



# NVIDIA Data Center GPU Driver version 560.35.03 (Linux)/ 560.94 (Windows)

Release Notes

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# Chapter 1. Version Highlights

This section provides highlights of the NVIDIA Data Center GPU R560 Driver (version 560.35.03 Linux and 560.94 Windows).

For changes related to the 560 release of the NVIDIA display driver, review the file "NVIDIA\_Changelog" available in the .run installer packages.

- ▶ Linux driver release date: 08/22/2024
- ▶ Windows driver release date: 08/22/2024

## 1.1. Software Versions

For this release, the software versions are as follows:

- ▶ CUDA Toolkit 12: 12.6  
Note that starting with CUDA 11, individual components of the toolkit are versioned independently. For a full list of the individual versioned components (for example, nvcc, CUDA libraries, and so on), see the [CUDA Toolkit Release Notes](#).
- ▶ NVIDIA Data Center GPU Driver: 560.35.03 (Linux) / 560.94 (Windows)
- ▶ Fabric Manager: 560.35.03 (Use `nv-fabricmanager -v`)
- ▶ NVFlash: 5.791

For more information on getting started with the NVIDIA Fabric Manager on NVSwitch-based systems (for example, NVIDIA HGX A100), refer to the [Fabric Manager User Guide](#).

## 1.2. Fixed Issues

- ▶ In Fabric Manager, an issue was fixed where NVLink multicast CUDA allocations would fail under Shared NVSwitch Virtualization deployment when the Tenant VM was using an older version of GPU driver, while the Service VM was using the latest R550 FM/ Driver release. [4739559]
- ▶ In Fabric Manager, an issue was fixed where the FM would crash during a GPU reset after FM was restarted with the `-restart` option in Shared NVSwitch Virtualization model. [4698530]

- ▶ Due to a kernel bug, under very specific conditions, the write operations from CPU to GPU could appear out of order, causing the GPU to miss tasks. The fix was to add a store fence to ensure correctness. [4696469]
- ▶ Fixed an issue in kernel RM and NVML that produced incorrect PCIe TX/RX counters. [4667045]
- ▶ On nvs switch based systems, the `nvidia-smi topo` command showed NS for some GPUs in the connectivity matrix. This issue has been fixed and the matrix now shows the correct connectivity after the `nvidia-fabricmanager` service is started. [4547730]
- ▶ Fixed a segmentation fault when using `cudaMalloc` in CUDA driver that was affecting certain applications. [4511621]
- ▶ The migration to CDPv2 introduced a regression where the entry patch was only applied to functions that use CDP. This meant that, if a function in a CDP module was called from a non-CDP context, no entry patch was applied, even though the `blockIdx` accesses in the function had been patched to read from the WAR memory. This resulted in the `blockIdx` reading incorrect data. The fix restores the original behavior of applying the entry patch to all functions in CDP modules, regardless of whether or not they use CDP. [4419815]
- ▶ Fixed an error in the calculation of virtual address width for canonical form addresses. [4413514]
- ▶ A regression introduced in kernel v6.6 that led to double faulting is resolved. [4318299]

## 1.3. Known Issues

- ▶ None.

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# Chapter 2. Virtualization

To make use of GPU passthrough with virtual machines running Windows and Linux, the hardware platform must support the following features:

- ▶ A CPU with hardware-assisted instruction set virtualization: Intel VT-x or AMD-V.
- ▶ Platform support for I/O DMA remapping.
- ▶ On Intel platforms, the DMA remapper technology is called Intel VT-d.
- ▶ On AMD platforms, it is called AMD IOMMU.

Support for these features varies by processor family, product, and system, and should be verified at the manufacturer's website.

The following hypervisors are supported for virtualization:

Hypervisor	Notes
Citrix XenServer	Version 6.0 and later
VMware vSphere (ESX / ESXi)	Version 5.1 and later.
Red Hat KVM	Red Hat Enterprise Linux 7 with KVM
Microsoft Hyper-V	Windows Server 2019 Hyper-V Generation 2

Data Center products now support one display of up to 2560x1600 resolution.

The following GPUs are supported for device passthrough for virtualization:

GPU Family	Boards Supported
NVIDIA Ada Lovelace	NVIDIA L40, L4
NVIDIA Grace Hopper	NVIDIA GH200
NVIDIA Hopper	NVIDIA H100, NVIDIA H800
NVIDIA Ampere GPU Architecture	NVIDIA A800, A100, A40, A30, A16, A10, A10G, A2, AX800
NVIDIA Turing	NVIDIA T4, NVIDIA T4G
NVIDIA Volta	NVIDIA V100
NVIDIA Pascal	Quadro: P2000, P4000, P5000, P6000, GP100

GPU Family	Boards Supported
NVIDIA Maxwell	Tesla: P 100, P40, P4 Quadro: K2200, M2000, M4000, M5000, M6000, M6000 24GB Tesla: M60, M40, M6, M4

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# Chapter 3. Hardware and Software Support

Support for these features varies by processor family, product, and system, and should be verified at the manufacturer's website.

## Supported Operating Systems for NVIDIA Data Center GPUs

The Release 560 driver is supported on the following operating systems:

- ▶ Windows x86\_64 operating systems:
  - ▶ Microsoft Windows® Server 2022 21H2
  - ▶ Microsoft Windows® 11 23H2
  - ▶ Microsoft Windows® 11 22H2 - SV2
  - ▶ Microsoft Windows® 11 21H2 - SV1
  - ▶ Microsoft Windows® 10 22H2
- ▶ The following table summarizes the supported Linux 64-bit distributions. For a complete list of distributions, kernel versions supported, see the [CUDA Linux System Requirements](#) documentation.

Distribution	x86_64	Arm64 Server
Debian 12.x (where x <= 6)	Yes	No
Debian 11.x (where x <= 10)	Yes	No
OpenSUSE Leap 15.x (where y <= 6)	Yes	No
Fedora 39	Yes	No
Red Hat Enterprise Linux 9.y (where y <= 4)	Yes	Yes
Rocky Linux 9.y (where y <= 4)	Yes	No
Red Hat Enterprise Linux 8.y (where y <= 10)	Yes	Yes
Rocky Linux 8.y (where y <= 10)	Yes	No

Distribution	x86_64	Arm64 Server
SUSE Linux Enterprise Server 15.y (where y <= 6)	Yes	Yes
Ubuntu 24.04 LTS	Yes	Yes
Ubuntu 22.04.z LTS (where z <= 4)	Yes	Yes
Ubuntu 20.04.z LTS (where z <= 6)	Yes	Yes
KylinOS V10 SP3 2403	Yes	Yes
Amazon Linux AL2023	Yes	No
Microsoft Azure Linux 2.0	Yes	No

## Supported Operating Systems and CPU Configurations for NVIDIA HGX H20

- ▶ Hopper Linux distributions:
  - ▶ Red Hat Enterprise Linux 9.4
  - ▶ Ubuntu 22.04 with NVIDIA HWE kernel
- ▶ Windows 64-bit distributions:
  - ▶ Windows Server 2022

## Supported Operating Systems and CPU Configurations for NVIDIA HGX GH200

- ▶ Grace Hopper Linux distributions:
  - ▶ Red Hat Enterprise Linux 9.4
  - ▶ SUSE Linux Enterprise Server 15 SP5 QU1
  - ▶ Ubuntu 22.04 with NVIDIA HWE kernel

RHEL and SLES feature parity with NVIDIA HWE Kernels. The latest RHEL 9 and SLES 15 SP5 kernels support bare metal.

## Supported Operating Systems and CPU Configurations for NVIDIA HGX H200

The Release 560 driver is validated with NVIDIA HGX H200 on the following operating systems and CPU configurations:

- ▶ Linux 64-bit distributions:
  - ▶ Red Hat Enterprise Linux 9.4 (in 4/8/16-GPU configurations)



- ▶ Ubuntu 22.04.2 LTS (in 4/8/16-GPU configurations)
- ▶ Windows 64-bit distributions:
  - ▶ Windows Server 2022
  - ▶ Windows is supported only in shared NVSwitch virtualization configurations.

## Supported Operating Systems and CPU Configurations for NVIDIA HGX H100/H800

The Release 560 driver is validated with NVIDIA HGX H100 on the following operating systems and CPU configurations:

- ▶ Linux 64-bit distributions:
  - ▶ Red Hat Enterprise Linux 8.10 (in 4/8/16-GPU configurations)
  - ▶ Red Hat Enterprise Linux 9.4 (in 4/8/16-GPU configurations)
  - ▶ SUSE Linux Enterprise Server 15.6 (in 4/8/16-GPU configurations)
  - ▶ Ubuntu 24.04 LTS (in 4/8/16-GPU configurations)
  - ▶ Ubuntu 22.04.2 LTS (in 4/8/16-GPU configurations)
- ▶ Windows 64-bit distributions:
  - ▶ Windows Server 2022
  - ▶ Windows is supported only in shared NVSwitch virtualization configurations.

## Supported Operating Systems and CPU Configurations for NVIDIA HGX A100/A800

The Release 560 driver is validated with NVIDIA HGX A100 on the following operating systems and CPU configurations:

- ▶ Linux 64-bit distributions:
  - ▶ Debian 12.6
  - ▶ Debian 11.10
  - ▶ Red Hat Enterprise Linux 8.10 (in 4/8/16-GPU configurations)
  - ▶ Rocky Linux 8.10 (in 4/8/16-GPU configurations)
  - ▶ Red Hat Enterprise Linux 9.4 (in 4/8/16-GPU configurations)
  - ▶ Ubuntu 24.04 LTS (in 4/8/16-GPU configurations)
  - ▶ Ubuntu 22.04.4 LTS (in 4/8/16-GPU configurations)
  - ▶ Ubuntu 20.04.6 LTS (in 4/8/16-GPU configurations)
  - ▶ SUSE SLES 15.6 (in 4/8/16-GPU configurations)
  - ▶ KylinOS V10 SP3 2403
- ▶ Windows 64-bit distributions:

- ▶ Windows Server 2022
- ▶ Windows is supported only in shared NVSwitch virtualization configurations.
- ▶ CPU Configurations:
  - ▶ AMD Rome in PCIe Gen4 mode
  - ▶ Intel Skylake/Cascade Lake (4-socket) in PCIe Gen3 mode

## Supported Virtualization Configurations

The Release 560 driver is validated with NVIDIA HGX A100, HGX A800, H100, and H800 on the following configurations:

- ▶ Passthrough (full visibility of GPUs and NVSwitches to guest VMs):
  - ▶ 8-GPU configurations with Ubuntu 20.04.6 and 22.4.2
- ▶ Shared NVSwitch (guest VMs only have visibility of GPUs and full NVLink bandwidth between GPUs in the same guest VM):
  - ▶ 1/2/4/8/16-GPU configurations with Ubuntu 20.04.6 LTS

## API Support

This release supports the following APIs:

- ▶ NVIDIA® CUDA® 12.4 for NVIDIA® Maxwell™, Pascal™, Volta™, Turing™, Hopper™, NVIDIA Ampere architecture, and NVIDIA Ada Lovelace GPU architecture GPUs
- ▶ OpenGL® 4.6
- ▶ Vulkan® 1.3
- ▶ DirectX 11
- ▶ DirectX 12 (Windows 10)
- ▶ Open Computing Language (OpenCL™ software) 3.0

Note that for using graphics APIs on Windows (such as OpenGL, Vulkan, DirectX 11, and DirectX 12) or any WDDM 2.0+ based functionality on Data Center GPUs, vGPU is required. See the [vGPU documentation](#) for more information.

## Supported NVIDIA Data Center GPUs

The NVIDIA Data Center GPU driver package is designed for systems that have one or more Data Center GPU products installed. This release of the driver supports CUDA C/C++ applications and libraries that rely on the CUDA C Runtime and/or CUDA Driver API.

Attention: Release 470 was the last driver branch to support Data Center GPUs based on the NVIDIA Kepler architecture. This includes discontinued support for the following compute capabilities:

- ▶ sm\_30 (NVIDIA Kepler)

- ▶ sm\_32 (NVIDIA Kepler)
- ▶ sm\_35 (NVIDIA Kepler)
- ▶ sm\_37 (NVIDIA Kepler)

For more information on GPU products and compute capability, see <https://developer.nvidia.com/cuda-gpus>.

<b>NVIDIA Server Platforms</b>	
<b>Product</b>	<b>Architecture</b>
NVIDIA HGX H20 8-GPU	H20 and NVSwitch
NVIDIA HGX H100 8-GPU	H100 and NVSwitch
NVIDIA HGX H800 8-GPU	H800 and NVSwitch
NVIDIA HGX H100 4-GPU	H100 and NVLink
NVIDIA HGX A800 8-GPU	A800 and NVSwitch
NVIDIA HGX A100 8-GPU	A100 and NVSwitch
NVIDIA HGX A100 4-GPU	A100 and NVLink
NVIDIA HGX-2	V100 and NVSwitch

<b>Data Center L-Series Products</b>	
<b>Product</b>	<b>GPU Architecture</b>
NVIDIA L2	NVIDIA Ada Lovelace
NVIDIA L20	NVIDIA Ada Lovelace
NVIDIA L40	NVIDIA Ada Lovelace
NVIDIA L40S	NVIDIA Ada Lovelace
NVIDIA L4	NVIDIA Ada Lovelace

<b>Data Center H-Series Products</b>	
<b>Product</b>	<b>GPU Architecture</b>
NVIDIA H100 PCIe	NVIDIA Hopper
NVIDIA H100 NVL	NVIDIA Hopper
NVIDIA H800 PCIe	NVIDIA Hopper
NVIDIA H800 NVL	NVIDIA Hopper

<b>RTX-Series / T-Series Products</b>	
<b>Product</b>	<b>GPU Architecture</b>
NVIDIA RTX 6000 Ada Generation	NVIDIA Ada Lovelace
NVIDIA RTX 5880 Ada Generation	NVIDIA Ada Lovelace

<b>RTX-Series / T-Series Products</b>	
<b>Product</b>	<b>GPU Architecture</b>
NVIDIA RTX 5000 Ada Generation	NVIDIA Ada Lovelace
NVIDIA RTX 4500 Ada Generation	NVIDIA Ada Lovelace
NVIDIA RTX 4000 Ada Generation	NVIDIA Ada Lovelace
NVIDIA RTX 4000 SFF Ada Generation	NVIDIA Ada Lovelace
NVIDIA RTX 2000 Ada Generation	NVIDIA Ada Lovelace
NVIDIA RTX 2000E Ada Generation	NVIDIA Ada Lovelace
NVIDIA RTX A6000	NVIDIA Ampere architecture
NVIDIA RTX A5500	NVIDIA Ampere architecture
NVIDIA RTX A5000	NVIDIA Ampere architecture
NVIDIA RTX A4500	NVIDIA Ampere architecture
NVIDIA RTX A4000H	NVIDIA Ampere architecture
NVIDIA RTX A4000	NVIDIA Ampere architecture
NVIDIA RTX A2000 12GB	NVIDIA Ampere architecture
NVIDIA RTX A2000	NVIDIA Ampere architecture
NVIDIA RTX A1000	NVIDIA Ampere architecture
NVIDIA RTX A400	NVIDIA Ampere architecture
NVIDIA RTX A800 40GB Active	NVIDIA Ampere architecture
Quadro RTX 8000	NVIDIA Turing
Quadro RTX 6000	NVIDIA Turing
Quadro RTX 5000	NVIDIA Turing
Quadro RTX 4000	NVIDIA Turing
NVIDIA T1000 8GB	NVIDIA Turing
NVIDIA T600	NVIDIA Turing
NVIDIA T400 4GB	NVIDIA Turing
NVIDIA T400	NVIDIA Turing
NVIDIA T400E	NVIDIA Turing

<b>Data Center A-Series Products</b>	
<b>Product</b>	<b>GPU Architecture</b>
NVIDIA A2	NVIDIA Ampere architecture
NVIDIA A800, AX800	NVIDIA Ampere architecture
NVIDIA A100X	NVIDIA Ampere architecture

<b>Data Center A-Series Products</b>	
<b>Product</b>	<b>GPU Architecture</b>
NVIDIA A100	NVIDIA Ampere architecture
NVIDIA A100 80 GB PCIe	
NVIDIA A40	NVIDIA Ampere architecture
NVIDIA A30, A30X	NVIDIA Ampere architecture
NVIDIA A16	NVIDIA Ampere architecture
NVIDIA A10, A10M, A10G	NVIDIA Ampere architecture

<b>Data Center T-Series Products</b>	
<b>Product</b>	<b>GPU Architecture</b>
NVIDIA T4, T4G	NVIDIA Turing

<b>Data Center V-Series Products</b>	
<b>Product</b>	<b>GPU Architecture</b>
NVIDIA V100	Volta

<b>Data Center P-Series Products</b>	
<b>Product</b>	<b>GPU Architecture</b>
NVIDIA Tesla P100	NVIDIA Pascal
NVIDIA Tesla P40	NVIDIA Pascal
NVIDIA Tesla P4	NVIDIA Pascal

<b>Data Center M-Class Products</b>	
<b>Product</b>	<b>GPU Architecture</b>
NVIDIA Tesla M60	Maxwell
NVIDIA Tesla M40 24 GB	Maxwell
NVIDIA Tesla M40	Maxwell
NVIDIA Tesla M6	Maxwell
NVIDIA Tesla M4	Maxwell

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