



NVIDIA DGX OS Server Release 4.5

Release Notes and Update Guide

Table of Contents

NVIDIA DGX OS Server 4.5 Release Notes	3
About Release 4.5.....	3
Delivery and Update Mechanisms.....	4
Initial 4.5 Release.....	4
Update Advisement.....	4
Version History	5
DGX OS Server Software Content.....	6
Package Versions in the 4.5.0 ISO Image.....	6
DGX Server Firmware Version Reference	6
Updating the Software.....	7
Preparing for Updating the Software	7
Connecting to the DGX server Console.....	7
Verifying the DGX Server Connection to the Repositories	8
Performing the Updates.....	9
Update Path Instructions.....	9
Updating from Release 4.1 and Later.....	10
Updating from 4.0.1 (or later)	12
Updating from 3.1.x.....	14
Known Issues	17
Resolved Issues.....	17
Known Software Issues	18
Known DGX-2 System Issues	19
Known DGX-1 System Issues	20
Known Issues Related to Ubuntu / Linux Kernel.....	21
Known Limitations.....	22
Appendix A. Third Party License Notice	26

NVIDIA DGX OS Server 4.5 Release Notes

This document describes the NVIDIA® DGX™ OS Server Release 4.5 software package.

About Release 4.5

The following are the primary new features of DGX OS Server Release 4.5 since Release 4.4:

- ▶ Updated NVIDIA GPU driver to [418.152.00](#)
- ▶ Added optional repository to install the NVIDIA R450 GPU driver
- ▶ Updated to Ubuntu 18.04.4 LTS

Delivery and Update Mechanisms

Initial 4.5 Release

DGX OS Server Release 4.5, version 4.5.0, is provided as an ISO image which is available from NVIDIA Enterprise Support in the event the server needs to be re-imaged. Version 4.5.0 is also provided as an “over-the-network” update, which requires an internet connection and ability to access the NVIDIA public repositories.

Refer to the *DGX-2 User Guide* (<https://docs.nvidia.com/dgx/dgx2-user-guide/index.html>) and *DGX-1 User Guide* (<https://docs.nvidia.com/dgx/dgx1-user-guide/index.html>) for the following instructions.

- ▶ How to re-image the system with the ISO image
- ▶ How to install the software on air-gapped systems

Update Advisement

- ▶ NVIDIA GPU Cloud Containers

In conjunction with DGX OS Server v4.5, customers should update their NVIDIA GPU Cloud containers to the latest container release¹.

- ▶ 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/>) lists known Common Vulnerabilities and Exposures (CVEs), including those that can be resolved by updating the DGX OS software.

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 <https://docs.nvidia.com/deeplearning/dgx/user-guide/index.html> for instructions on how to access them.

Version History

This section lists the changes made in each released version of DGX OS Release 4.5. See [DGX OS Server Software Content](#) for the software component list and versions.

Version 4.5.0

- ▶ Initial Release 4.5 version.
- ▶ Changes since Version 4.4.1:
 - Updated Ubuntu to 18.04.4 LTS
 - Updated NVIDIA GPU driver to [418.152.00](#)
 - Added optional R450 package (NVIDIA GPU driver 450.51.05)
 - Updated NVSM software to version 20.03.6 (R418 package) and 20.05.9 (R450 package)
 - Updated Docker-CE to [19.03.5](#)

Includes native support for running GPU-accelerated containers which eliminates the need to use the NVIDIA Container Runtime for Docker (`nvidia-docker2` package).



NOTE: While the `nvidia-docker2` package is included in this release, support for it may be discontinued in future DGX OS releases.

DGX OS Server Software Content

The following tables provides version information for software included in the DGX OS Server ISO image as well as software installed on the system after getting subsequent updates.

Package Versions in the 4.5.0 ISO Image

The following table shows the version information for software included in the DGX OS Server ISO image for version 4.5.0.

Component	Version (R418 package)	Version (R450 package)
GPU Driver	418.152.02 (includes CUDA update to 10.1, if previously installed separately)	450.51.05 (includes CUDA update to 11.0, if previously installed separately)
NVIDIA System Health Monitor (NVSM)	20.03.6	20.05.9
Data Center GPU Management (DCGM)	1.7.2	2.0.8
NVIDIA Container Toolkit	3.1.4-1	
Ubuntu	18.04.4 LTS	
Ubuntu kernel	4.15.0-106-generic ²	
Docker Engine	19.03.5	
Mellanox OFED	MLNX 4.7-3.2.9.0	
KVM Package Components (DGX-2 only)	Version (Both packages)	
dgx-kvm-sw	19.07.0	
dgx-kvm-host-utils	20.03.0	
dgx-kvm-host-conf	19.04.0	
qemu	2.11+dfsg-1ubuntu7.15~Nvidia.19.02.1	

DGX Server Firmware Version Reference

See the [DGX-2 System Firmware Update Container Version 20.01.25](#) and [DGX-1 System Firmware Update Container Version 19.10.7](#) release notes for the corresponding firmware versions available at the time of this DGX OS release.

² If updating over-the-network, your kernel version may be a later version depending on when the update is performed.

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 Updating the Software

Connecting to the DGX server Console

Connect to the DGX server 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 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-changelogs http://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

Performing the Updates

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**
 - a) Update from Release 2.x to the latest Release 3.1 as described in the [DGX OS 3.1.8 Release Notes.](#)
 - b) [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.

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 system can access the public repositories as explained in [Verifying the DGX Server Connection to the Repositories](#).
2. [Optional] Skip this step to stay with the R418 package; however, to move to the R450 package, issue the following.

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

3. Update the list of available packages and their versions.

```
$ sudo apt update
```

4. 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](#).

5. Upgrade to version 4.5.0.

```
$ 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.

6. 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.



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 system can access the public repositories as explained in [Verifying the DGX Server Connection to the Repositories](#).

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

```
$ sudo apt update
```

2. Install the 4.1.0 components from the repository.

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

3. (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
```

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

```
$ sudo apt update
```

5. 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](#).

6. Upgrade to version 4.5.0.

```
$ 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.

7. 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 Version 4.0.1 \(or Later\)](#) update 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
```

3. Install any updates.

```
$ sudo apt -y full-upgrade
```

4. Install dgx-release-upgrade.

```
$ sudo apt 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. 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] ?

- 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.

7. 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]
```

8. 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 4.4 release.

9. Follow the instructions at [Updating from Release 4.1 and Later](#) to complete the update to 4.5.0.

Known Issues

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

Resolved Issues

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

- *[DGX-2 KVM]: Running `nvidia-vm health-check` fails when run on a faulty GPU within the VM.*

Known Software Issues

The following are known issues with the software.

- ▶ [NVSM Reports "Unknown" for Number of logical CPU cores on non-English system](#)
- ▶ [InfiniBand Bandwidth Drops for KVM Guest VMs](#)

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

Issue

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.

InfiniBand Bandwidth Drops for KVM Guest VMs

Issue

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.

- ▶ [NVSM May Report some NVLink States are Disabled](#)
- ▶ [NVSM Does not Detect Downgraded GPU PCIe Link](#)

NVSM May Report some NVLink States are Disabled

Issue

Running `nvsm show nvswitches` may report some NVLink states as disabled.

Example:

```
NVLinks_9_Id = NVLink12  
NVLinks_9_State = Disabled
```

Explanation

This occurs during boot if NVSM retrieves the NVLink state before the Fabric Manager initializes. The issue will be resolved in a future release.

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 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.

- ▶ [Forced Reboot Hangs the OS](#)
- ▶ [Script Cannot Recreate RAID Array After Re-inserting a Known Good SSD](#)
- ▶ [Software Power Cap Not Reported Correctly by nvidia-smi](#)

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`.

Resolution

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

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 and Resolution

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

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`

System May Slow Down When Using `mpirun`

Issue

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

```
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.

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](#)).

Known Limitations

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

- ▶ [\[DGX-2\] Hot-plugging of Storage NVMe Drives is not Supported](#)
- ▶ [\[DGX-2\] 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](#)
- ▶ [\[DGX-2\] PKCS Errors Appear When the System Boots](#)
- ▶ [\[DGX-2 KVM\] Logfile Setup Error When Creating a VM](#)
- ▶ [\[DGX-2 KVM\] nvidia-vm vmshow Command Does Not Work for Running VMs](#)
- ▶ [\[DGX-1\] Script Cannot Recreate RAID Array After Re-inserting a Known Good SSD](#)

[DGX-2] Hot-plugging of Storage NVMe Drives is not Supported

Issue

Hot-plugging or hot-swapping one of the storage non-volatile memory express (NVMe) drive might result in system instability or incorrect device reporting.

Workaround and Resolution

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

[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 a SOL session.

Workaround

To re-active SOL, either

- Reboot the system, or
- Kill and then restart the process as follows.
 - c) 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"
```
 - d) Kill the process.


```
kill <PID>
```

where `<PID>` is the Process ID returned by the previous command.
 - e) 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
```

[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

[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.

[DGX-2] PKCS Errors Appear When the System Boots

Issue

When the DGX system boots, “PKCS#7 signature not signed with a trusts key” messages appear on the console and system logs.

Explanation

DGX OS Server installs Ubuntu 18.04, which checks all kernel modules for signatures even though Secure Boot is not enabled. Since the NVIDIA drivers are not part of the Ubuntu kernel, the drivers will be flagged with the message when the system boots.

This does not affect the system nor indicate a problem with system software.

[DGX-2 KVM] Logfile Setup Error When Creating a VM

Issue

The following error may appear while creating a VM:

```
..Error setting up logfile: No write access to directory
/home/$USER/.cache/virt-manager
```

Workaround

To avoid the error, remove the `/home/$USER/.cache/virt-manager` directory after installing KVM packages or before running the first `nvidia-vm` command.

[DGX-2 KVM] nvidia-vm vmshow Command Does Not Work for Running VMs

Issue

When running `nvidia-vm vmshow`, the information for running guest VMs is reported as "Unknown".

[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.

```
# 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
```

Appendix A. Third Party License Notice

This NVIDIA product contains third party software that is being made available to you under their respective open source software licenses. Some of those licenses also require specific legal information to be included in the product. This section provides such information.

msecli

The msecli utility (<https://www.micron.com/products/solid-state-storage/storage-executive-software>) is provided under the following terms:

Micron Technology, Inc. Software License Agreement

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