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6.11. When the scheduling policy is fixed share, GPU utilization is reported as higher than expected.

6.12. nvidia-smi reports that vGPU migration is supported on all hypervisors.

6.13. NVIDIA Control Panel Crashes in a VM connected to two 4K displays.

6.14. vGPU guest VM driver not properly loaded on servers with more than 512 GB or 1 TB or more of system memory.

6.15. Luxmark causes a segmentation fault on an unlicensed Linux client.

6.16. Resolution is not updated after a VM acquires a license and is restarted.

6.17. On Tesla P40, P6, and P4 GPUs, the default ECC setting prevents NVIDIA vGPU from starting.

6.18. NVIDIA vGPU encoder and process utilization counters don't work with Windows Performance Counters.

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6.20. No Manage License option available in NVIDIA X Server Settings by default.

6.21. Licenses remain checked out when VMs are forcibly powered off.

6.22. Memory exhaustion can occur with vGPU profiles that have 512 Mbytes or less of frame buffer.

6.23. VM bug checks after the guest VM driver for Windows 10 RS2 is installed.

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6.28. Local VGA console is momentarily unblanked when Citrix Virtual Apps and Desktops changes resolution of the VM desktop.

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6.30. Application frame rate may drop when running Citrix Virtual Apps and Desktops at 2560x1600 resolution.

6.31. Windows VM BSOD.

6.32. Windows VM BSOD when upgrading NVIDIA drivers over a Citrix Virtual Apps and Desktops session.

6.33. XenCenter does not allow vGPUs to be selected as a GPU type for Linux VMs.

6.34. If X server is killed on a RHEL7 VM running vGPU, XenCenter console may not automatically switch to text console.

6.35. Citrix Virtual Apps and Desktops shows only a black screen when connected to a vGPU VM.
These Release Notes summarize current status, information on validated platforms, and known issues with NVIDIA vGPU software and associated hardware on Citrix Hypervisor.

The releases in this release family of NVIDIA vGPU software include the software listed in the following table:

<table>
<thead>
<tr>
<th>Software</th>
<th>7.0</th>
<th>7.1</th>
<th>7.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVIDIA Virtual GPU Manager for the Citrix Hypervisor</td>
<td>410.68</td>
<td>410.91</td>
<td>410.107</td>
</tr>
<tr>
<td>releases listed in Hypervisor Software Releases</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NVIDIA Windows driver</td>
<td>411.81</td>
<td>412.16</td>
<td>412.31</td>
</tr>
<tr>
<td>NVIDIA Linux driver</td>
<td>410.71</td>
<td>410.92</td>
<td>410.107</td>
</tr>
</tbody>
</table>

**Caution**

If you install the wrong NVIDIA vGPU software packages for the version of Citrix Hypervisor you are using, NVIDIA Virtual GPU Manager will fail to load.

The releases of the vGPU Manager and guest VM drivers that you install must be compatible. Different versions of the vGPU Manager and guest VM driver from within the same main release branch can be used together. For example, you can use the vGPU Manager from release 7.1 with guest VM drivers from release 7.0. However, versions of the vGPU Manager and guest VM driver from different main release branches cannot be used together. For example, you cannot use the vGPU Manager from release 7.1 with guest VM drivers from release 6.2.

See VM running older NVIDIA vGPU drivers fails to initialize vGPU when booted.

This requirement does not apply to the NVIDIA vGPU software license sever. All releases of NVIDIA vGPU software are compatible with all releases of the license server.
1.1. Updates in Release 7.0

New Features in Release 7.0

- vGPU support for NVIDIA frame buffer capture metrics
- vGPU support for render capture metrics from the hypervisor and guest VMs
- Support for NVIDIA GPU Cloud (NGC) containers with NVIDIA vGPU software
- Miscellaneous bug fixes

Hardware and Software Support Introduced in Release 7.0

- Support for Ubuntu 18.04 LTS as a guest OS
- Support for Red Hat Enterprise Linux 7.6 as a guest OS
- Support for CentOS 7.6 as a guest OS
- Support for Windows 10 Spring Creators Update (1803) as a guest OS

Feature Support Withdrawn in Release 7.0

- 32-bit Windows guest operating systems are no longer supported.

1.2. Updates in Release 7.1

New Features in Release 7.1

- Miscellaneous bug fixes

Hardware and Software Support Introduced in Release 7.1

- Support for the Tesla T4 GPU

1.3. Updates in Release 7.2

New Features in Release 7.2

- Miscellaneous bug fixes
- Security updates - see Security Updates

Hardware and Software Support Introduced in Release 7.2

- Support for Citrix Virtual Apps and Desktops version 7.1903
Chapter 2.
VALIDATED PLATFORMS

This release family of NVIDIA vGPU software provides support for several NVIDIA GPUs on validated server hardware platforms, Citrix Hypervisor hypervisor software versions, and guest operating systems. It also supports the version of NVIDIA CUDA Toolkit that is compatible with R410 drivers.

2.1. Supported NVIDIA GPUs and Validated Server Platforms

This release of NVIDIA vGPU software provides support for the following NVIDIA GPUs on Citrix Hypervisor, running on validated server hardware platforms:

- GPUs based on the NVIDIA Maxwell™ graphic architecture:
  - Tesla M6
  - Tesla M10
  - Tesla M60
- GPUs based on the NVIDIA Pascal™ architecture:
  - Tesla P4
  - Tesla P6
  - Tesla P40
  - Tesla P100 PCIe 16 GB (XenMotion with vGPU is not supported.)
  - Tesla P100 SXM2 16 GB (XenMotion with vGPU is not supported.)
  - Tesla P100 PCIe 12GB (XenMotion with vGPU is not supported.)
- GPUs based on the NVIDIA Volta architecture:
  - Tesla V100 SXM2 (XenMotion with vGPU is not supported.)
  - Tesla V100 SXM2 32GB (XenMotion with vGPU is not supported.)
  - Tesla V100 PCIe (XenMotion with vGPU is not supported.)
  - Tesla V100 PCIe 32GB (XenMotion with vGPU is not supported.)
- Tesla V100 FHHL (XenMotion with vGPU is not supported.)
- GPUs based on the NVIDIA Turing architecture:
  - Since 7.1: Tesla T4

For a list of validated server platforms, refer to NVIDIA GRID Certified Servers.

2.2. Hypervisor Software Releases

Changes to Citrix Product Names and Release Numbers

Citrix has changed the product names of its hypervisor and virtual desktop software.

<table>
<thead>
<tr>
<th>Old Name</th>
<th>New Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>XenServer</td>
<td>Citrix Hypervisor</td>
</tr>
<tr>
<td>XenApp and XenDesktop</td>
<td>Citrix Virtual Apps and Desktops</td>
</tr>
<tr>
<td>Citrix Receiver</td>
<td>Citrix Workspace App</td>
</tr>
</tbody>
</table>

The release number of Citrix Virtual Apps and Desktops releases after 7.18 is in the form 7 yymm, where yymm denotes the year and month that the product was released. For example, for a product released in August 2018, yymm is 1808.

For more information, see these topics in the Citrix documentation:
- New product names
- New product and component version numbers

Supported Citrix Hypervisor Releases

This release family of NVIDIA vGPU software is supported on the Citrix Hypervisor releases listed in the table.

Support for NVIDIA vGPU software requires the Enterprise edition of Citrix Hypervisor. For details, see Citrix XenServer Licesning FAQ (PDF).
Cumulative update releases for a base release of Citrix Hypervisor are compatible with the base release and can also be used with this version of NVIDIA vGPU software unless expressly stated otherwise.

<table>
<thead>
<tr>
<th>Software</th>
<th>Releases Supported</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrix Hypervisor (XenServer) 7.6</td>
<td>RTM build and compatible cumulative update releases</td>
<td>All NVIDIA GPUs that support NVIDIA vGPU software are supported.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This release supports XenMotion with vGPU on suitable GPUs as listed in Supported NVIDIA GPUs and Validated Server Platforms.</td>
</tr>
<tr>
<td>Citrix Hypervisor (XenServer) 7.5</td>
<td>RTM build and compatible cumulative update releases</td>
<td>All NVIDIA GPUs that support NVIDIA vGPU software are supported.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This release supports XenMotion with vGPU on suitable GPUs as listed in Supported NVIDIA GPUs and Validated Server Platforms.</td>
</tr>
<tr>
<td>Citrix Hypervisor (XenServer) 7.1</td>
<td>RTM build and compatible cumulative update releases</td>
<td>Not supported on Tesla T4. XenMotion with vGPU is not supported.</td>
</tr>
<tr>
<td>Citrix Hypervisor (XenServer) 7.0</td>
<td>RTM build 125380 and compatible cumulative update releases</td>
<td>Not supported on Tesla T4. XenMotion with vGPU is not supported.</td>
</tr>
</tbody>
</table>

**Supported Virtual Desktop Software Releases**

This release supports only the virtual desktop software releases listed in the table.

<table>
<thead>
<tr>
<th>Software</th>
<th>Releases Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citrix Virtual Apps and Desktops</td>
<td>Since 7.2: Versions 7 1903 and 7 1808 in HDX 3D Pro mode</td>
</tr>
<tr>
<td></td>
<td>7.0, 7.1 only: Version 7 1808 in HDX 3D Pro mode</td>
</tr>
<tr>
<td>XenApp/XenDesktop</td>
<td>Versions 7.18, 7.17, and 7.15 in HDX 3D Pro mode</td>
</tr>
</tbody>
</table>
2.3. Guest OS Support

NVIDIA vGPU software supports several Windows releases and Linux distributions as a guest OS. The supported guest operating systems depend on the hypervisor software version.

Use only a guest OS release that is listed as supported by NVIDIA vGPU software with your virtualization software. To be listed as supported, a guest OS release must be supported not only by NVIDIA vGPU software, but also by your virtualization software. NVIDIA cannot support guest OS releases that your virtualization software does not support.

NVIDIA vGPU software supports only 64-bit guest operating systems. No 32-bit guest operating systems are supported.

2.3.1. Windows Guest OS Support

NVIDIA vGPU software supports only the 64-bit Windows releases listed in the table as a guest OS on Citrix Hypervisor. The releases of Citrix Hypervisor for which a Windows release is supported depend on whether NVIDIA vGPU or pass-through GPU is used.

If a specific release, even an update release, is not listed, it’s not supported.

XenMotion with vGPU is supported on supported Windows guest OS releases.

<table>
<thead>
<tr>
<th>Guest OS</th>
<th>NVIDIA vGPU - Citrix Hypervisor Releases</th>
<th>Pass-Through GPU - Citrix Hypervisor Releases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows Server 2016 1607, 1709</td>
<td>7.6, 7.5, 7.1, 7.0</td>
<td>7.6, 7.5, 7.1, 7.0</td>
</tr>
<tr>
<td>Windows Server 2012 R2</td>
<td>7.6, 7.5, 7.1, 7.0</td>
<td>7.6, 7.5, 7.1, 7.0</td>
</tr>
<tr>
<td>Windows Server 2008 R2</td>
<td>7.6, 7.5, 7.1, 7.0</td>
<td>7.6, 7.5, 7.1, 7.0</td>
</tr>
<tr>
<td>Windows 10 RTM (1507), November Update (1511), Anniversary Update (1607), Creators Update (1703), Fall Creators Update (1709), Spring Creators Update (1803) (64-bit)</td>
<td>7.6, 7.5, 7.1, 7.0</td>
<td>7.6, 7.5, 7.1, 7.0 Supported only on GPUs based on the Maxwell architecture</td>
</tr>
<tr>
<td>Windows 8.1 Update (64-bit)</td>
<td>7.6, 7.5, 7.1, 7.0</td>
<td>7.6, 7.5, 7.1, 7.0</td>
</tr>
<tr>
<td>Windows 8.1 (64-bit)</td>
<td>7.6, 7.5, 7.1, 7.0</td>
<td>-</td>
</tr>
<tr>
<td>Windows 8 (64-bit)</td>
<td>7.6, 7.5, 7.1, 7.0</td>
<td>-</td>
</tr>
<tr>
<td>Windows 7 (64-bit)</td>
<td>7.6, 7.5, 7.1, 7.0</td>
<td>7.6, 7.5, 7.1, 7.0</td>
</tr>
</tbody>
</table>
2.3.2. Linux Guest OS Support

NVIDIA vGPU software supports **only** the Linux distributions listed in the table as a guest OS on Citrix Hypervisor. The releases of Citrix Hypervisor for which a Linux release is supported depend on whether NVIDIA vGPU or pass-through GPU is used.

If a specific release, even an update release, is not listed, it’s **not** supported. **XenMotion with vGPU is not supported on any Linux guest OS release.**

<table>
<thead>
<tr>
<th>Guest OS</th>
<th>NVIDIA vGPU - Citrix Hypervisor Releases</th>
<th>Pass-Through GPU - Citrix Hypervisor Releases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Hat Enterprise Linux 7.0-7.6</td>
<td>7.6, 7.5, 7.1, 7.0</td>
<td>7.6, 7.5, 7.1, 7.0</td>
</tr>
<tr>
<td>CentOS 7.0-7.6</td>
<td>7.6, 7.5, 7.1, 7.0</td>
<td>7.6, 7.5, 7.1, 7.0</td>
</tr>
<tr>
<td>Ubuntu 18.04 LTS</td>
<td>7.6</td>
<td>7.6</td>
</tr>
<tr>
<td>Ubuntu 16.04 LTS</td>
<td>7.6, 7.5, 7.1, 7.0</td>
<td>7.6, 7.5, 7.1, 7.0</td>
</tr>
<tr>
<td>Ubuntu 14.04 LTS</td>
<td>7.6, 7.5, 7.1, 7.0</td>
<td>7.6, 7.5, 7.1, 7.0</td>
</tr>
</tbody>
</table>

2.4. NVIDIA CUDA Toolkit Version Support

The releases in this release family of NVIDIA vGPU software support NVIDIA CUDA Toolkit 10.0.

For more information about NVIDIA CUDA Toolkit, see [CUDA Toolkit 10.0 Documentation](#).

2.5. XenMotion with vGPU Support

XenMotion with vGPU is supported only on a subset of supported GPUs, Citrix Hypervisor releases, and guest operating systems.

Supported GPUs:

- Tesla M6
- Tesla M10
- Tesla M60
- Tesla P4
- Tesla P6
- Tesla P40
- **Since 7.1:** Tesla T4

Supported Citrix Hypervisor releases: 7.6, 7.5 and 7.4 only.

Supported guest OS releases: Windows only. XenMotion with vGPU is **not** supported on Linux.
Chapter 3.
KNOWN PRODUCT LIMITATIONS

Known product limitations for this release of NVIDIA vGPU software are described in the following sections.

3.1. vGPU profiles with 512 Mbytes or less of frame buffer support only 1 virtual display head on Windows 10

Description
To reduce the possibility of memory exhaustion, vGPU profiles with 512 Mbytes or less of frame buffer support only 1 virtual display head on a Windows 10 guest OS.

The following vGPU profiles have 512 Mbytes or less of frame buffer:

- Tesla M6-0B, M6-0Q
- Tesla M10-0B, M10-0Q
- Tesla M60-0B, M60-0Q

Workaround
Use a profile that supports more than 1 virtual display head and has at least 1 Gbyte of frame buffer.
3.2. NVENC requires at least 1 Gbyte of frame buffer

**Description**

Using the frame buffer for the NVIDIA hardware-based H.264/HEVC video encoder (NVENC) may cause memory exhaustion with vGPU profiles that have 512 Mbytes or less of frame buffer. To reduce the possibility of memory exhaustion, NVENC is disabled on profiles that have 512 MBytes or less of frame buffer. Application GPU acceleration remains fully supported and available for all profiles, including profiles with 512 MBytes or less of frame buffer. NVENC support from both Citrix and VMware is a recent feature and, if you are using an older version, you should experience no change in functionality.

The following vGPU profiles have 512 Mbytes or less of frame buffer:

- Tesla M6-0B, M6-0Q
- Tesla M10-0B, M10-0Q
- Tesla M60-0B, M60-0Q

**Workaround**

If you require NVENC to be enabled, use a profile that has at least 1 Gbyte of frame buffer.

3.3. VM running older NVIDIA vGPU drivers fails to initialize vGPU when booted

**Description**

A VM running a version of the NVIDIA guest VM drivers from a previous main release branch, for example release 4.4, will fail to initialize vGPU when booted on a Citrix Hypervisor platform running the current release of Virtual GPU Manager.

In this scenario, the VM boots in standard VGA mode with reduced resolution and color depth. The NVIDIA virtual GPU is present in Windows Device Manager but displays a warning sign, and the following device status:

> Windows has stopped this device because it has reported problems. (Code 43)

Depending on the versions of drivers in use, the Citrix Hypervisor VM’s /var/log/messages log file reports one of the following errors:

- An error message:
Known Product Limitations

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vmiop_log: error: Unable to fetch Guest NVIDIA driver information

‣ A version mismatch between guest and host drivers:

vmiop_log: error: Guest VGX version(1.1) and Host VGX version(1.2) do not match

‣ A signature mismatch:

vmiop_log: error: VGPU message signature mismatch.

Resolution

Install the current NVIDIA guest VM driver in the VM.

3.4. Virtual GPU fails to start if ECC is enabled

Description

Tesla M60, Tesla M6, and GPUs based on the Pascal GPU architecture, for example Tesla P100 or Tesla P4, support error correcting code (ECC) memory for improved data integrity. Tesla M60 and M6 GPUs in graphics mode are supplied with ECC memory disabled by default, but it may subsequently be enabled using nvidia-smi. GPUs based on the Pascal GPU architecture are supplied with ECC memory enabled.

However, NVIDIA vGPU does not support ECC memory. If ECC memory is enabled, NVIDIA vGPU fails to start.

Citrix XenCenter displays the following error message:

An emulator required to run this VM failed to start

The following error is logged in the Citrix Hypervisor host’s /var/log/messages log file:

vmiop_log: error: Initialization: VGX not supported with ECC Enabled.

Resolution

Ensure that ECC is disabled on all GPUs.

Before you begin, ensure that NVIDIA Virtual GPU Manager is installed on your hypervisor.

1. Use nvidia-smi to list the status of all GPUs, and check for ECC noted as enabled on GPUs.

```bash
# nvidia-smi -q

==============NVSMI LOG==============
Timestamp                           : Tue Dec 19 18:36:45 2017
Driver Version                      : 384.99
```
2. Change the ECC status to off on each GPU for which ECC is enabled.
   ▶ If you want to change the ECC status to off for all GPUs on your host machine, run this command:
   ```bash
   # nvidia-smi -e 0
   ```
   ▶ If you want to change the ECC status to off for a specific GPU, run this command:
   ```bash
   # nvidia-smi -i id -e 0
   ```
   *id* is the index of the GPU as reported by `nvidia-smi`. This example disables ECC for the GPU with index 0000:02:00.0.

3. Reboot the host.
   ```bash
   # shutdown -r now
   ```

4. Confirm that ECC is now disabled for the GPU.
   ```bash
   # nvidia-smi -q
   =============NVSMI LOG================
   Timestamp                           : Tue Dec 19 18:37:53 2017
   Driver Version                      : 384.99
   Attached GPUs                       : 1
   GPU 0000:02:00.0
   [...]
   Ecc Mode
   Current                     : Disabled
   Pending                     : Disabled
   [...]
   ```

If you later need to enable ECC on your GPUs, run one of the following commands:

▶ If you want to change the ECC status to on for all GPUs on your host machine, run this command:

```bash
# nvidia-smi -e 1
```  
▶ If you want to change the ECC status to on for a specific GPU, run this command:

```bash
# nvidia-smi -i id -e 1
```  
*id* is the index of the GPU as reported by `nvidia-smi`.  

---

**Attached GPUs**

```
1
GPU 0000:02:00.0
```
This example enables ECC for the GPU with index 0000:02:00.0.

```bash
# nvidia-smi -i 0000:02:00.0 -e 1
```

After changing the ECC status to on, reboot the host.

### 3.5. Single vGPU benchmark scores are lower than pass-through GPU

**Description**

A single vGPU configured on a physical GPU produces lower benchmark scores than the physical GPU run in pass-through mode.

Aside from performance differences that may be attributed to a vGPU’s smaller frame buffer size, vGPU incorporates a performance balancing feature known as Frame Rate Limiter (FRL). On vGPUs that use the best-effort scheduler, FRL is enabled. On vGPUs that use the fixed share or equal share scheduler, FRL is disabled.

FRL is used to ensure balanced performance across multiple vGPUs that are resident on the same physical GPU. The FRL setting is designed to give good interactive remote graphics experience but may reduce scores in benchmarks that depend on measuring frame rendering rates, as compared to the same benchmarks running on a pass-through GPU.

**Resolution**

FRL is controlled by an internal vGPU setting. On vGPUs that use the best-effort scheduler, NVIDIA does not validate vGPU with FRL disabled, but for validation of benchmark performance, FRL can be temporarily disabled by specifying `frame_rate_limiter=0` in the VM's `platform:vgpu_extra_args` parameter:

```
[root@xenserver ~]# xe vm-param-set uuid=e71afda4-53f4-3a1b-6c92-a364a7f619c2 platform:vgpu_extra_args="frame_rate_limiter=0"
[root@xenserver ~]#
```

The setting takes effect the next time the VM is started or rebooted.

With this setting in place, the VM’s vGPU will run without any frame rate limit. The FRL can be reverted back to its default setting in one of the following ways:

- Removing the `vgpu_extra_args` key from the `platform` parameter
- Removing `frame_rate_limiter=0` from the `vgpu_extra_args` key
- Setting `frame_rate_limiter=1`. For example:

```
[root@xenserver ~]# xe vm-param-set uuid=e71afda4-53f4-3a1b-6c92-a364a7f619c2 platform:vgpu_extra_args="frame_rate_limiter=1"
[root@xenserver ~]#
```
3.6. nvidia-smi fails to operate when all GPUs are assigned to GPU pass-through mode

Description
If all GPUs in the platform are assigned to VMs in pass-through mode, nvidia-smi will return an error:

```
[root@xenserver-vgx-test ~]# nvidia-smi
Failed to initialize NVML: Unknown Error
```

This is because GPUs operating in pass-through mode are not visible to nvidia-smi and the NVIDIA kernel driver operating in the Citrix Hypervisor dom0.

To confirm that all GPUs are operating in pass-through mode, use XenCenter’s GPU tab to review current GPU assignment:
Resolution
N/A

3.7. Windows Aero is disabled on Citrix Virtual Apps and Desktops session using 3 or 4 monitors in 2560×1600 resolution

Description
Windows Aero may be disabled when Citrix Virtual Apps and Desktops is connected to a VM with a vGPU or passthrough GPU, with 3 or 4 monitors at 2560×1600 resolution.

This limitation is a limitation of Windows 7. For details, see the Microsoft knowledge base article Desktop background disappears with very large extended desktop on Windows 7.

3.8. VMs configured with large memory fail to initialize vGPU when booted

Description
When starting multiple VMs configured with large amounts of RAM (typically more than 32GB per VM), a VM may fail to initialize vGPU. In this scenario, the VM boots in standard VGA mode with reduced resolution and color depth. The NVIDIA vGPU software GPU is present in Windows Device Manager but displays a warning sign, and the following device status:

Windows has stopped this device because it has reported problems. (Code 43)

The Citrix Hypervisor VM’s /var/log/messages log file contains these error messages:

```
vmiop_log: error: NVOS status 0x29
vmiop_log: error: Assertion Failed at 0x7620fd4b:179
vmiop_log: error: 8 frames returned by backtrace
... 
vmiop_log: error: VGPU message 12 failed, result code: 0x29
... 
vmiop_log: error: NVOS status 0x8 
vmiop_log: error: Assertion Failed at 0x7620c8df:280 
vmiop_log: error: 8 frames returned by backtrace
... 
vmiop_log: error: VGPU message 26 failed, result code: 0x8
```
Resolution

vGPU reserves a portion of the VM’s framebuffer for use in GPU mapping of VM system memory. The reservation is sufficient to support up to 32GB of system memory, and may be increased to accommodate up to 64GB by specifying `enable_large_sys_mem=1` in the VMs `platform:vgpu_extra_args` parameter:

```
[root@xenserver ~]# xe vm-param-set uuid=e71afda4-53f4-3a1b-6c92-a364a7f619c2 platform:vgpu_extra_args="enable_large_sys_mem=1"
```

The setting takes effect the next time the VM is started or rebooted. With this setting in place, less GPU FB is available to applications running in the VM. To accommodate system memory larger than 64GB, the reservation can be further increased by specifying `extra_fb_reservation` in the VM's `platform:vgpu_extra_args` parameter, and setting its value to the desired reservation size in megabytes. The default value of 64M is sufficient to support 64GB of RAM. We recommend adding 2M of reservation for each additional 1GB of system memory. For example, to support 96GB of RAM, set `extra_fb_reservation` to 128:

```
platform:vgpu_extra_args="enable_large_sys_mem=1, extra_fb_reservation=128"
```

The reservation can be reverted back to its default setting in one of the following ways:

- Removing the `vgpu_extra_args` key from the `platform` parameter
- Removing `enable_large_sys_mem` from the `vgpu_extra_args` key
- Setting `enable_large_sys_mem=0`

3.9. vGPU host driver RPM upgrade fails

Description

Upgrading vGPU host driver RPM fails with an error message about failed dependencies on the console.

```
[root@xenserver ~]# rpm –U NVIDIA-vGPU-xenserver-6.5-352.46.x86_64.rpm
error: Failed dependencies:
NVIDIA-vgx-xenserver conflicts with NVIDIA-vGPU-xenserver-6.5-352.46.x86_64
[root@xenserver ~]#
```

Resolution

Uninstall the older vGPU RPM before installing the latest driver.

Use the following command to uninstall the older vGPU RPM:

```
[root@xenserver ~]# rpm –e NVIDIA-vgx-xenserver
```
Only resolved issues that have been previously noted as known issues or had a noticeable user impact are listed. The summary and description for each resolved issue indicate the effect of the issue on NVIDIA vGPU software before the issue was resolved.

Issues Resolved in Release 7.0
No resolved issues are reported in this release for Citrix Hypervisor.

Issues Resolved in Release 7.1

<table>
<thead>
<tr>
<th>Bug ID</th>
<th>Summary and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2425350</td>
<td>After a long stress test, a blue screen crash (BSOD) occurs</td>
</tr>
<tr>
<td>200492702</td>
<td>After a long stress test, the GPU hangs, causing severe performance issues or a blue screen crash in the VM.</td>
</tr>
<tr>
<td>200461544</td>
<td>Blue Screen crash during guest driver installation</td>
</tr>
<tr>
<td></td>
<td>During installation of the NVIDIA vGPU software graphics driver in guest VMs running some Microsoft Windows 10 releases, a blue screen crash occurs with the error VIDEO_TDR_FAILURE 116.</td>
</tr>
<tr>
<td>200426078</td>
<td>Migrating a VM configured with vGPU can cause errors</td>
</tr>
<tr>
<td></td>
<td>If the guest VM graphics driver comes from an older release of NVIDIA vGPU software than the Virtual GPU Manager, migrating a VM configured with vGPU causes XID error 43, a TDR, and a VM crash.</td>
</tr>
</tbody>
</table>

Issues Resolved in Release 7.2
No resolved issues are reported in this release for Citrix Hypervisor.
Chapter 5. SECURITY UPDATES

5.1. Since 7.2: Restricting Access to GPU Performance Counters

The NVIDIA graphics driver contains a vulnerability (CVE-2018-6260) that may allow access to application data processed on the GPU through a side channel exposed by the GPU performance counters. To address this vulnerability, update the driver and restrict access to GPU performance counters to allow access only by administrator users and users who need to use CUDA profiling tools.

The GPU performance counters that are affected by this vulnerability are the hardware performance monitors used by the CUDA profiling tools such as CUPTI, Nsight Graphics, and Nsight Compute. These performance counters are exposed on the hypervisor host and in guest VMs only as follows:

‣ On the hypervisor host, they are always exposed. However, the Virtual GPU Manager does not access these performance counters and, therefore, is not affected.
‣ In Windows and Linux guest VMs, they are exposed only in VMs configured for GPU pass through. They are not exposed in VMs configured for NVIDIA vGPU.

5.1.1. Windows: Restricting Access to GPU Performance Counters for One User by Using NVIDIA Control Panel

Perform this task from the guest VM to which the GPU is passed through.

Ensure that you are running NVIDIA Control Panel version 8.1.950.

1. Open NVIDIA Control Panel:
   ▶ Right-click on the Windows desktop and select NVIDIA Control Panel from the menu.
   ▶ Open Windows Control Panel and double-click the NVIDIA Control Panel icon.
2. In NVIDIA Control Panel, select the Manage GPU Performance Counters task in the Developer section of the navigation pane.

3. Complete the task by following the instructions in the Manage GPU Performance Counters > Developer topic in the NVIDIA Control Panel help.

5.1.2. Windows: Restricting Access to GPU Performance Counters Across an Enterprise by Using a Registry Key

You can use a registry key to restrict access to GPU Performance Counters for all users who log in to a Windows guest VM. By incorporating the registry key information into a script, you can automate the setting of this registry for all Windows guest VMs across your enterprise.

Perform this task from the guest VM to which the GPU is passed through.

**Caution**

Only enterprise administrators should perform this task. Changes to the Windows registry must be made with care and system instability can result if registry keys are incorrectly set.

1. Set the RmProfilingAdminOnly Windows registry key to 1.

   - Value: "RmProfilingAdminOnly"
   - Type: DWORD
   - Data: 00000001

   The data value 1 restricts access, and the data value 0 allows access, to application data processed on the GPU through a side channel exposed by the GPU performance counters.

2. Restart the VM.

5.1.3. Linux Guest VMs and Hypervisor Host: Restricting Access to GPU Performance Counters

On systems where unprivileged users don’t need to use GPU performance counters, restrict access to these counters to system administrators, namely users with the CAP_SYS_ADMIN capability set. By default, the GPU performance counters are not restricted to users with the CAP_SYS_ADMIN capability.

Perform this task from the guest VM to which the GPU is passed through or from your hypervisor host machine.

In Linux guest VMs, this task requires sudo privileges. On your hypervisor host machine, this task must be performed as the root user on the machine.

1. Log in to the guest VM or open a command shell on your hypervisor host machine.

2. Set the kernel module parameter NVreg_RestrictProfilingToAdminUsers to 1 by adding this parameter to the /etc/modprobe.d/nvidia.conf file.
If you are setting only this parameter, add an entry for it to the `/etc/modprobe.d/nvidia.conf` file as follows:

```
options nvidia
    NVreg_RegistryDwords="NVreg_RestrictProfilingToAdminUsers=1"
```

If you are setting multiple parameters, set them in a single entry as in the following example:

```
options nvidia NVreg_RegistryDwords="RmPVMRL=0x0"
    "NVreg_RestrictProfilingToAdminUsers=1"
```

If the `/etc/modprobe.d/nvidia.conf` file does not already exist, create it.

3. Restart the VM or reboot your hypervisor host machine.
6.1. NVIDIA Notification Icon prevents log off of Citrix Published Application user sessions

Description
By default on Windows Server operating systems, the NVIDIA Notification Icon application is started with every Citrix Published Application user session. This application might prevent the Citrix Published Application user session from being logged off even after the user has quit all other applications.

Resolution
Disable the NVIDIA Notification Icon application for Citrix Published Application user sessions as explained in Virtual GPU Software User Guide.

Status
Resolved by the provision of Windows registry keys for disabling the NVIDIA Notification Icon application for Citrix Published Application user sessions.

Ref. #
2206368
6.2. 7.0 Only: After a long stress test, a blue screen crash (BSOD) occurs

Description
After a long stress test, the GPU hangs, causing severe performance issues or a blue screen crash in the VM.

This issue affects only supported GPUs based on the NVIDIA Pascal architecture or the NVIDIA Volta architecture.

The `nvidia-smi -q` command returns the following information, in which power readings and clocks data are shown as Unknown Error.

<table>
<thead>
<tr>
<th>Power Readings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Management</td>
<td>Supported</td>
</tr>
<tr>
<td>Power Draw</td>
<td>Unknown Error</td>
</tr>
<tr>
<td>Power Limit</td>
<td>250.00 W</td>
</tr>
<tr>
<td>Default Power Limit</td>
<td>250.00 W</td>
</tr>
<tr>
<td>Enforced Power Limit</td>
<td>250.00 W</td>
</tr>
<tr>
<td>Min Power Limit</td>
<td>125.00 W</td>
</tr>
<tr>
<td>Max Power Limit</td>
<td>250.00 W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clocks</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphics</td>
<td>Unknown Error</td>
</tr>
<tr>
<td>SM</td>
<td>Unknown Error</td>
</tr>
<tr>
<td>Memory</td>
<td>3615 MHz</td>
</tr>
<tr>
<td>Video</td>
<td>Unknown Error</td>
</tr>
</tbody>
</table>

Status
Resolved in release 7.1

Ref. #
* 2425350
* 200492702

6.3. Vulkan applications crash in Windows 7 guest VMs configured with NVIDIA vGPU

Description
In Windows 7 guest VMs configured with NVIDIA vGPU, applications developed with Vulkan APIs crash or throw errors when they are launched. Vulkan APIs require sparse texture support, but in Windows 7 guest VMs configured with NVIDIA vGPU, sparse textures are not enabled.
In Windows 10 guest VMs configured with NVIDIA vGPU, sparse textures are enabled and applications developed with Vulkan APIs run correctly in these VMs.

**Status**
Open

**Ref. #**
200381348

### 6.4. Host core CPU utilization is higher than expected for moderate workloads

**Description**
When GPU performance is being monitored, host core CPU utilization is higher than expected for moderate workloads. For example, host CPU utilization when only a small number of VMs are running is as high as when several times as many VMs are running.

**Workaround**
Disable monitoring of the following GPU performance statistics:

- vGPU engine usage by applications across multiple vGPUs
- Encoder session statistics
- Frame buffer capture (FBC) session statistics
- Statistics gathered by performance counters in guest VMs

**Status**
Open

**Ref. #**
2414897

### 6.5. Frame capture while the interactive logon message is displayed returns blank screen

**Description**
Because of a known limitation with NvFBC, a frame capture while the interactive logon message is displayed returns a blank screen.
An NvFBC session can capture screen updates that occur after the session is created. Before the logon message appears, there is no screen update after the message is shown and, therefore, a black screen is returned instead. If the NvFBC session is created after this update has occurred, NvFBC cannot get a frame to capture.

**Workaround**

See Black Screen at Logon with Nvidia HDX 3D Pro enabled in the Citrix knowledge base.

**Status**

Not a bug

**Ref. #**

2115733

6.6. RDS sessions do not use the GPU with some Microsoft Windows Server releases

**Description**

When some releases of Windows Server are used as a guest OS, Remote Desktop Services (RDS) sessions do not use the GPU. With these releases, the RDS sessions by default use the Microsoft Basic Render Driver instead of the GPU. This default setting enables 2D DirectX applications such as Microsoft Office to use software rendering, which can be more efficient than using the GPU for rendering. However, as a result, 3D applications that use DirectX are prevented from using the GPU.

**Version**

- Windows Server 2016
- Windows Server 2012

**Solution**

Change the local computer policy to use the hardware graphics adapter for all RDS sessions.

2. Set the **Use the hardware default graphics adapter for all Remote Desktop Services sessions** option.
6.7. Cloned VMs configured with a vGPU type different than the type in the master image fail to start

Description
Cloned VMs configured with a vGPU type different than the type in the master image fail to start.

When a Windows 10 VM is booted, the VM becomes stuck in a loop and alternately displays *Getting devices ready: 50%* and *Preparation in progress*.

Workaround
Create one master image for each vGPU type that you want to use. Do not attempt to configure a cloned VM with a vGPU type different than the type in the master image.

Status
Open

Ref. #
2285306

6.8. 7.0 Only: Blue Screen crash during guest driver installation

Description
During installation of the NVIDIA vGPU software graphics driver in guest VMs running some Microsoft Windows 10 releases, a blue screen crash occurs with the error *VIDEO_TDR_FAILURE 116*.

Version
This issue affects the following Microsoft Windows 10 releases:

- RTM (1507)
- November Update (1511)
Workaround

1. Identify the NVIDIA GPU for which the **Hardware Ids** property contains values that start with `PCI\VEN_10DE`.
   
a. Open **Device Manager** and expand **Display adapters**.
b. For each NVIDIA GPU listed under **Display adapters**, double-click the GPU and in the **Properties** window that opens, click the **Details** tab and select **Hardware Ids** in the **Property** list.

2. For the device that you identified in the previous step, display the value of the **Class Guid** property.

   The value of this property is a string, for example, `4d36e968-e325-11ce-bfc1-08002be10318`.

3. Open the **Registry Editor** and navigate to `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Class\class-guid\`, where `class-guid` is the value of the **Class Guid** property that you displayed in the previous step.

   Under `class-guid`, multiple adapters numbered as four-digit numbers starting from `0000` are listed, for example, `0000` and `0001`.

4. For each adapter listed, create the `EnableVGXFlipQueue` Windows registry key with type **REG_DWORD** and a value of `0`.

5. Install the NVIDIA vGPU software graphics driver.

**Status**

Resolved in NVIDIA vGPU software release 7.1.

**Ref. #**

200461544

**6.9. 7.0 Only: Migrating a VM configured with vGPU can cause errors**

**Description**

If the guest VM graphics driver comes from an older release of NVIDIA vGPU software than the Virtual GPU Manager, migrating a VM configured with vGPU causes XID error 43, a TDR, and a VM crash.

For example, this issue occurs if the guest VM graphics driver comes from NVIDIA vGPU software 6.1 and the Virtual GPU Manager comes from NVIDIA vGPU software 6.2.
**Workaround**

Ensure that the guest VM graphics driver and the Virtual GPU Manager come from the same release of NVIDIA vGPU software.

**Status**

Open

**Ref. #**

Resolved in NVIDIA vGPU software release 7.1.

### 6.10. Even when the scheduling policy is equal share, unequal GPU utilization is reported

**Description**

When the scheduling policy is equal share, unequal GPU engine utilization can be reported for the vGPUs on the same physical GPU.

For example, GPU engine usage for three P40-8Q vGPUs on a Tesla P40 GPU might be reported as follows:

```
[root@localhost:-] nvidia-smi vgpu
Wed Jun 27 10:33:18 2018
+-----------------------------------------------------------------------------+
| NVIDIA-SMI 390.59                 Driver Version: 390.59                    |
|-------------------------------+--------------------------------+------------|
| GPU  Name                     | Bus-Id                         | GPU-Util   |
|      vGPU ID    Name          | VM ID    VM Name               | vGPU-Util  |
|===============================+================================+============|
|   0  Tesla P40                | 00000000:81:00.0               |  52%       |
|      2122661    GRID P40-8Q   | 2122682  centos7.4-xmpl-211... |     19%    |
|      2122663    GRID P40-8Q   | 2122692  centos7.4-xmpl-211... |      0%    |
|      2122659    GRID P40-8Q   | 2122664  centos7.4-xmpl-211... |     25%    |
|   1  Tesla P40                | 00000000:85:00.0               |  58%       |
|      2122662    GRID P40-8Q   | 2122689  centos7.4-xmpl-211... |     59%    |
|      2122658    GRID P40-8Q   | 2122667  centos7.4-xmpl-211... |      0%    |
|      2122660    GRID P40-8Q   | 2122670  centos7.4-xmpl-211... |     25%    |
+-------------------------------+--------------------------------+------------+
```

The vGPU utilization of the vGPU 2122658 is reported as 59%. However, the expected vGPU utilization should not exceed 33%.

This behavior is a result of the mechanism that is used to measure GPU engine utilization.

**Status**

Open
6.11. When the scheduling policy is fixed share, GPU utilization is reported as higher than expected

Description

When the scheduling policy is fixed share, GPU engine utilization can be reported as higher than expected for a vGPU.

For example, GPU engine usage for six P40-4Q vGPUs on a Tesla P40 GPU might be reported as follows:

```
[root@localhost:~] nvidia-smi vgpu
Mon Aug 20 10:33:18 2018
+-----------------------------------------------------------------------------+
| NVIDIA-SMI 390.42                 Driver Version: 390.42                    |
|-------------------------------+--------------------------------+------------|
| GPU  Name                     | Bus-Id                         | GPU-Util   |
|      vGPU ID    Name          | VM ID    VM Name               | vGPU-Util  |
|===============================+================================+============|
|   0  Tesla P40                | 00000000:81:00.0               |  99%       |
|      85109  GRID P40-4Q       | 85110    win7-xmpl-146048-1    |     32%    |
|      87195  GRID P40-4Q       | 87196    win7-xmpl-146048-2    |     39%    |
|      88095  GRID P40-4Q       | 88096    win7-xmpl-146048-3    |     26%    |
|      89170  GRID P40-4Q       | 89171    win7-xmpl-146048-4    |     0%     |
|      90475  GRID P40-4Q       | 90476    win7-xmpl-146048-5    |     0%     |
|      93363  GRID P40-4Q       | 93364    win7-xmpl-146048-6    |     0%     |
|   1  Tesla P40                | 00000000:85:00.0               |   0%       |
+-------------------------------+--------------------------------+------------+
```

The vGPU utilization of vGPU 85109 is reported as 32%. For vGPU 87195, vGPU utilization is reported as 39%. And for 88095, it is reported as 26%. However, the expected vGPU utilization of any vGPU should not exceed approximately 16.7%.

This behavior is a result of the mechanism that is used to measure GPU engine utilization.

Status

Open

Ref. #

2227591
6.12. `nvidia-smi` reports that vGPU migration is supported on all hypervisors

**Description**

The command `nvidia-smi vgpu -m` shows that vGPU migration is supported on all hypervisors, even hypervisors or hypervisor versions that do not support vGPU migration.

**Status**

Closed

**Ref. #**

200407230

6.13. NVIDIA Control Panel Crashes in a VM connected to two 4K displays

**Description**

When NVIDIA Control Panel is started in a VM connected through a pass-through GPU to two 4K displays, a Citrix HDX 3D Pro Warning pop-up window opens containing the following error message:

```
Full screen applications are not supported on Citrix HDX 3D Pro. Press Ok to exit
```

NVIDIA Control Panel then crashes.

After the VM is rebooted, NVIDIA Control Panel is available again.

**Version**

Citrix Virtual Apps and Desktops 7.16

**Status**

Not an NVIDIA bug

**Ref. #**

200393766
6.14. vGPU guest VM driver not properly loaded on servers with more than 512 GB or 1 TB or more of system memory

Description
If PV IOMMU is enabled, support for vGPU is limited to servers with a maximum of 512 GB of system memory. On servers with more than 512 GB of system memory and PV IOMMU enabled, the guest VM driver is not properly loaded. Device Manager marks the vGPU with a yellow exclamation point.

If PV IOMMU is disabled, support for vGPU is limited to servers with less than 1 TB of system memory. This limitation applies only to systems with supported GPUs based on the Maxwell architecture: Tesla M6, Tesla M10, and Tesla M60. On servers with 1 TB or more of system memory, VMs configured with vGPU fail to power on. However, support for GPU pass through is not affected by this limitation.

Resolution
1. If PV IOMMU is enabled, disable it.
   
   ```bash
   [root@xenserver ~]# /opt/xensource/libexec/xen-cmdline --set-xen iommu=dom0-passthrough
   ```
2. If the server has 1 TB or more of system memory, limit the amount of system memory on the server to 1 TB minus 16 GB.
   
   If the server has less than 1 TB or more of system memory, omit this step.
3. Reboot the server.

Status
Not an NVIDIA bug

Ref. #
1799582
6.15. Luxmark causes a segmentation fault on an unlicensed Linux client

Description
If the Luxmark application is run on a Linux guest VM configured with NVIDIA vGPU that is booted without acquiring a license, a segmentation fault occurs and the application core dumps. The fault occurs when the application cannot allocate a CUDA object on NVIDIA vGPUs where CUDA is disabled. On NVIDIA vGPUs that can support CUDA, CUDA is disabled in unlicensed mode.

Status
Not an NVIDIA bug.

Ref. #
200330956

6.16. Resolution is not updated after a VM acquires a license and is restarted

Description
In a Red Enterprise Linux 7.3 guest VM, an increase in resolution from 1024×768 to 2560×1600 is not applied after a license is acquired and the gridd service is restarted. This issue occurs if the multimonitor parameter is added to the xorg.conf file.

Version
Red Enterprise Linux 7.3

Status
Open

Ref. #
200275925
6.17. On Tesla P40, P6, and P4 GPUs, the default ECC setting prevents NVIDIA vGPU from starting

Description
On Tesla P40, Tesla P6, and Tesla P4 GPUs, the default error-correcting code (ECC) memory setting prevents NVIDIA vGPU from starting. By default, ECC memory is enabled on these GPUs, but NVIDIA vGPU does not support ECC memory.

Workaround
Before running NVIDIA vGPU, disable ECC memory as explained in Virtual GPU Software User Guide.

Status
Closed.

Ref. #
200269717

6.18. NVIDIA vGPU encoder and process utilization counters don't work with Windows Performance Counters

Description
GPU encoder and process utilization counter groups are listed in Windows Performance Counters, but no instances of the counters are available. The counters are disabled by default and must be enabled.

Workaround
Enable the counters by running the following sequence of commands from a command shell:

```
wmic /namespace:nv path System call enableProcessUtilizationPerfCounter
wmic /namespace:nv path System call enableEncoderSessionsPerfCounter
```

If you need to disable the counters, run the following sequence of commands from a command shell:
wmic /namespace:nv path System call disableProcessUtilizationPerfCounter
wmic /namespace:nv path System call disableEncoderSessionsPerfCounter

Status
Open

Ref. #
1971698

6.19. A segmentation fault in DBus code causes nvidia-gridd to exit on Red Hat Enterprise Linux and CentOS

Description
On Red Hat Enterprise Linux 6.8 and 6.9, and CentOS 6.8 and 6.9, a segmentation fault in DBus code causes the nvidia-gridd service to exit.

The nvidia-gridd service uses Dbus for communication with NVIDIA X Server Settings to display licensing information through the Manage License page. Disabling the GUI for licensing resolves this issue.

To prevent this issue, the GUI for licensing is disabled by default. You might encounter this issue if you have enabled the GUI for licensing and are using Red Hat Enterprise Linux 6.8 or 6.9, or CentOS 6.8 and 6.9.

Version
Red Hat Enterprise Linux 6.8 and 6.9
CentOS 6.8 and 6.9

Status
Open

Ref. #
- 200358191
- 200319854
- 1895945
6.20. No **Manage License** option available in **NVIDIA X Server Settings** by default

**Description**

By default, the **Manage License** option is not available in **NVIDIA X Server Settings**. This option is missing because the GUI for licensing on Linux is disabled by default to work around the issue that is described in *A segmentation fault in DBus code causes nvidia-gridd to exit on Red Hat Enterprise Linux and CentOS*.

**Workaround**

This workaround requires **sudo** privileges.

1. If **NVIDIA X Server Settings** is running, shut it down.
2. If the `/etc/nvidia/gridd.conf` file does not already exist, create it by copying the supplied template file `/etc/nvidia/gridd.conf.template`.
3. As root, edit the `/etc/nvidia/gridd.conf` file to set the `EnableUI` option to `TRUE`.
4. Start the `nvidia-gridd` service.

```
# sudo service nvidia-gridd start
```

When **NVIDIA X Server Settings** is restarted, the **Manage License** option is now available.

**Status**

Open

6.21. Licenses remain checked out when VMs are forcibly powered off

**Description**

NVIDIA vGPU software licenses remain checked out on the license server when non-persistent VMs are forcibly powered off.
The NVIDIA service running in a VM returns checked out licenses when the VM is shut down. In environments where non-persistent licensed VMs are not cleanly shut down, licenses on the license server can become exhausted. For example, this issue can occur in automated test environments where VMs are frequently changing and are not guaranteed to be cleanly shut down. The licenses from such VMs remain checked out against their MAC address for seven days before they time out and become available to other VMs.

**Resolution**

If VMs are routinely being powered off without clean shutdown in your environment, you can avoid this issue by shortening the license borrow period. To shorten the license borrow period, set the `LicenseInterval` configuration setting in your VM image. For details, refer to [Virtual GPU Client Licensing User Guide](https://www.nvidia.com).

**Status**

Closed

**Ref. #**

1694975

### 6.22. Memory exhaustion can occur with vGPU profiles that have 512 Mbytes or less of frame buffer

**Description**

Memory exhaustion can occur with vGPU profiles that have 512 Mbytes or less of frame buffer.

This issue typically occurs in the following situations:

- Full screen 1080p video content is playing in a browser. In this situation, the session hangs and session reconnection fails.
- Multiple display heads are used with Citrix Virtual Apps and Desktops or VMware Horizon on a Windows 10 guest VM.
- Higher resolution monitors are used.
- Applications that are frame-buffer intensive are used.
- NVENC is in use.

To reduce the possibility of memory exhaustion, NVENC is disabled on profiles that have 512 Mbytes or less of frame buffer.
When memory exhaustion occurs, the NVIDIA host driver reports Xid error 31 and Xid error 43 in the Citrix Hypervisor `/var/log/messages` file.

The following vGPU profiles have 512 Mbytes or less of frame buffer:

- Tesla M6-0B, M6-0Q
- Tesla M10-0B, M10-0Q
- Tesla M60-0B, M60-0Q

The root cause is a known issue associated with changes to the way that recent Microsoft operating systems handle and allow access to overprovisioning messages and errors. If your systems are provisioned with enough frame buffer to support your use cases, you should not encounter these issues.

**Workaround**

- Use an appropriately sized vGPU to ensure that the frame buffer supplied to a VM through the vGPU is adequate for your workloads.
- Monitor your frame buffer usage.
- If you are using Windows 10, consider these workarounds and solutions:
  - Use a profile that has 1 Gbyte of frame buffer.
  - Optimize your Windows 10 resource usage.

To obtain information about best practices for improved user experience using Windows 10 in virtual environments, complete the **NVIDIA GRID vGPU Profile Sizing Guide for Windows 10** download request form.

For more information, see also **Windows 10 Optimization for XenDesktop** on the Citrix blog.

**Status**

Open

**Ref. #**

- 200130864
- 1803861
6.23. VM bug checks after the guest VM driver for Windows 10 RS2 is installed

Description
When the VM is rebooted after the guest VM driver for Windows 10 RS2 is installed, the VM bug checks. When Windows boots, it selects one of the standard supported video modes. If Windows is booted directly with a display that is driven by an NVIDIA driver, for example a vGPU on Citrix Hypervisor, a blue screen crash occurs.

This issue occurs when the screen resolution is switched from VGA mode to a resolution that is higher than 1920×1200.

Fix
Download and install Microsoft Windows Update KB4020102 from the Microsoft Update Catalog.

Workaround
If you have applied the fix, ignore this workaround.
Otherwise, you can work around this issue until you are able to apply the fix by not using resolutions higher than 1920×1200.

1. Choose a GPU profile in Citrix XenCenter that does not allow resolutions higher than 1920×1200.
2. Before rebooting the VM, set the display resolution to 1920×1200 or lower.

Status
Not an NVIDIA bug

Ref. #
200310861

6.24. On Citrix Hypervisor 7.0, VMs unexpectedly reboot and Citrix Hypervisor crashes or freezes

Description
On Citrix Hypervisor 7.0, VMs to which a vGPU is attached unexpectedly reboot and Citrix Hypervisor crashes or freezes.
The event log in the Citrix Hypervisor /var/log/crash/xen.log file lists the following errors:

- A fatal bus error on a component at the slot where the GPU card is installed
- A fatal error on a component at bus 0, device 2, function 0

This issue occurs when page-modification logging (PML) is enabled on Intel Broadwell CPUs running Citrix Hypervisor 7.0. Citrix is aware of this issue and is working on a permanent fix.

**Workaround**

Disable page-modification logging (PML) as explained in XenServer 7 host crash while starting multiple virtual machines in the Citrix Support Knowledge Center.

**Status**

Not an NVIDIA bug

**Ref. #**

1853248

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**6.25. With no NVIDIA driver installed, Citrix Hypervisor misidentifies Tesla M10 cards**

**Description**

An erroneous entry in the pci.ids database causes Citrix Hypervisor to identify Tesla M10 cards as GRID M40 when no NVIDIA driver is installed.

**Version**

Citrix Hypervisor 6.5 and 7.0

**Workaround**

None

**Status**

Not an NVIDIA bug

**Ref. #**

NVIDIA-420/1792341
6.26. GNOME Display Manager (GDM) fails to start on Red Hat Enterprise Linux 7.2 and CentOS 7.0

**Description**
GDM fails to start on Red Hat Enterprise Linux 7.2 and CentOS 7.0 with the following error:

Oh no! Something has gone wrong!

**Workaround**
Permanently enable permissive mode for Security Enhanced Linux (SELinux).

1. As root, edit the `/etc/selinux/config` file to set `SELINUX` to permissive.
   ```bash
   SELINUX=permissive
   ```
2. Reboot the system.
   ```bash
   ~]# reboot
   ```

For more information, see Permissive Mode in *Red Hat Enterprise Linux 7 SELinux User’s and Administrator’s Guide*.

**Status**
Not an NVIDIA bug

**Ref. #**
200167868

6.27. Video goes blank when run in loop in Windows Media Player

**Description**
When connected to a vGPU-enabled VM using Citrix Virtual Apps and Desktops, a video played back in looping mode on Windows Media Player goes blank or freezes after a few iterations.

**Workaround**
None
6.28. Local VGA console is momentarily unblanked when Citrix Virtual Apps and Desktops changes resolution of the VM desktop

Description
When Citrix Virtual Apps and Desktops establishes a remote connection to a VM using vGPU, the VM's local VGA console display in XenCenter is blanked (assuming the VM local console has not been disabled by setting `platform:vgpu_extra_args="disable_vnc=1"`). If the Citrix Virtual Apps and Desktops session changes resolution of the VM's desktop, the local VGA console momentarily unblanks, allowing a XenCenter user to briefly view the desktop.

Workaround
Disable the VM's local VGA console

```
xe vm-param-set uuid=vm-uuid platform:vgpu_extra_args="disable_vnc=1"
```

Status
Open

Ref. #
NVIDIA-145/1375164

6.29. VM bugchecks on shutdown/restart when Citrix Virtual Apps and Desktops is installed and NVIDIA driver is uninstalled or upgraded.

Description
If the Citrix Virtual Apps and Desktops agent is installed in a VM before any NVIDIA GPU driver is installed, the VM will bugcheck (bluescreen) when the
Known Issues

NVIDIA driver is subsequently upgraded or uninstalled. The bugcheck code is 0x7E, \texttt{SYSTEM\_THREAD\_EXCEPTION\_NOT\_HANDLED}.

Workaround

Use one of the following workarounds:

- Do a force shutdown of the VM and restart it.
- Install the NVIDIA driver in guest VMs before installing Citrix Virtual Apps and Desksops.

Status

Open

Ref. #

NVIDIA-295/200018125

6.30. Application frame rate may drop when running Citrix Virtual Apps and Desktops at 2560\times1600 resolution.

Description

An application’s rendering frame rate may drop when running Citrix Virtual Apps and Desktops at 2560\times1600 resolution, relative to the frame rate obtained at lower resolutions.

Fix

Using the Windows \texttt{regedit} utility within the VM, open the HKLM\SOFTWARE \texttt{\Citrix\Graphics} registry key and create a new DWORD value, \texttt{EncodeSpeed}, with a value of 2. Reboot the VM. This setting may improve the delivered frame rate at the expense of a reduction in image quality.

Status

Open

Ref. #

NVIDIA-190/1416336
6.31. Windows VM BSOD

**Description**

Windows VM bugchecks on Citrix Hypervisor when running a large number of vGPU based VMs.

The Citrix Hypervisor /var/log/messages file contains these error messages:

```
NVRM: Xid (PCI:0000:08:00): 31, Ch 00000001e, engmask 00000111, intr 10000000
NVRM: Xid (PCI:0000:08:00): 31, Ch 000000016, engmask 00000111, intr 10000000 ...
vmiop_log: error: Assertion Failed at 0xb5b898d8:4184
vmiop_log: error: 8 frames returned by backtrace
vmiop_log: error: /usr/lib/libnvidia-vgx.so(_nv000793vgx+0x69d) [0xb5b8064d]
vmiop_log: error: /usr/lib/libnvidia-vgx.so(_nv000479vgx+0x118) [0xb5b898d8]
vmiop_log: error: /usr/lib/libnvidia-vgx.so(_nv000782vgx+0x59) [0xb5b85f49]
vmiop_log: error: /usr/lib/libnvidia-vgx.so(_nv000347vgx+0x3db) [0xb5b932db]
vmiop_log: error: /usr/lib/libnvidia-vgx.so [0xb5b78e4a]
vmiop_log: error: /usr/lib/xen/bin/vgpu [0x80554be]
vmiop_log: error: /lib/libpthread.so.0 [0xb7612912]
vmiop_log: error: /lib/libc.so.6(clone+0x5e) [0xb76fc5ee]
vmiop_log: error: failed to initialize guest PTE entries
vmiop_log: error: failed to fill up guest PTE entries 3
vmiop_log: error: VGPU message 27 failed, result code: 0xff000003
vmiop_log: error: 0xc1d00001, 0xff010000, 0xcaf00004, 0x0
vmiop_log: error: Timeout occurred, reset initiated.
```

**Version**

Citrix Hypervisor 6.2

**Fix**

Ensure that you are running the latest OEM firmware for your NVIDIA vGPU software boards.

**Status**

Closed

**Ref. #**

NVIDIA-327/1632120
6.32. Windows VM BSOD when upgrading NVIDIA drivers over a Citrix Virtual Apps and Desktops session

Description
Windows VM bugchecks when NVIDIA guest drivers are upgraded over a Citrix Virtual Apps and Desktops session.
If the VM is restarted after the bugcheck, the upgraded driver loads correctly and full functionality is available.

Fix
Upgrade Citrix Virtual Apps and Desktops to 7.6 Feature Pack 3

Status
Closed

Ref. #
NVIDIA-370/200130780

6.33. XenCenter does not allow vGPUs to be selected as a GPU type for Linux VMs

Description
When creating a new Linux VM or editing the properties of an existing Linux VM, XenCenter does not allow vGPUs to be selected as a GPU type.
vGPU on Linux VMs is supported as a technical preview on Citrix Hypervisor 6.5, and does include XenCenter integration.

Version
Affects the XenCenter integration with Citrix Hypervisor 6.5 only.
Resolved in the XenCenter integration with Citrix Hypervisor 7.0.
**Workaround**

Refer to XenServer vGPU Management in *Virtual GPU Software User Guide* for how to configure vGPU by using the `xe` CLI.

**Status**

Closed

**Ref. #**

NVIDIA-360

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6.34. If X server is killed on a RHEL7 VM running vGPU, XenCenter console may not automatically switch to text console

**Description**

If X server is killed on a RHEL7 VM running vGPU, XenCenter console may display a corrupted image and fail to switchover to text console.

The failure to switchover to text console is due to a bug in RHEL7, which causes X server to not start correctly under certain configurations.

**Workaround**

Use `CTRL+ALT+F1, F2`, or `F3` to switch between Linux terminals.

**Status**

Closed

**Ref. #**

NVIDIA-350/200123378
6.35. Citrix Virtual Apps and Desktops shows only a black screen when connected to a vGPU VM

Description
Citrix Virtual Apps and Desktops sometimes displays only a black screen when it is connected to an NVIDIA vGPU VM. The probable cause is that the display that is connected to the NVIDIA vGPU is entering a lower power state.

Fix
Disable all display-related power management settings.
For detailed instructions, visit Microsoft power plans frequently asked questions and from the list, select your OS version.

Status
Not an NVIDIA bug

Ref. #
1719877
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