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Chapter 1.
INTRODUCTION

This document contains instructions for replacing NVIDIA® DGX-2™ System components. Be sure to familiarize yourself with the NVIDIA Terms & Conditions documents before attempting to perform any modification or repair to the DGX-2 System. These Terms & Conditions for the DGX-2 System can be found through the NVIDIA DGX Systems Support page.

Contact NVIDIA Enterprise Support to obtain an RMA number for any system or component that needs to be returned for repair or replacement. When replacing a component, use only the replacement supplied to you by NVIDIA.

You can obtain the following components for replacement in your data center.

- Front Fan Modules
- Cache (U.2) NVMe Drives
- Power Supplies
- Power Supply Carrier
- Power Supply Carrier Fan
- Boot (M.2) NVMe Drives
- Boot Drives Riser Assembly
- DIMMs
- Motherboard Tray Battery
- PCIe Riser Assembly
- ConnectX-5 Network Adapter Card
- I/O Expander Tray
- Front Console Board
- EMI Shield
- Bezel

Contact NVIDIA Enterprise Support for replacement instructions and guidance for specific components if those instructions are not included in this document.

1.1. NVIDIA Enterprise Support Portal
The best way to file an incident is to log on to the NVIDIA Enterprise Support portal.

1.2. NVIDIA Enterprise Support Email

You can also send an email to enterprisesupport@nvidia.com.

1.3. NVIDIA Enterprise Support - Local Time Zone Phone Numbers

- **US**: +1 408-486-2500; +1 (800) 421-5048 (toll-free)
- **AU**: +61 280989194; +61 1800291070 (toll-free)
- **CA**: +1 8004215048 (US toll-free)
- **DE**: +49 69153253964; +49 08007246641 (toll-free)
- **FR**: +33 186990248; +33 805542735 (toll-free)
- **RU**: +7 4999516131; +7 88003336865 (toll-free)
- **SK**: +42 220235792; +42 0807910883 (toll-free)
- **TW**: +886 226563206; +886 800868923 (toll-free)
- **UK**: +44 2039013062; +44 8000286417 (toll-free)
- **CN**: +86 8007440746 (mobile); +86 8004400815 (landline)
- **JP**: 0120-706-170 9 AM - 6 PM JST
Chapter 2.
FRONT FAN MODULE REPLACEMENT

2.1. Front Fan Module Replacement Overview

This is a high-level overview of the steps needed to replace the front fan modules.

1. Identify the failed front fan module through the BMC and submit a service ticket to NVIDIA Enterprise Support.
2. Get a replacement from NVIDIA Enterprise Support.
3. Remove the failed fan module using the fan numbering diagram as a reference.
4. Insert the new fan module.
5. Confirm the new fan module is working correctly through the BMC or NVSM.
   
   ```
   nvsm show health
   ```
6. Return the bad fan module using the packaging from the new fan module.

2.2. Identifying the Failed Fan Module

1. Log on to the BMC.
2. Click Sensor from the left navigation menu, then review the Normal Sensors section.
There are two fans in the fan module, identified by FAN\textsubscript{n} F or FAN\textsubscript{n} R, where \textit{n} is the module ID. If either fan fails, then the entire module must be replaced.

3. Use NVSM to confirm the fan issue.

\$ sudo nvsm show health

In the output, look for the 'unhealthy' status for the same fan.

### 2.3. Replacing and Returning the Front Fan Module

1. Remove the new fan module from its packaging and be ready to install it.
2. Locate the failed fan module on the physical system using the following diagram.
3. Remove the failed front fan module by pressing on the tab and pulling on the handle.

4. Quickly insert the new fan module, observing that the handle release mechanism is facing up and the rear connector is facing down.

Caution Replace the fan module within 30 seconds to prevent overheating of the system components.
5. Confirm that the fan module is working properly by verifying on the BMC and by using NVSM (`nvsm show health`) to confirm the replaced fan is healthy.

6. Use packaging to pack up the bad fan and follow the shipping instructions to return the bad fan to NVIDIA Enterprise Support.
3.1. U.2 NVMe Cache Drive Replacement Overview

This is a high-level overview of the procedure to replace a cache drive.

**Caution** Hot-swapping of the NVMe drives is not supported. Be sure to turn the system off before replacing a failed drive.

1. Identify the failed Non-Volatile Memory Express (NVMe) drive.
2. Get replacement from NVIDIA Enterprise Support.
3. Power down the system and then remove the failed NVMe drive.
4. Insert the new NVMe drive.
5. Power on the DGX-2 System.
6. Rebuild the RAID volume and remount the `/raid` partition.

3.2. Identifying the Failed U.2 NVMe

**Identifying the Failed NVMe from the Front**

If physical access to the system is available, you can identify a failed drive by the blinking red LED as illustrated in the following example.
Identifying the Failed NVMe from the Console

To identify the failed NVMe drive from the DGX-2 console, enter the following and then look for a missing entry from the output.

```
$ sudo mdadm -D /dev/md1
```

```
Number   Major   Minor   RaidDevice State
0     259        8        0      active sync   /dev/nvme9n1
1     259       13        1      active sync   /dev/nvme5n1
2     259        7        2      active sync   /dev/nvme6n1
3     259       10        3      active sync   /dev/nvme3n1
4     259       12        4      active sync   /dev/nvme2n1
5     259       11        5      active sync   /dev/nvme7n1
6     259        9        6      active sync   /dev/nvme8n1
7     259        6        7      active sync   /dev/nvme4n1
```

The list should include device names from `nvme2n1` through `nvme9n1` for systems with 8 NVMe drives, and from `nvme0n1` through `nvme15n1` for systems with 16 NVMe drives.

To map the device name to the physical slot ID, enter the following, where X corresponds to the missing device name.

```
$ ls -l /dev/disk/by-path |grep nvmeX |cut -d'|' -f3
```
The command returns the PCIe bus ID. Refer to the following figure to find the slot ID that corresponds to the PCIe bus ID for the faulty drive.

![Figure 1 NVMe Drives: PCIe to Slot Mapping](image)

**Figure 1 NVMe Drives: PCIe to Slot Mapping**

**Identifying the NVMe Manufacturer and Model**

Enter the following, replacing X with the number corresponding to the Linux device name for the failed drive.

```bash
$ sudo nvsm show /systems/1/storage/1/drives/nvmeXn1
```

Example output:

```
/systems/1/storage/1/drives/nvme5n1
Properties:
  Capacity = 384075982336
  BlockSizeBytes = 7501476528
  SerialNumber = 174719FCF9F1
  PartNumber = N/A
  Model = Micron_9200_MTFDHAL3T8TCT
  Revision = 100007H0
  Manufacturer = Micron Technology Inc
  Status_State = Enabled
  Status_Health = OK
  Name = Non-Volatile Memory Express
  MediaType = SSD
  IndicatorLED = N/A
  EncryptionStatus = N/A
  HotSpareType = N/A
  Protocol = NVMe
  NegotiatedSpeedsGbs = 0
  Id = 5
```

Determine the manufacturer and model from the 'Model' entry in the output, and then request a replacement NVMe from NVIDIA Enterprise Support, specifying this information.

### 3.3. Replacing the U.2 NVMe Drive
1. Be sure you have obtained the replacement drive.
2. Back up any critical data to a network shared volume or some other means of backup.
3. Power off the system using the power button.
4. Remove the NVMe drive by squeezing the levers on the handle and pulling the drive out.
5. Replace the new NVMe drive in the same slot by fully inserting it and making sure it clicks into place.
6. Power on the system.

Perform the tasks described in the chapter U.2 NVMe Cache Drive Post-Installation Tasks.
Chapter 4.
U.2 NVME CACHE DRIVE UPGRADE FROM 8 TO 16

If you require more than 30 terabytes (useable 28 terabytes) for cache, you can increase the cache to 60 terabytes (useable 56 terabytes) by adding eight more NVMe drives to the DGX-2 System.

4.1. U.2 NVMe Cache Drive Upgrade Overview

This is a high-level overview of the steps needed to upgrade the DGX-2 System's cache size.

1. Identify the manufacturer and model of the currently installed NVMe drives.
2. Place an order for additional eight NVME drives.
3. Power off the system.
4. Install the NVMe drives in the DGX-2 System.
5. Power on the system.
6. Re-initialize the /raid filesystem to recognize all 16 drives.

4.2. Identifying the NVMe Drive Manufacturer

1. Identify the drives in the RAID volume.

```
$ sudo nvsm show /systems/1/storage/1/volumes/md1
Properties
...  Drives = [ nvme2n1, nvme3n1, nvme4n1, nvme5n1, nvme6n1, nvme7n1, nvme8n1, nvme9n1 ]
...```

2. Select one of the drives listed in the Drives= entry from the previous command, and then enter the following command, where X corresponds to the drive that you selected.
3. Determine the manufacturer (Samsung or Micron) and model from the `Model=` entry in the output, and then order the additional drives from NVIDIA Enterprise Support, specifying the manufacturer and model.

### 4.3. Installing the Optional NVMe Drives

1. Be sure you have obtained the additional drives.
2. Back up any critical data to a network shared volume or some other means of backup.
3. Power off the system using the power button.
4. Remove the blank filler disks from slots 2, 3, 6, 7, 10, 11, 14, and 15.

![Diagram of DGX-2 System](image)

Squeeze the levers on the handle and pull the blank filler disks out.

5. Install the additional eight NVMe drives in slots 2, 3, 6, 7, 10, 11, 14, and 15.
6. Power on the system.
Perform the tasks described in the chapter **U.2 NVMe Cache Drive Post-Installation Tasks**.
Chapter 5.
U.2 NVME CACHE DRIVE POST-INSTALLATION TASKS

This chapter describes the tasks that are typically needed after replacing a U.2 NVME drive or upgrading from 8 to 16 drives.

5.1. Recreating the Cache RAID 0 Volume

1. Stop cachefilesd.

   ```
   $ sudo systemctl stop cachefilesd
   ```

2. Umount /raid and stop raid-0.

   ```
   $ sudo umount -f /raid
   $ sudo mdadm --stop /dev/md1
   ```

3. Run the script to rebuild the RAID volume.

   ```
   $ sudo /usr/bin/configure_raid_array.py -c -f
   ```

   Press Y at any questions.

4. When completed, confirm that the /raid volume is mounted.

   ```
   $ df -hl /raid
   ```

   The /dev/md1 filesystem should be mounted on /raid with size 28 TB or 56 TB, depending on whether 8 or 16 drives are installed.

5.2. Confirming the Volume is Ready

1. Confirm the storage devices and volumes in the system are healthy using the following command.
U.2 NVMe Cache Drive Post-Installation Tasks

$ sudo nvsm show systems/1/storage/1/volumes/md1

2. Verify Status_Health=OK and that the numbers of drives listed in Drives is as expected.

3. Confirm that the drives are now available.

$ sudo mdadm -D /dev/md1

If the drive manufacturer is Micron, perform the steps in Enabling the Temperature Sensor.

5.3. Enabling the Temperature Sensor

The steps in this section need to be followed only for Micron NVMe drives.

1. Verify the need to enable temperature reading for the installed NVMe drives by running ipmitool.

$ sudo ipmitool sdr|grep -i -e "nvme.*temp"

2. If any of the NVMe drives do not show a temperature reading, enter the following script.

$ for drives in `nvme list|grep Micron | cut -d' ' -f1 |sed 's/..$//'` do /opt/MicronTechnology/MicronMSECLI/msecli -M -k 1 -n $drives done

3. Confirm that temperature reading for the replaced drive is enabled by running ipmitool.

$ sudo ipmitool sdr|grep -i -e "nvme.*temp"

5.4. Returning NVMe Drives

Use the packaging from the new drive and follow the instructions that came with the package to ship the old drive back to NVIDIA Enterprise Support.

If your organization has purchased a media retention policy, you may be able to keep failed drives for destruction. Check with NVIDIA Enterprise Support on the status of the policy for specifics.
This chapter describes how to replace one of the DGX-2 System power supplies (PSUs).

6.1. Power Supply Replacement Overview

This is a high-level overview of the steps needed to replace a power supply.

1. Identify failed power supply through the BMC and submit a service ticket.
2. Get replacement power supply from NVIDIA Enterprise Support.
3. Identify the power supply using the diagram as a reference and the indicator LEDs.
4. Remove the power cord from the power supply that will be replaced.
5. Remove the failed power supply.
6. Insert new power supply.
7. Insert the power cord and make sure both LEDs light up green (IN/OUT).
8. Use the BMC to confirm that the power supply is working correctly.

6.2. Identifying the Failed Power Supply

Identifying the Failed Power Supply from the Back

If physical access to the system is available, you can identify a failed PSU by the inspecting the LEDs on the power supply.
Both LEDs should be solid green. If either of the LEDs are not green or if they are blinking, contact NVIDIA Enterprise Support to troubleshoot the issue.

**Identifying the Failed Power Supply from the Console**

There are a couple of ways to identify the failed PSU from the DGX-2 console.

- Use the NVSM CLI as follows.

  ```bash
  sudo nvsm show psus
  ```

  The output shows information for each PSU. Look for any that do not report `Status_Health=OK`.

- You can also log into the BMC, then click **Sensor** from the left side menu and inspect the PSU information from the **Normal Sensors** section.

Both NVSM and the BMC identify each power supply as PSUx, where x is from 0 to 5. The following diagram shows the physical location of each PSU.

**Identifying the Power Supply Manufacturer**

Enter the following NVSM CLI command to see the manufacturer of the PSUs in the system.

```bash
$ sudo nvsm show psus |grep Manufacturer
```

Request a replacement PSU from NVIDIA Enterprise Support, specifying this information.
6.3. Replacing the Power Supply

1. Be sure you have obtained the replacement PSU and that you have saved the packaging to use when sending back the failed PSU.

2. Determine whether you need to shut down the system.
   - If the five remaining PSUs are working and energized, then you do not need to shut down power to the DGX-2 System.
   - If fewer than five PSUs are working and energized, then you do need to shut down power to the DGX-2 System.

3. Unplug the power cable from the PSU to be replaced.
   You may need to dislodge the power cord from the retaining clip.

4. Remove the PSU.
   a) Push on the blue tab to release the lock.

   b) Pull on the handle to remove the PSU from the chassis.

5. Install the new power supply.
a) Insert the new power supply into the chassis and push it all the way in, making sure that the blue locking mechanism engages.
b) Plug in the power cord and attach the retaining clip.
c) If needed, power on the system.

6. Confirm the installation by
   ▶ Viewing the PSU status from the BMC dashboard->Sensors page.
   ▶ Running \texttt{nvsm show health} to confirm the health of the system.

Pack the old power supply and ship it back to NVIDIA Enterprise Support.
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