



NVIDIA DGX OS SERVER VERSION 3.1.6

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Release Notes and Update Guide

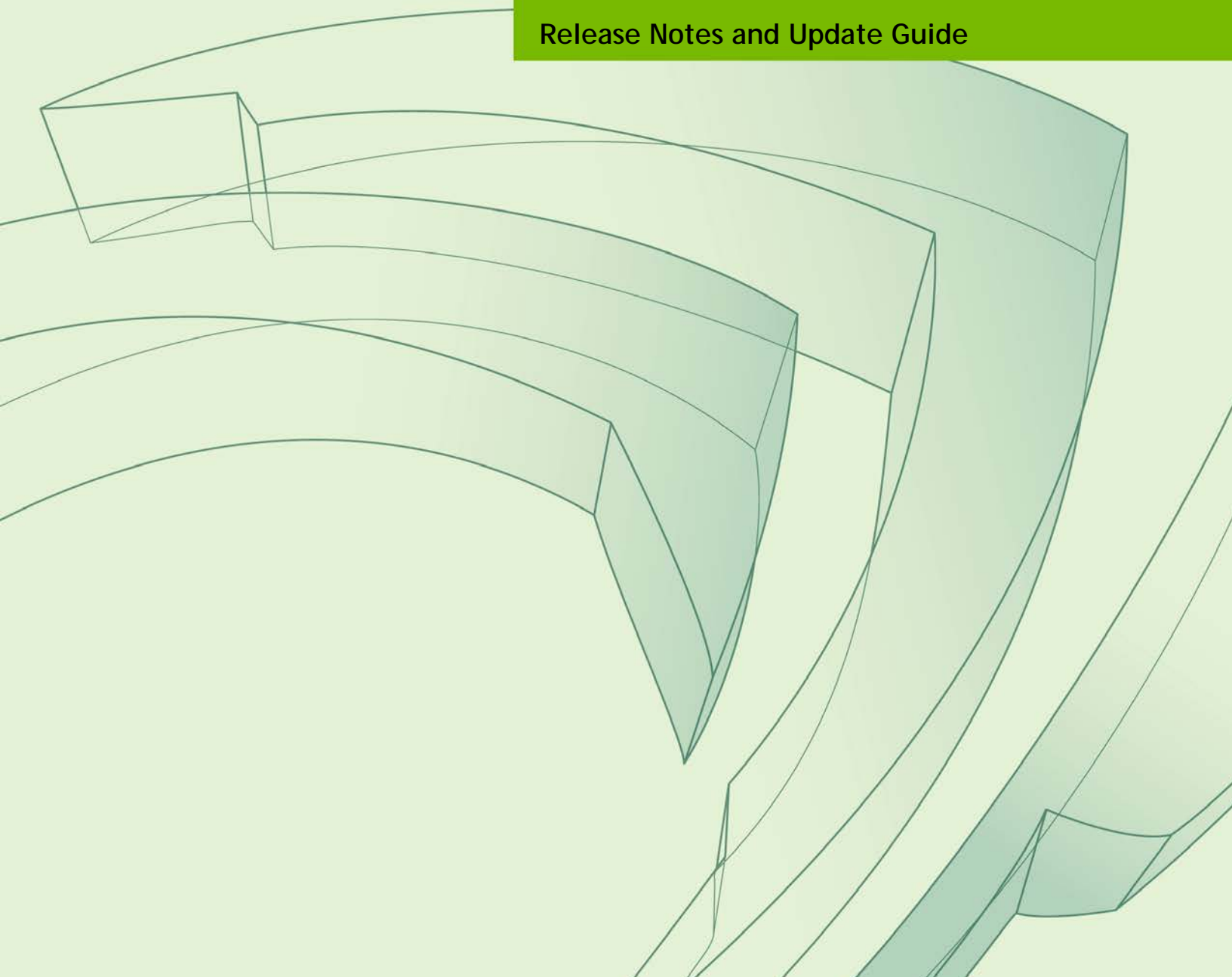


TABLE OF CONTENTS

NVIDIA DGX OS Server Release Notes for Version 3.1.6	3
Update Advisement.....	4
About Release 3.1.....	4
Highlights and Changes since Version 3.1.4.....	5
Known Issues.....	5
DGX OS Server Software Content.....	7
Version Reference.....	8
Pascal.....	8
Volta (16 GB).....	8
Volta (32 GB).....	8
Re-Imaging Your DGX-1.....	9
Updating to Version 3.1.6	10
Update Path Instructions.....	10
Connecting to the DGX-1 Console.....	11
Updating from 1.x to 2.x.....	12
Update Instructions.....	12
Recovering from an Interrupted Update.....	15
Updating from 2.x to 3.1.6.....	16
Update Instructions.....	16
Verifying the nvidia-peer-memory Module.....	19
Enabling Dynamic DNS Updates.....	20
Recovering from an Interrupted Update.....	21
Updating from 3.1.x to 3.1.6.....	22
Update Instructions.....	22
Verifying the nvidia-peer-memory Module.....	23
Recovering from an Interrupted or Failed Update.....	23
Appendix A. Third Party License Notice	25

NVIDIA DGX OS SERVER RELEASE NOTES FOR VERSION 3.1.6

This document describes version 3.1.6 of the NVIDIA® DGX™ OS Server Release 3.1 software and update package.

DGX OS Server v3.1.6 is installed at the factory, and is also provided by Enterprise Support as an ISO image in the event a system needs to be re-imaged.

DGX OS Server v3.1.6 is also provided as in “over the network” update, and requires an internet connection and ability to access the NVIDIA public repository. See the chapter [Updating to Version 3.1.6](#) for instructions on performing the update.

If your DGX-1 is not connected to a network with internet access, refer to the DGX-1 User Guide for instructions on how to install the software on air-gapped systems.

UPDATE ADVISEMENT

▶ DGX OS Server software

NVIDIA recommends updating the DGX OS Server software on their DGX-1 systems from version 1.x or 2.x to version 3.1.6. See the Highlights section for details of version 3.1.6.

▶ NVIDIA Docker Containers

In conjunction with DGX OS Server v3.1.6, customers should update their NVIDIA Docker containers to the latest container release¹.

▶ Ubuntu Security Updates

Customers are responsible for keeping the DGX-1 up to date with the latest Ubuntu security updates using the 'apt-get upgrade' procedure. See the [Ubuntu Wiki Upgrades](#) web page for more information.

ABOUT RELEASE 3.1

The following are the primary features of the DGX OS Server Release 3.1:

- ▶ Supports DGX-1 using NVIDIA Pascal as well as Volta GPUs.
- ▶ 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 the Docker Engine Utility for NVIDIA GPUs are pre-installed, and the docker daemon automatically launched.

¹ See the *NVIDIA Deep Learning Frameworks* documentation website (<http://docs.nvidia.com/deeplearning/dgx/index.htm>) for information on the latest container releases as well as instructions for how to access them.

HIGHLIGHTS AND CHANGES SINCE VERSION 3.1.4

- ▶ NVIDIA GPU Driver Version 384.125
 - Includes security updates for driver components.
- ▶ Added Broadcom StorCLI package.
- ▶ Added support for DGX-1 systems incorporating the NVIDIA Tesla V100 32 GB GPU.

KNOWN ISSUES

- ▶ [Network Performance Drop](#)
- ▶ [Software Power Cap Not Reported Correctly by nvidia-smi](#)
- ▶ [GPUs Cannot be Reset While the System is Running](#)
- ▶ [Apparmor Profile May not Work with Some Containers](#)

Network Performance Drop

Issue

An issue with the Ubuntu kernel 4.4.0-116 results in slower network performance when running server-side UDP workloads.

Details

The DGX OS Server 3.1.6 ISO image incorporates the Ubuntu kernel 4.4.0-116. The issue may be resolved in a later kernel version, at which point an over-the-network update of the DGX OS software will incorporate the fix.

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.

Workaround

This issue is with nvidia-smi reporting and not with the actual functionality. This will be fixed in a future release.

GPUs Cannot be Reset While the System is Running

Issue

You will not be able to reset the GPUs while the system is running.

Workaround

If an issue occurs which causes the GPUs to hang or if they need to be reset, you must reboot the system.

Apparmor Profile May not Work with Some Containers

Issue

Apparmor is enabled in this version of the DGX OS Server, with Docker generating a default profile. The default profile may or may not work with your containers.

Workaround

If there is a conflict with your containers, then either

- ▶ Disable Apparmor, or
- ▶ Provide a custom Apparmor profile and include it in the docker run command.

DGX OS SERVER SOFTWARE CONTENT

The following table provides version information for software included in the DGX OS Server update.

Component	Version	Notes
DGX OS Server	3.1.6	Software versions included in this DGX OS Server update package and ISO image.
GPU Driver	384.125	
Docker Engine Utility for NVIDIA GPUs ¹	1.0.1	
Ubuntu	16.04 LTS	
Ubuntu kernel	4.4.0-116	Version included in the ISO image. For over-the-network updates, the Ubuntu update will incorporate the kernel version available at the time of the update.
Docker CE	17.12.1-ce-0-ubuntu	Version included in the ISO image. For over-the-network updates, as of 5/7/2018 the release of Docker CE installed on your DGX-1 is the release that is provided from a repository maintained by NVIDIA.

1. NVIDIA Container Runtime for Docker is available as an optional upgrade to replace Docker Engine Utility for NVIDIA GPUs. For more information, see [Upgrading to the NVIDIA Container Runtime for Docker](#).

VERSION REFERENCE

The following table shows the firmware and BIOS versions for the DGX-1 hardware at the time of this release. Information provided for reference purposes.

Pascal

Component	Version	Notes
DGX-1 BMC	3.20.30	Released versions for DGX-1 hardware (Pascal) at the time of this software release. Information provided for reference purposes.
DGX-1 SBIOS	S2W_3A04	
DGX-1 VBIOS	86.00.41.00.05	

Volta (16 GB)

Component	Version	Notes
DGX-1 BMC	3.20.30	Released versions for DGX-1 hardware (Volta) at the time of this software release. Information provided for reference purposes.
DGX-1 SBIOS	S2W_3A04	
DGX-1 VBIOS	88.00.18.00.01	

Volta (32 GB)

Component	Version	Notes
DGX-1 BMC	3.20.30	Released versions for DGX-1 hardware (Volta) at the time of this software release. Information provided for reference purposes.
DGX-1 SBIOS	S2W_3A04	
DGX-1 VBIOS	88.00.43.00.04	

RE-IMAGING YOUR DGX-1

The recommended method for updating your DGX-1 software is by performing the over-the-network update as described in the next chapter.

If necessary, you can re-image the system using the ISO image. Refer to the *DGX-1 User Guide* (<http://docs.nvidia.com/dgx/dgx1-user-guide/index.html>) for instructions on how to re-image the system with the new ISO image.

The re-imaging process creates a fresh installation of the DGX OS. The standard software installation overwrites any data or file systems that may exist on the OS disk as well as the RAID disks. All the disks are re-partitioned, and the RAID array is mounted as `/raid`.



WARNING: This process destroys all data and software customizations that you have made on the DGX-1. Be sure to back up any data that you want to preserve, and push any Docker images that you want to keep to a trusted registry.

After re-imaging the system, follow the instructions in the User Guide for first time setup of the DGX-1.

UPDATING TO VERSION 3.1.6

These instructions explain how to update the DGX-1 software through an internet connection to the NVIDIA public repository. The process updates a DGX-1 system image to the latest QA'd versions of the entire DGX-1 software stack, including the drivers.

Perform the updates using commands on the DGX-1 console.

UPDATE PATH INSTRUCTIONS

The update instructions depend on the software version currently installed on the DGX-1. Follow the instructions corresponding to your current DGX-1 software.

Updating from Version 1.x

- a) [Update from Version 1.x to 2.x](#)
- b) [Update from 2.x to 3.1.6](#)

Updating from Version 2.x

Follow instructions at [Updating from 2.x to 3.1.6](#).

Updating from Version 3.1.x

Follow instructions at [Updating from 3.1.x to 3.1.6](#).

CONNECTING TO THE DGX-1 CONSOLE

Connect to the DGX-1 console using either 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-1 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-1 Console if the DGX-1 is connected to a 172.17.xx.xx subnet.

DGX OS Server software version 3.1.6 installs Docker CE which uses the 172.17.xx.xx subnet by default for Docker containers. If the DGX-1 system is on the same subnet, you will not be able to establish a network connection to the DGX-1.

Refer to the DGX-1 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-1.

Remote Connection through the BMC

This method requires that you have the BMC login credentials.

1. Make sure you have connected the IPMI port on the DGX-1 to your LAN.
2. Open a Java-enabled browser within your LAN and go to `http://<IPMI IP Address>/`. Use Firefox or Internet Explorer. Google Chrome is not officially supported by the BMC.

Make sure popups are allowed for the BMC address.

3. Log in.

If the administrator has not manually created a password, then the username that was created during the initial DGX-1 setup is used for both the BMC username and BMC password.
4. From the top menu, click **Remote Control** and then select **Console Redirection**.
5. Click **Java Console** to open the popup window.
6. If necessary, power on the DGX-1 using the power button icon on the upper right corner of the BMC window.

UPDATING FROM 1.X TO 2.X

These instructions serve as the first phase of the update to DGX OS Server software version 3.1.6 from version 1.x. If you plan to use version 2.x without updating further, then refer to the Release Notes for version 2.x for the proper instructions.

See the section [Connecting to the DGX-1 Console](#) for guidance on connecting to the console to perform the update

Update Instructions

1. Verify that networking is enabled so that you can access the DGX-1 public repository.

For example:

```
$ ping www.google.com
```

You may require alternate methods of verifying, if your network is not configured for ping.

2. Run the package manager.

```
$ sudo apt-get update
```

3. Install CURL, if not already installed.

```
$ sudo apt-get install curl
```

4. Verify that the DGX-1 public repository is configured.

```
$ dpkg -l dgx1-repo-ubuntu1404
```

Expected output:

```
ii dgx1-repo-ubuntu1404 1.1-1 amd64 dgx1 repository configuration files
```

If this output appears, then proceed directly to step 5.

If the `dgx1-repo-ubuntu1404` package is not present, then install the package manually as follows:

- a) Download the debian repo using `wget`.

```
$ sudo wget
http://international.download.nvidia.com/dgx1/repos/pool/multiverse/
d/dgx1-repo/dgx1-repo-ubuntu1404_1.1-1_amd64.deb -O /tmp/dgx1-repo-
ubuntu1404_1.1-1_amd64.deb
```

b) Install the package.

```
$ sudo dpkg -i /tmp/dgx1-repo-ubuntu1404_1.1-1_amd64.deb
```

c) Verify that the package installed.

```
$ dpkg -l dgx1-repo-ubuntu1404
```

Expected output:

```
ii dgx1-repo-ubuntu1404 1.1-1 amd64 dgx1 repository configuration files
```

5. Get the new package list.

```
$ sudo apt-get update
```

6. Install the update script.

```
$ sudo apt-get -y --force-yes install dgx1-ota-update
```

7. Run the update script.

The script automatically performs several steps:

- Removes packages (nvidia-361, ar-mgr, isert-dkms, etc).
- Installs the update meta package (dgx1-ota-update-meta).
- Reboots the DGX-1 upon completion.

To run the script, enter the following:

```
$ sudo /usr/bin/dgx1-ota-update.sh
```

Enter y at the prompt:

```
Upgrade NVIDIA DGX1 from 1.0.x to 2.1.3? (y/NO)-:y
```

- You may be presented with a configuration choice such as the following:

```
Setting up dgx-limits (1.0-1) ...
```

```
Configuration file '/etc/security/limits.d/dgx1- limits.conf'
```

```
==> File on system created by you or by a script.
```

```
==> File also in package provided by package maintainer.
```

```
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.
```

```
*** dgx1-limits.conf (Y/I/N/O/D/Z) [default=N] ?
```

Press **Y** to all such messages to “install the package maintainer’s version”.

- If you see the following message:

```
A new version of configuration file /etc/default/grub is available, but
the version installed currently has been locally modified.
What do you want to do about modified configuration file
grub?
install the package maintainer's version
keep the local version currently installed
show the differences between the versions
show a side-by-side difference between the versions
show a 3-way difference between available versions
do a 3-way merge between available versions
start a new shell to examine the situation
```

Select **install the package maintainer’s version**.

- You may see the following error message during DKMS configuration for the `nv_peer_mem` module while running the script:

```
DKMS: install completed.
modprobe: ERROR: could not insert 'nv_peer_mem': Exec format error
The update to version 3.1.6 will remedy this error.
```

8. When completed, press `y` at the prompt to reboot the system.

```
Reboot now to finalize 2.1.3? (y/NO) : y
```

9. Wait for the system to come back up, then confirm that the Linux kernel version is 4.4.0-116 or later.

```
$ uname -a
```

Expected output:

```
Linux jws-1 4.4.0-116-generic ...
```

10. Confirm GPU driver version is 384.125.

```
$ nvidia-smi
```

Expected output (first line)

```
NVIDIA-SMI 384.125 Driver Version: 384.125
```

Recovering from an Interrupted Update

If the script is interrupted during the update, such as from a loss of power or loss of network connection, you can attempt to recover as follows:

1. 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-1, you will not be able to perform the over-the-network update. You will need to re-image the DGX-1 with the latest image (see the [DGX-1 User Guide](#) for instructions) and then perform the network update.
 - If you are successfully returned to the Linux command line, continue the following steps.
1. Reset the script.

```
$ sudo dpkg --configure -a
```

2. Continue following the instructions from step 7 in the [Updating from Version 1.x](#) update instructions.

UPDATING FROM 2.X TO 3.1.6

See the section [Connecting to the DGX-1 Console](#) for guidance on connecting to the console to perform the update.

Update Instructions

1. Verify that networking is enabled so that you can access the DGX-1 public repository.

For example:

```
$ ping www.google.com
```

You may require alternate methods of verifying, if your network is not configured for ping.

2. Run the package manager.

```
$ sudo apt-get update
```

3. Install any updates.

```
$ sudo apt-get upgrade -y
```

4. Install dgx-release-upgrade.

```
$ sudo apt-get install -y dgx-release-upgrade
```

5. 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
```

6. 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]
```

- At the prompt whether to restart services during the package upgrades without asking, select **Yes**.

```
Restart services during package upgrades without
asking? <Yes> <No>
```

- After starting the update process, respond to the presented options as follows:
 - Select **“keep the local version currently installed”** if there is a new grub package and you see the following text:

```
A new version of configuration file /etc/default/grub is available,
but the version installed currently has been locally modified.
```

```
What do you want to do about modified configuration file grub?
  Install the package maintainer's version
  keep the local version currently installed ← Select
  show the differences between the versions
  show a side-by-side difference between the versions
  show a 3-way difference between available versions
  do a 3-way merge between available versions
  start a new shell to examine the situation
```

The local version contains the changes that have been made on the DGX-1.

- Press **Y** if prompted about InfiniBand configuration choices.

```
Configuration file
`./usr/src/mlnx-ofed-kernel-4.0/ofed_scripts/ib_ipoib.conf'

==> File on system created by you or by a script.
==> File also in package provided by package maintainer.

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.
*** ib_ipoib.conf (Y/I/N/O/D/Z) [default=N] ?
```

- Press **Y** if prompted about docker.list configuration choices.

```
Configuration file '/etc/apt/sources.list.d/docker.list'

==> File on system created by you or by a script.
==> File also in package provided by package maintainer.

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

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

```
Restart required
```

```
To finish the upgrade, a restart is required. Upon the next boot,
the system will continue to install several packages in the
background.
```

```
*** This can take another ~7 minutes to complete. DO NOT shutdown or
reboot the system during this period ***.
```

```
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.

10. Confirm the Linux kernel version.

```
$ uname -a
```

Expected output: (or later version)

```
Linux jws-1 4.4.0-104-generic #116~16.04.1-Ubuntu SMP Mon Aug 14
16:07:05 UTC 2017 x86_64 x86_64 x86_64 GNU/Linux
```

11. Confirm the CUDA driver version.

```
$ nvidia-smi
```

Expected output, first line

```
NVIDIA-SMI 384.125                Driver Version: 384.125
```

Verifying the nvidia-peer-memory Module

1. Make sure the nvidia-peer-memory module is installed.

```
$ lsmod | grep nv_peer_mem
```

Expected output:

```
nv_peer_mem      16384  0
nvidia           11911168  30 nv_peer_mem,nvidia_modeset,nvidia_uvm
ib_core         143360  13
rdma_cm,ib_cm,ib_sa,iw_cm,nv_peer_mem,mlx4_ib,mlx5_ib,ib_mad,ib_ucm
,ib_umad,ib_uverbs,rdma_ucm,ib_ipoib
```

- If the expected output appears, then no further action is needed.
- If there is no output, then continue the steps to install the nvidia-peer-memory module.

2. Install the module.

```
$ sudo apt-get install --reinstall mlnx-ofed-kernel-dkms nvidia-
peer-memory-dkms
```

Expected output:

```
DKMS: install completed.
Processing triggers for initramfs-tools (0.103ubuntu4.2) ...
update-initramfs: Generating /boot/initrd.img-4.4.0-64-generic
```

3. Add the module to the Linux kernel.

```
$ sudo modprobe nv_peer_mem
```

There is no expected output for this command.

4. Repeat step 1 to verify that the nvidia-peer-memory module is installed.

Enabling Dynamic DNS Updates

If your network is configured for DHCP, then dynamic DNS updates need to be enabled. You may have already enabled dynamic DNS updates on the DGX OS Server 2.x software, in which case no further action is needed.

To verify, check whether `/etc/resolv.conf` is a link to `/run/resolvconf/resolv.conf`.

```
$ ls -l /etc/resolv.conf
```

Expected output:

```
lrwxrwxrwx 1 root root 29 Dec 1 21:19 /etc/resolv.conf ->
../run/resolvconf/resolv.conf
```

- ▶ If the expected output appears, then no further action is needed.
- ▶ If this does not appear, then enable dynamic DNS updates as follows:
 1. Launch the Resolvconf Reconfigure package.

```
$ sudo dpkg-reconfigure resolvconf
```

The Configuring resolvconf screen appears.

2. Select **<Yes>** when asked whether to prepare `/etc/resolv.conf` for dynamic updates.
3. Select **<No>** when asked whether to append original file to dynamic file.
4. Select **<OK>** at the Reboot recommended screen.
 - You do not need to reboot.
 - You are returned to the command line.
5. Bring down the interface, where `<network-interface>` is the name of your primary network interface (em1, em2, enp1s0f0, or enp1s0f1).

```
$ sudo ifup <network-interface>
```

Expected output:

```
ifdown: interface <network interface> not configured
```

6. Bring up the interface.

```
$ sudo ifup <network interface>
```

Expected output (last line):

```
...
bound to <IP address> -- renewal in ...
```

Recovering from an Interrupted Update

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

- ▶ If you have *not* rebooted the system and are successfully returned to the Linux command line, restart the update by entering the following, replacing * with the actual string of characters that identify the directory where the tarball was extracted:

```
$ cd /tmp/ubuntu-release-upgrade-*/
$ sudo ./xenial
```

- ▶ If you rebooted the system and are successfully returned to the Linux command line, you will need to download and extract the tarball manually.

```
$ sudo apt-get install -y wget
$ wget
http://international.download.nvidia.com/dgx/repos/release_updates/xenial.tar.gz
$ tar -zxvf xenial.tar.gz -C <extract_path>
```

Then restart the failed update:

```
$ cd <extracted_path>
$ sudo ./xenial
```

- ▶ If the system encounters a kernel panic after you restore power and reboot the DGX-1, you will not be able to perform the over-the-network update. You will need to re-image the DGX-1 with the latest image (see the [DGX-1 User Guide](#) for instructions) and then perform the network update.

UPDATING FROM 3.1.X TO 3.1.6

See the section [Connecting to the DGX-1 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. Run the package manager.

```
$ sudo apt update
```

2. 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](#).

3. Upgrade to version 3.1.6.

```
$ 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.

4. Reboot the system.

Verifying the nvidia-peer-memory Module

1. Make sure the nvidia-peer-memory module is installed.

```
$ lsmod | grep nv_peer_mem
```

Expected output:

```
nv_peer_mem      16384  0
nvidia           11911168  30 nv_peer_mem,nvidia_modeset,nvidia_uvm
ib_core         143360  13
rdma_cm,ib_cm,ib_sa,iw_cm,nv_peer_mem,mlx4_ib,mlx5_ib,ib_mad,ib_ucm
,ib_umad,ib_uverbs,rdma_ucm,ib_ipoib
```

- If the expected output appears, then no further action is needed.
- If there is no output, then continue the steps to install the nvidia-peer-memory module.

2. Install the module.

```
$ sudo apt-get install --reinstall mlnx-ofed-kernel-dkms nvidia-
peer-memory-dkms
```

Expected output:

```
DKMS: install completed.
Processing triggers for initramfs-tools (0.103ubuntu4.2) ...
update-initramfs: Generating /boot/initrd.img-4.4.0-64-generic
```

3. Add the module to the Linux kernel.

```
$ sudo modprobe nv_peer_mem
```

There is no expected output for this command.

4. Repeat step 1 to verify that the nvidia-peer-memory module is installed.

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-1, you will not be able to perform the over-the-network update. You will need to re-image the DGX-1 with the latest image (see the [DGX-1 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 Version 3.1.x to 3.1.6](#) update instructions.

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