist "the"

ERROR: Unexpected response from blacklist "host"

ERROR: Unexpected response from blacklist "engine"

ERROR: Unexpected response from blacklist "is"

ERROR: Unexpected response from blacklist "not"

ERROR: Unexpected response from blacklist "valid"

ERROR: Unexpected response from blacklist "any"

ERROR: Unexpected response from blacklist "longer""

ERROR: No healthy/unhealthy data returned from blacklist command

Explanation and Resolution

This occurs because the health-check VM is created from an image based on the DGX OS ISO, which uses the R418 driver package, but the host was updated to the R450 driver package. The two packages use different DCGM releases which cannot communicate with each other, resulting in the error.

Issue: NVSM Does not Detect Downgraded GPU PCIe Link

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

Explanation and Resolution

The NVSM software currently does not check for this condition. The check will be added in a future software release.

Known DGX-1 System Issues

The following are known issues specific to the DGX-1 server.

- nvidia-nvswitch Version Mismatch Message Appears when Running DCGM
- Forced Reboot Hangs the OS

Issue: nvidia-nvswitch Version Mismatch Message Appears when Running DCGM

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

Explanation

This occurs with GPU driver versions later than 450.51.06. The version check occurs on all DGX systems, but applies only to NVSwitch systems, so the message can be ignored on non-NVSwitch systems such as the DGX Station or DGX-1.

Issue: Forced Reboot Hangs the OS

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`.

Resolution

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

Known Issues Related to Ubuntu / Linux Kernel

The following are known issues related to the Ubuntu OS or the Linux kernel that affect the DGX server.

- System May Slow Down When Using mpirun

Issue: System May Slow Down When Using `mpirun`

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:

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.

Workaround

> 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.

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).

Chapter 7. Deprecated NVIDIA DGX OS Server Releases

This section lists the NVIDIA® DGX™ OS Server software images and updates that have been deprecated.

Release 4.99 (DGX A100 Only)

- Highlights
  - Supports the NVIDIA DGX A100 server only.
  - Updated NVIDIA GPU driver to Release 450.
- Latest update: **4.99.11**

  See the following for update instructions, additional information, and known issues.

  DGX OS Server 4.99.x Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-4.99-relnotes-update-guide.pdf)

Release 3.1

- **End of Support Notice**

  NVIDIA has announced End of Support for DGX OS Server 3, effective September 30, 2019. DGX OS Server 3.1.8 is the last DGX OS Server 3 release. For more information, see DGX OS Server 3, DGX OS Desktop 3 (requires login to NVIDIA Enterprise Support).
- Highlights
  - Ubuntu 16.04 LTS
    - Initialization daemon changed from **Upstart** to **systemd**.
    - Updated network interface naming policy.

      Policy now uses predictable names, rather than the native naming scheme used in previous releases. The first and second Ethernet interfaces, enumerated as em1 and em2 in previous releases, will now enumerate as enp1s0f0 and enp1s0f1 respectively.
  - NVIDIA GPU Driver Release 384

    - Supports the NVIDIA Tesla™ V100 GPUs.
    - Supports CUDA 9.0 .
  - CUDA drivers and diagnostic packages updated to Release 384.
  - Mellanox drivers updated to 4.0.
  - Docker CE and nvidia-docker are pre-installed, and the docker daemon automatically launched.
- See the following for additional information, known issues, and update instructions for specific versions.
  - DGX OS Server v3.1.8 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-3.1.8-relnotes-update-guide.pdf)
  - DGX OS Server v3.1.7 Release Notes (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-3.1.7-relnotes-update-guide.pdf)
  - DGX OS Server v3.1.6 (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-3.1.6-relnotes-update-guide_v01.pdf) Release Notes
  - DGX OS Server v3.1.4 (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-3.1.4-relnotes-update-guide_v03.pdf) Release Notes
  - DGX OS Server v3.1.2 (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-3.1.2-relnotes-install-guide_v04.pdf) Release Notes
  - DGX OS Server v3.1.1 (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-3.1.1-relnotes-install-guide.pdf) Release Notes

Release 2.1

- **End of Support Notice**

  NVIDIA will discontinue support for DGX OS Server 2.1 effective December 31, 2018. After this date, NVIDIA will no longer provide software updates for this release. You may need to upgrade your DGX-1 systems to a supported release to address issues or security vulnerabilities.

  Evaluate your installation to determine update needs and strategy. Systems can be updated now to DGX OS Server 3.1 (which includes Ubuntu 16.04), or updated later to update to a future software release that includes Ubuntu 18.04.

- Highlights
  - Ubuntu 14.04 LTS

    Updates installed packages with the latest versions available at the time of update.
  - NVIDIA GPU Driver Release 384
    - Supports CUDA 9.0
  - CUDA drivers and diagnostic packages updated to Release 384.
  - CUDA Toolkit (if already installed) will get updated to 9.0.176.

- See the following for additional information and update instructions for specific versions.
  - DGX OS Server v2.1.4 Release Notes v02 (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-2.1.4-relnotes-update-guide.pdf)
  - DGX OS Server v2.1.3 (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-2.1.3-relnotes-update-guide_v01.pdf) Release Notes
  - DGX OS Server v2.1.2 (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-2.1.2-relnotes-update-guide_v02.pdf) Release Notes
  - DGX OS Server v2.1.1 (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-2.1.1-relnotes-upgrade-guide_v02.pdf) Release Notes

Release 2.0

- Highlights
  - Ubuntu 14.04 LTS
  - NVIDIA GPU Driver Release 375
- End of Support Notice

  NVIDIA will discontinue support for DGX OS Server 2.0 effective December 31, 2018. After this date, NVIDIA will no longer provide software updates for this release. You may need to upgrade your DGX-1 systems to a supported release to address issues or security vulnerabilities.

  Evaluate your installation to determine update needs and strategy. Systems can be updated now to DGX OS Server 3.1 (which includes Ubuntu 16.04), or updated later to update to a future software release that includes Ubuntu 18.04.
- See the following for additional information and update instructions for specific versions.
  - DGX OS Server v2.0.6 (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-2.0.6-relnotes-upgrade-guide.pdf) Release Notes
  - DGX OS Server v2.0.4 (http://docs.nvidia.com/dgx/pdf/DGX-OS-server-2.0.4-relnotes-upgrade-guide.pdf) Release Notes

  .

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