



VIRTUAL GPU SOFTWARE

QSG-07847-001 _v10.0 through 10.1 | February 2020

Quick Start Guide



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ABOUT THIS GUIDE

Virtual GPU Software Quick Start Guide provides minimal instructions for installing and configuring NVIDIA® virtual GPU software on the Citrix Hypervisor or VMware vSphere hypervisor and for installing and configuring a single-instance NVIDIA virtual GPU License Server on Windows. If you need complete instructions, are using other platforms, or require high availability for the license server, refer to *Virtual GPU Software User Guide* and *Virtual GPU License Server User Guide*.

Chapter 1.

GETTING YOUR NVIDIA vGPU SOFTWARE

After your order for NVIDIA vGPU software is processed, you will receive an order confirmation message from NVIDIA. This message contains information that you need for getting your NVIDIA vGPU software from the NVIDIA Licensing Portal. To log in to the NVIDIA Licensing Portal, you must have an NVIDIA Enterprise Account.

1.1. Before You Begin

Before following the procedures in this guide, ensure that the following prerequisites are met:

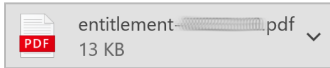
- ▶ You have a server platform that is capable of hosting your chosen hypervisor and NVIDIA GPUs that support NVIDIA vGPU software. For a list of validated server platforms, refer to [NVIDIA GRID Certified Servers](#).
- ▶ One or more NVIDIA GPUs that support NVIDIA vGPU software is installed in your server platform.
- ▶ A supported virtualization software stack is installed according to the instructions in the software vendor's documentation.
- ▶ A virtual machine (VM) running a supported Windows guest operating system (OS) is configured in your chosen hypervisor.

For information about supported hardware and software, and any known issues for this release of NVIDIA vGPU software, refer to the *Release Notes* for your chosen hypervisor:

- ▶ [Virtual GPU Software for Citrix Hypervisor Release Notes](#)
- ▶ [Virtual GPU Software for VMware vSphere Release Notes](#)

1.2. Your Order Confirmation Message

After your order for NVIDIA vGPU software is processed, you will receive an order confirmation message to which your NVIDIA Entitlement Certificate is attached.



Thank you for your software and/or services order!

Please find enclosed your Entitlement Certificate for the Software and/or Services products you ordered.

Please refer to the attached Entitlement Certificate to register for your software and services.

The following is your order information:

PO Number	NVIDIA Sales Order	NVIDIA Delivery Number

Questions?

NVIDIA Enterprise Support contact information can be found here <https://www.NVIDIA.com/en-us/support/enterprise/>

Your NVIDIA Entitlement Certificate contains your product activation keys.



NVIDIA Corporation
2788 San Tomas Expressway
SANTA CLARA CA 95051
USA

NVIDIA® Entitlement Certificate

This certificate serves as evidence that NVIDIA has entitled you for the following product(s).

End Customer ()

NVIDIA Delivery	
Entitlement Date	11 APR 2019
PO Number	
NVIDIA Sales Order	

No	Entitlement Description	Quantity	Sales Type	Term	Start Date	End Date
1	Quadro vDWS Bundle - Subscription, CCU	48 EA	Initial	1 Year	11 APR 2019	10 APR 2020
	Quadro vDWS Subscription, CCU	48 EA	Initial	1 Year	11 APR 2019	10 APR 2020
	GRID vApps Subscription, CCU					
	PAK ID					

Please follow the instructions provided in the following section to register your entitlements.

Thank you for your order!

Your NVIDIA Entitlement Certificate also provides instructions for using the certificate.

NOTICE

HOW TO USE THIS CERTIFICATE

Registration Instructions

Please refer to the [NVIDIA Virtual GPU Software Quick Start Guide](#) for information on how to get started, including instructions on how to register for your entitlement.

Sales Type: Initial

1. Already have vGPU entitlements? Please [Login](#)
2. New to vGPU entitlements? Please [register](#) and follow instructions on the registration page.

Questions?

NVIDIA Enterprise Support contact information can be found [here](#)

Rights and restrictions on the use, transfer and copying of the Software are set forth in NVIDIA's End User License Agreement.

To get your NVIDIA vGPU software, you must have an NVIDIA Enterprise Account.



For a Support, Upgrade, and Maintenance Subscription (SUMS) renewal, you should already have an NVIDIA Enterprise Account and this requirement should already be met.

- ▶ If you do not have an account, follow the **Register** link in the instructions for using the certificate to create your account. For details, see [Creating your NVIDIA Enterprise Account](#).
- ▶ If you already have an account, follow the **Login** link in the instructions for using the certificate to log in to the [NVIDIA Enterprise Application Hub](#), go to the NVIDIA Licensing Portal, and download your NVIDIA vGPU software. For details, see [Downloading your NVIDIA vGPU Software](#).

1.3. Creating your NVIDIA Enterprise Account

If you do not have an NVIDIA Enterprise Account, you must create an account to be able to log in to the NVIDIA Licensing Portal.

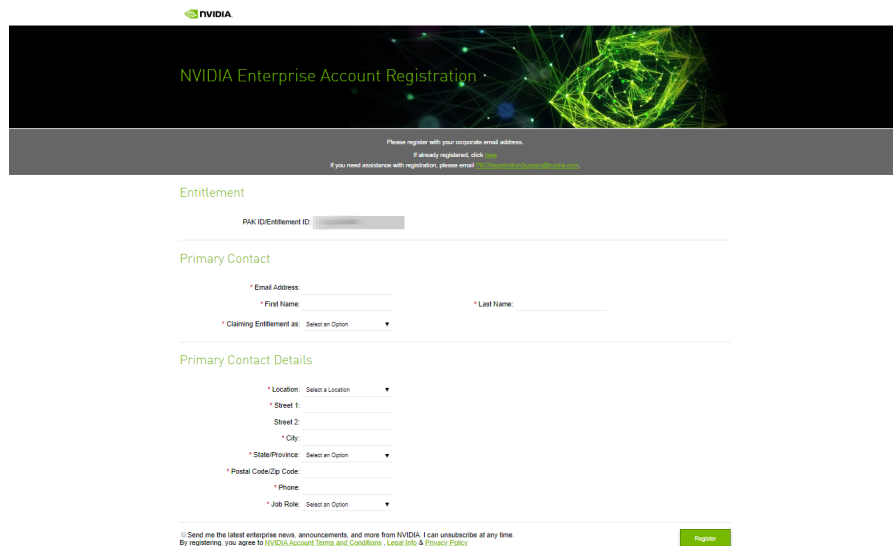


If you already have an account, skip this task and go to [Downloading your NVIDIA vGPU Software](#).

Before you begin, ensure that you have your order confirmation message.

1. In the instructions for using your NVIDIA Entitlement Certificate, follow the **Register** link.

2. Fill out the form on the **NVIDIA Enterprise Account Registration** page and click **Register**.



NVIDIA

NVIDIA Enterprise Account Registration

Please register with your corporate email address.
 If already registered, click [here](#).
 If you need assistance with registration, please email enterprise@nvidia.com.

Entitlement

PAK ID/Entitlement ID:

Primary Contact

* Email Address:

* First Name:

* Last Name:

* Claiming Entitlement as:

Primary Contact Details

* Location:

* Street 1:

Street 2:

* City:

* State/Province:

* Postal Code/Zip Code:

* Phone:

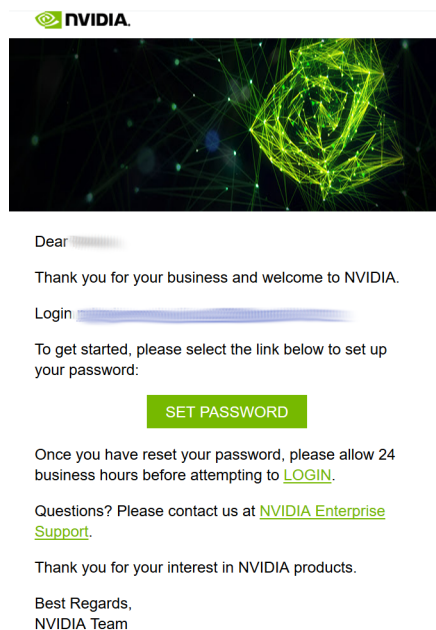
* Job Role:

Send me the latest enterprise news, announcements, and more from NVIDIA. I can unsubscribe at any time. By registering, you agree to [NVIDIA's Account Terms and Conditions](#), [Legal Info](#), & [Privacy Policy](#).

Register

A message confirming that an account has been created appears and an e-mail instructing you to set your NVIDIA password is sent to the e-mail address you provided.

3. Open the e-mail instructing you to set your password and click **SET PASSWORD**.





After you have set your password during the initial registration process, you will be able to log in to your account within 15 minutes. However, it may take up to 24 business hours for your entitlement to appear in your account.

For your account security, the **SET PASSWORD** link in this e-mail is set to expire in 24 hours.

4. Enter and re-enter your new password, and click **SUBMIT**.

SET NEW PASSWORD

New password: ●●●●●●●●

Re-type password: ●●●●●●●●

- Between 9 and 54 characters (inclusive)
- At least one lowercase letter
- At least one uppercase letter
- At least one number
- At least one special character[]
- Password Match

[SUBMIT](#)

[Terms & Conditions](#) | [Legal Info](#) | [Privacy Policy](#)
Copyright © 2019 NVIDIA Corporation

A message confirming that your password has been set successfully appears.



Password

SUCCESS

Your password has been updated. [LOGIN](#)

[Terms & Conditions](#) | [Legal Info](#) | [Privacy Policy](#)
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You are then automatically directed to log in to the NVIDIA Licensing Portal with your new password.

1.4. Downloading your NVIDIA vGPU Software

Before you begin, ensure that you have your order confirmation message and have created an NVIDIA Enterprise Account.

1. Visit the [NVIDIA Enterprise Application Hub](#) by following the **Login** link in the instructions for using your NVIDIA Entitlement Certificate or when prompted after setting the password for your NVIDIA Enterprise Account.
2. When prompted, provide your e-mail address and password, and click **LOGIN**.

3. On the **NVIDIA APPLICATION HUB** page that opens, click **NVIDIA LICENSING PORTAL**.

The NVIDIA Licensing Portal dashboard page opens.



Your entitlement might not appear on the NVIDIA Licensing Portal dashboard page until 24 business hours after you set your password during the initial registration process.

- In the NVIDIA Licensing Portal dashboard page opens, click the down arrow next to each entitlement listed to view details of the NVIDIA vGPU software that you purchased.

The screenshot shows the NVIDIA Licensing Portal dashboard. The left navigation pane includes: DASHBOARD, ENTITLEMENTS, LICENSE SERVERS, SOFTWARE DOWNLOADS, USER MANAGEMENT, and ENTERPRISE SUPPORT. The main content area is divided into two sections: Entitlements and License Servers.

Entitlements Section:

ENTITLEMENT / FEATURE	EXPIRATION	ALLOCATED / TOTAL
GRID-Virtual-...	never expires	0 / 2400
GRID-Virtual-...	never expires	0 / 2400
SUMS	2022-10-25	2400 / 2
Quadro-Virtu...	never expires	0 / 9332
GRID-Virtual-...	never expires	0 / 9332
SUMS	2022-10-25	9332 / 5
Quadro-Virtu...	2022-08-20	0 / 3
GRID-Virtual-...	2022-08-20	0 / 3
GRID-Virtu...	never expires	0 / 30
GRID-Virtu...	never expires	0 / 30
SUMS	2022-01-04	30 / 30

License Servers Section:

You do not have any license servers. Would you like to create one?
[CREATE LICENSE SERVER](#)

- In the left navigation pane of the NVIDIA Licensing Portal dashboard, click **SOFTWARE DOWNLOADS**.
- On the **Product Download** page that opens, follow the **Download** link for the brand and version of your chosen hypervisor for the release of NVIDIA vGPU software that you are using, for example, NVIDIA vGPU for vSphere 6.7 for NVIDIA vGPU software release 10.1.

The screenshot shows the NVIDIA Licensing Portal Software Downloads page. The left navigation pane includes: DASHBOARD, ENTITLEMENTS, LICENSE SERVERS, SOFTWARE DOWNLOADS, USER MANAGEMENT, and ENTERPRISE SUPPORT. The main content area displays a table of software downloads.

Software Downloads Table:

PLATFORM	PLATFORM VERSION	vGPU VERSION	DESCRIPTION	RELEASE DATE	ACTIONS
VMware vSphere	6.5	9.0	NVIDIA vGPU for vSphere...	2019-06-21	Download
Citrix XenServer	7.0	8.0	NVIDIA vGPU for XenServ...	2019-04-16	Download
Red Hat Enterprise Linux ...	7.4	6.4	NVIDIA vGPU for RHEL KV...	2019-02-22	Download

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For information about the software lifecycle for NVIDIA virtual GPU Software visit: <https://docs.nvidia.com/grid/news/index.html>
 NVIDIA vGPU Documentation is available at: <https://docs.nvidia.com/grid/>

If you don't see the brand and version of your chosen hypervisor for the release of NVIDIA vGPU software that you are using, click **ALL AVAILABLE** to see a list of all NVIDIA vGPU software available for download. Use the drop-down lists or the search box to filter the software listed.

7. When prompted to accept the license for the software that you are downloading, click **AGREE & DOWNLOAD**.
8. When the browser asks what it should do with the file, select the option to save the file.

When the download is complete, the **Download Complete** pop-up window remains open for you to download any additional software that you might need for your NVIDIA vGPU software deployment.



9. In the **Download Complete** pop-up window, follow the links to download any additional software that you need for your NVIDIA vGPU software deployment.
 - a) Follow the link to the NVIDIA vGPU software license server software for your license server host machine's operating system, for example, **License Manager for Windows**.
 - b) If you are using an NVIDIA Tesla™ M60 or M6 GPU and think you might need to change its mode, follow the **Mode Change Utility** link.

For details about when you need to change the mode, see [Switching the Mode of a Tesla M60 or M6 GPU](#).

Chapter 2.

INSTALLING YOUR NVIDIA vGPU SOFTWARE LICENSE SERVER AND LICENSE FILES

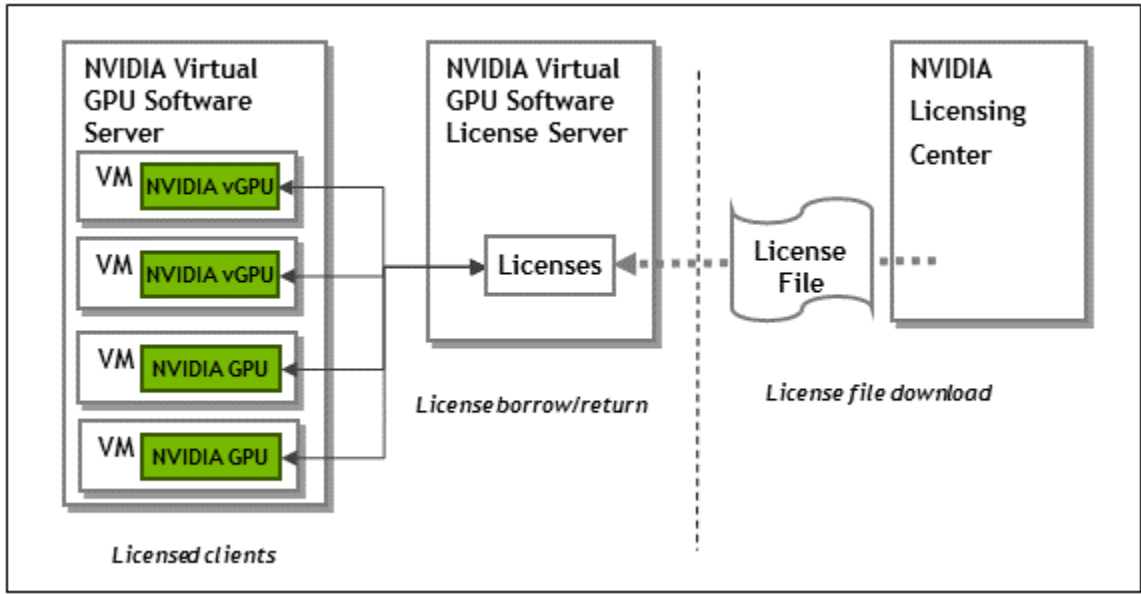
The NVIDIA vGPU software License Server is used to serve a pool of floating licenses to NVIDIA vGPU software licensed products. The license server is designed to be installed at a location that is accessible from a customer's network, and be configured with licenses obtained from the NVIDIA Licensing Portal.



These instructions cover only the installation and configuration of a single-instance license server. If you require high availability for the license server, refer to *Virtual GPU License Server User Guide* for instructions for how to configure a primary and secondary license server. If you do not register a secondary server when the primary server is registered, you **cannot** register the secondary server later.

2.1. Overview of NVIDIA vGPU software Licensing

NVIDIA vGPU software is a licensed product. Licensed vGPU functionalities are activated during guest OS boot by the acquisition of a software license served over the network from an NVIDIA vGPU software license server. The license is returned to the license server when the guest OS shuts down.



The licenses served by the NVIDIA vGPU software license server are obtained from the NVIDIA Licensing Portal as downloadable license files, and installed into the license server through its management interface.

2.2. Platform Configuration Requirements

- ▶ The platform must have a fixed (unchanging) IP address. The IP address may be assigned dynamically by DHCP or statically configured, but must be constant.
- ▶ The platform must have at least one unchanging Ethernet MAC address, to be used as a unique identifier when registering the server and generating licenses in the NVIDIA Licensing Portal.
- ▶ The platform's date and time must be set accurately. NTP is recommended.

2.3. Installing the Java Runtime Environment

If a suitable Java runtime environment (JRE) version is not already installed on your system, install a supported JRE before running the NVIDIA license server installer.

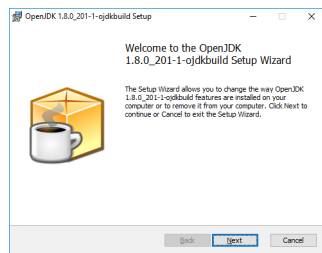
Install a JRE for the same the processor architecture as the license server that you will install: If you will install a 32-bit license server, install a 32-bit JRE; if you will install a 64-bit license server, install a 64-bit JRE.

1. Download a supported Oracle Java SE JRE or OpenJDK JRE.
 - ▶ Download Oracle Java SE JRE from the [java.com: Java + You](https://www.java.com/en/faq/java+you/) page.
 - ▶ Download OpenJDK JRE from the [Community builds using source code from OpenJDK project](https://openjdk.org/projects/communities/build/) on GitHub.
2. Install the JRE that you downloaded.

- ▶ Oracle Java SE JRE installation:



- ▶ OpenJDK JRE installation:



3. Set the JAVA_HOME system variable to the full path to the jre folder of your JRE installation.

For example:

- ▶ For 64-bit Oracle Java SE JRE: C:\Program Files\Java\jre1.8.0_191
- ▶ For 32-bit Oracle Java SE JRE: C:\Program Files (x86)\Java\jre1.8.0_191
- ▶ For 64-bit OpenJDK JRE: C:\Program Files\ojdkbuild\java-1.8.0-openjdk-1.8.0.201-1\jre

- ▶ For 32-bit OpenJDK JRE: `C:\Program Files (x86)\ojdkbuild\java-1.8.0-openjdk-1.8.0.201-1\jre`

Ensure that the path does **not** include any trailing characters, such as a slash or a space.

If you are upgrading to a new version of the JRE, update the value of the `JAVA_HOME` system variable to the full path to the `jre` folder of your **new** JRE version.

4. Ensure that the `Path` system variable contains the path to the `java.exe` executable file.

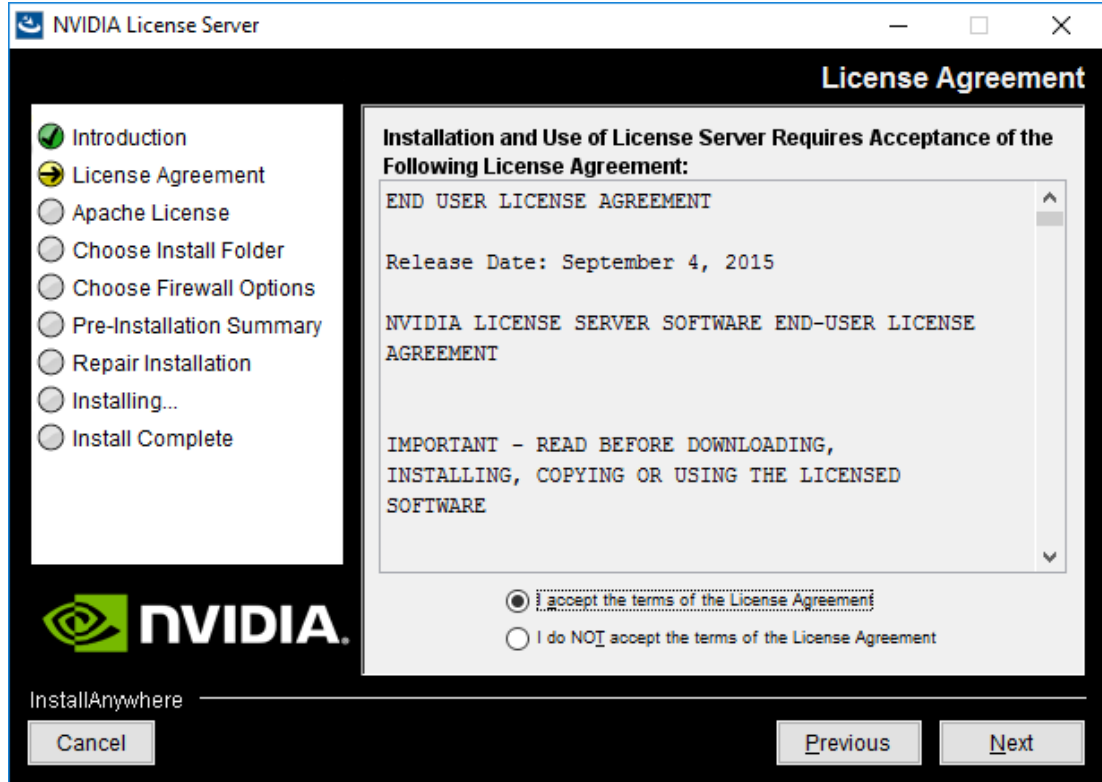
The installer may have already added this path for you.

For example:

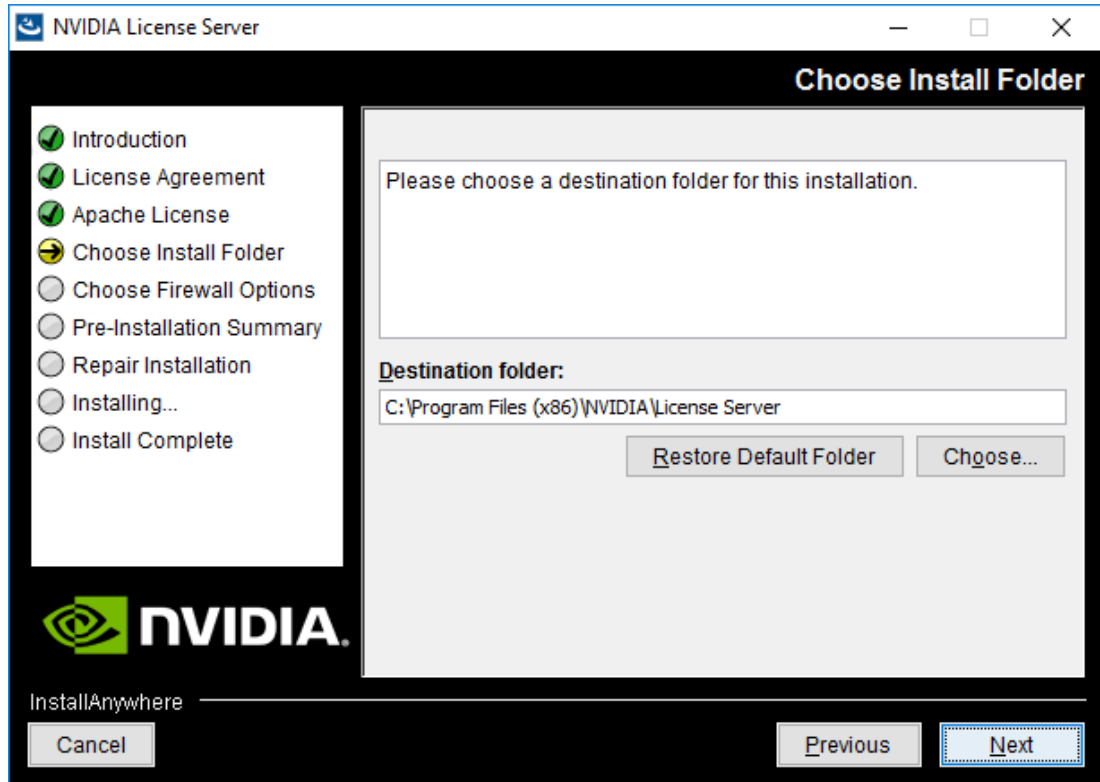
- ▶ For 64-bit Oracle Java SE JRE: `C:\Program Files\Java\jre1.8.0_191\bin`
- ▶ For 32-bit Oracle Java SE JRE: `C:\Program Files (x86)\Java\jre1.8.0_191\bin`
- ▶ For 64-bit OpenJDK JRE: `C:\Program Files\ojdkbuild\java-1.8.0-openjdk-1.8.0.201-1\bin`
- ▶ For 32-bit OpenJDK JRE: `C:\Program Files (x86)\ojdkbuild\java-1.8.0-openjdk-1.8.0.201-1\bin`

2.4. Installing the License Server Software

1. Unzip the license server installer and run `setup.exe`.
2. Accept the EULA for the license server software and the Apache Tomcat software used to support the license server's management interface.



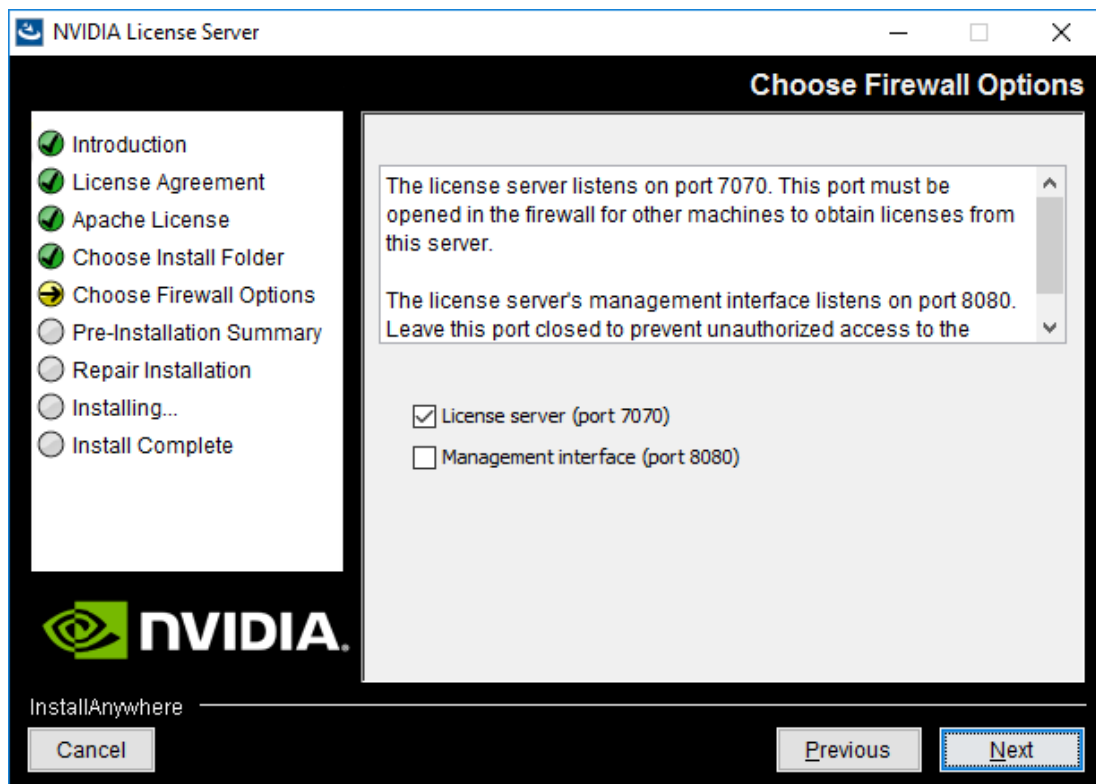
3. Choose the destination folder where you want the license server software to be installed.



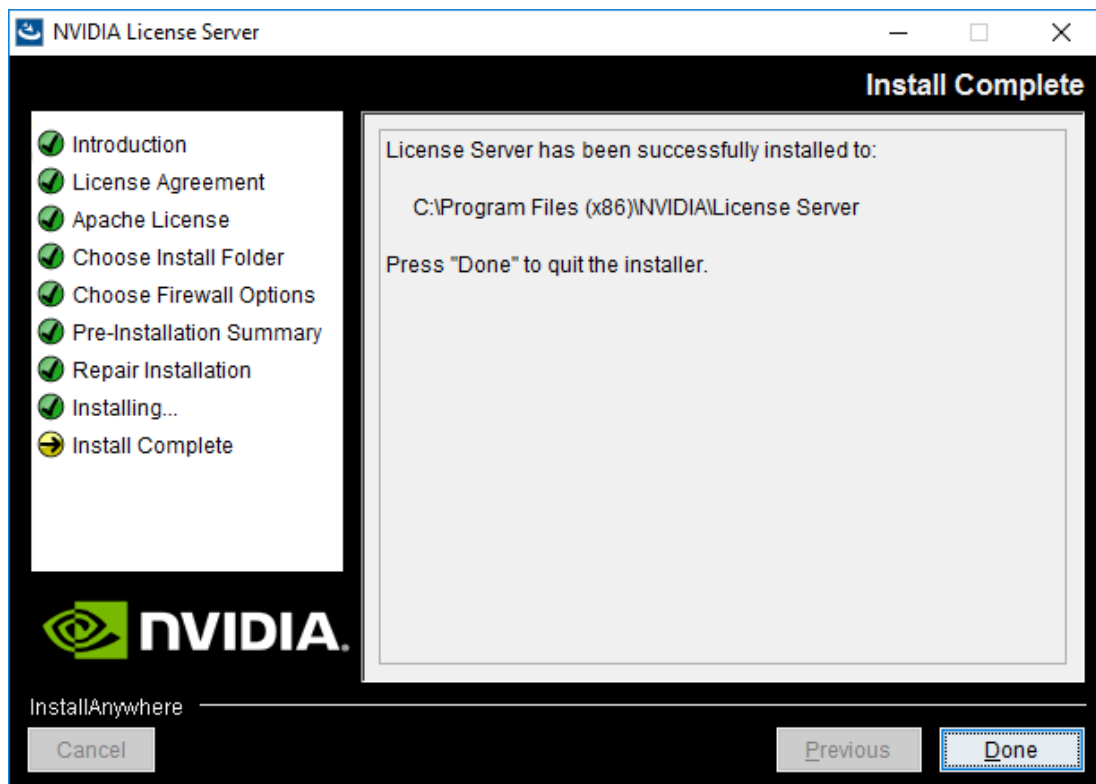
4. In the **Choose Firewall Options** dialog box, select the ports to be opened in the firewall.

To enable remote clients to access licenses from the server and prevent remote access to the management interface, use the default setting, which sets ports as follows:

- ▶ Port 7070 is open to enable remote clients to access licenses from the server.
- ▶ Port 8080 is closed to ensure that the management interface is available only through a web browser running locally on the license server host.



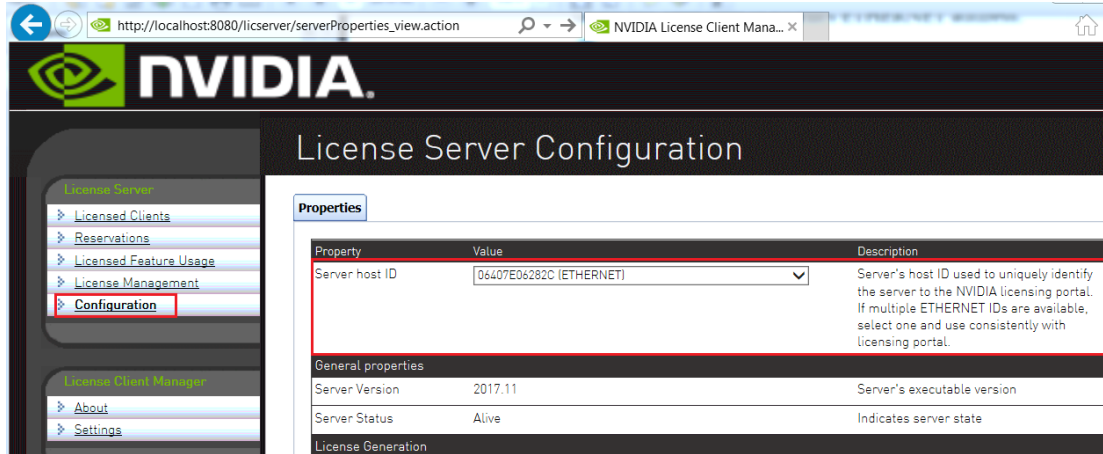
5. After installation has completed successfully, click **Done** to exit the installer.



2.5. Obtaining the License Server's MAC Address

The license server's Ethernet MAC address uniquely identifies your server to the NVIDIA Licensing Portal. You will need this address to register your license server with the NVIDIA Licensing Portal to generate license files.

1. Open a web browser on the license server host and connect to the URL `http://localhost:8080/licserver`.
2. In the license server management interface, select **Configuration**.
3. On the **License Server Configuration** page that opens, in the **Server host ID** drop-down list, select the platform's ETHERNET address.



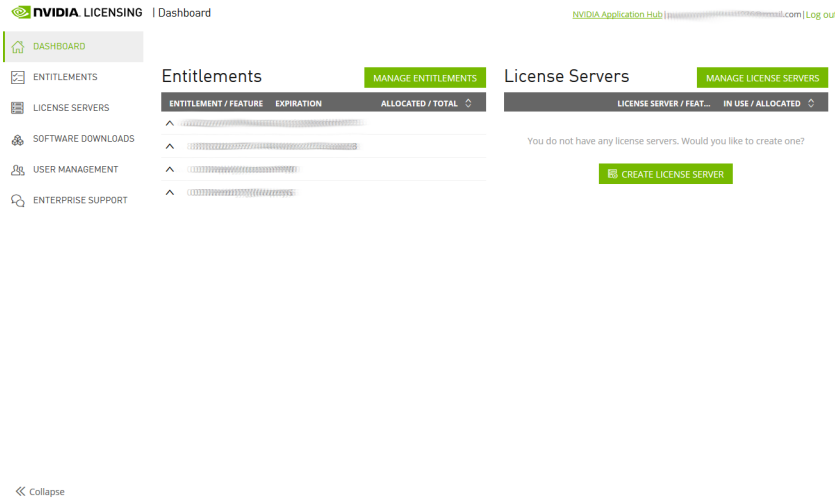
2.6. Managing your License Servers and Getting your License Files

To be able to download NVIDIA vGPU software licenses, you must create at least one license server on the NVIDIA Licensing Portal and allocate licenses to the server. After creating a license server and allocating licenses to it, you can download your license file.

2.6.1. Creating a License Server on the NVIDIA Licensing Portal

To be able to download NVIDIA vGPU software licenses, you must create at least one license server on the NVIDIA Licensing Portal. Creating a license server on the NVIDIA Licensing Portal registers your license server host with the NVIDIA Licensing Portal through the MAC address of the host.

1. If you are not already logged in, log in to the [NVIDIA Enterprise Application Hub](#) and click **NVIDIA LICENSING PORTAL** to go to the NVIDIA Licensing Portal. If no license servers have been created for your account, the NVIDIA Licensing Portal dashboard displays a message asking if you want to create a license server.



2. On the NVIDIA Licensing Portal dashboard, click **CREATE LICENSE SERVER**.
The **Create License Server** pop-up window opens.

3. Provide the details of your license server.
 - a) In the **Server Name** field, enter the host name of the license server.
 - b) Optional: In the **Description** field, enter a text description of the license server.
This description will be displayed on the details page for the license server that you are creating.
 - c) In the **MAC Address** field, enter the MAC address of your license server.
4. Add the licenses that you want to allocate to this license server.
 - a) From the **Product** drop-down list, select the product for which you want to add licenses.
 - b) In the **Licenses** field, enter the number of licenses for the product that you want to add.
 - c) To add licenses for an additional product, click the plus (+) icon next to the **Licenses** field and use the **Product** and **Licenses** fields that are added to the window to select the product and enter the number of licenses.

5. Leave the **Secondary License Server** and **Secondary MAC Address** fields unset.
6. Click **Create**.

2.6.2. Downloading a License File

Each license server that you create has license file associated with it. The license file contains all the licenses that you allocated to the license server. After downloading the license file, you can install it on the license server host associated with the license server on the NVIDIA Licensing Portal.

1. If you are not already logged in, log in to the [NVIDIA Enterprise Application Hub](#) and click **NVIDIA LICENSING PORTAL** to go to the NVIDIA Licensing Portal.
2. In the list of license servers on the NVIDIA Licensing Portal dashboard, select the license server whose associated license file you want to download.
3. In the details page for the license server that opens, review the licenses allocated to the license server.

The screenshot shows the NVIDIA Licensing Portal interface. The top navigation bar includes 'NVIDIA LICENSING' and a user profile with a 'Log out' link. A sidebar on the left contains navigation options: DASHBOARD, ENTITLEMENTS, LICENSE SERVERS, SOFTWARE DOWNLOADS, USER MANAGEMENT, and ENTERPRISE SUPPORT. The main content area displays details for a license server named 'pdl2primary'. At the top of this section are five action buttons: 'DOWNLOAD LICENSE FILE', 'MANAGE LICENSES', 'REMOVE FEATURES', 'ADD FEATURES', and 'DELETE SERVER'. Below these buttons is a table with the following columns: Server Type (FLEXERA), MAC Address (00:00:00:5E:00:55), Failover Server (pdl2secondary), and Failover MAC Address (00:00:00:5E:00:56). A 'Created' field shows '09/27/19 11:19 pm (UTC)' and a 'Last Modified' field shows '09/27/19 11:19 pm (UTC)'. A 'Description' field contains the text 'My second license server'. Below this is a section titled 'Product Licenses' which contains two tables. The first table is for 'GRID-Virtual-PC 2.0' and the second is for 'GRID-Virtual-Apps 3.0'. Both tables have columns for 'Entitlement ID' and 'Expiration Date'. The 'Expiration Date' for both is 'never expires'. A 'Collapse' link is visible at the bottom left of the interface.

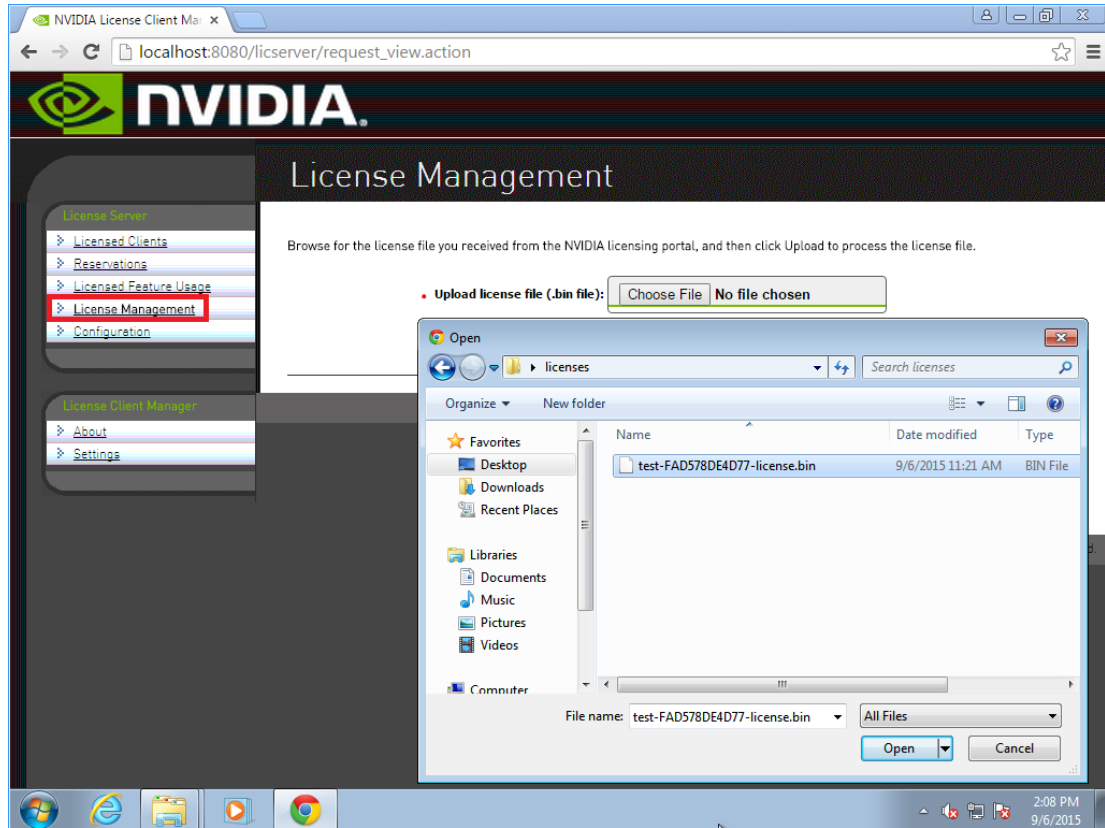
4. Click **DOWNLOAD LICENSE FILE** and save the `.bin` license file to your license server for installation.

2.7. Installing a License

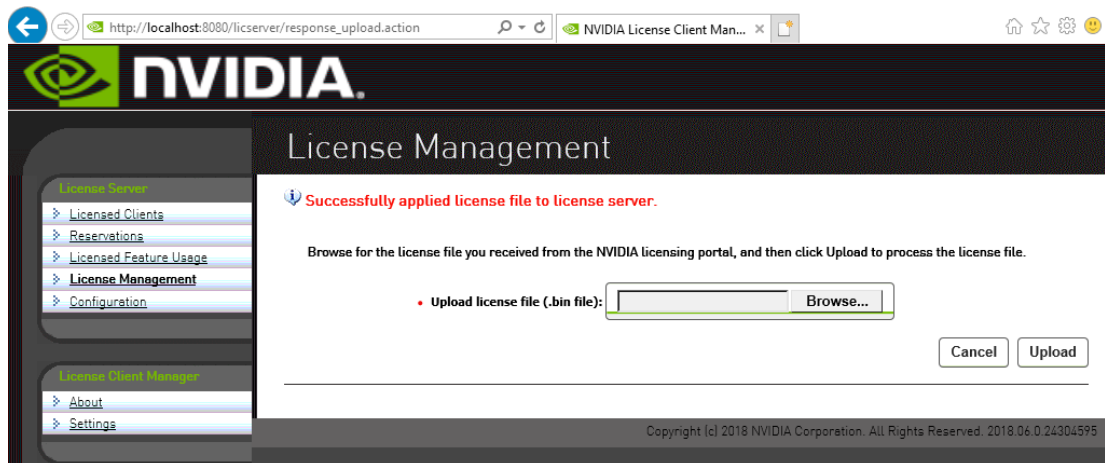
NVIDIA vGPU software licenses are distributed as `.bin` files for download from the NVIDIA Licensing Portal.

Before installing a license, ensure that you have downloaded the license file from the NVIDIA Licensing Portal.

1. In the license server management interface, select **License Management**.
2. On the **License Management** page that opens, click **Choose File**.



3. In the file browser that opens, select the .bin file and click **Open**.
 4. Back on the **License Management** page, click **Upload** to install the license file on the license server.
- The license server should confirm successful installation of the license file.



Chapter 3.

INSTALLING AND CONFIGURING NVIDIA VGPU MANAGER AND THE GUEST DRIVER

Before installing and configuring NVIDIA vGPU Manager and the Guest Driver, ensure that a VM running a supported Windows guest OS is configured in your chosen hypervisor.

The factory settings of some supported GPU boards are incompatible with NVIDIA vGPU software. Before configuring NVIDIA vGPU software on these GPU boards, you must configure the boards to change these settings.

3.1. Switching the Mode of a Tesla M60 or M6 GPU

Tesla M60 and M6 GPUs support compute mode and graphics mode. NVIDIA vGPU requires GPUs that support both modes to operate in graphics mode.



Only Tesla M60 and M6 GPUs require and support mode switching. Other GPUs that support NVIDIA vGPU do not require or support mode switching.

Even in compute mode, Tesla M60 and M6 GPUs do **not** support NVIDIA vComputeServer vGPU types.

Recent Tesla M60 GPUs and M6 GPUs are supplied in graphics mode. However, your GPU might be in compute mode if it is an older Tesla M60 GPU or M6 GPU, or if its mode has previously been changed.

If your GPU supports both modes but is in compute mode, you must use the `gpumodeswitch` tool to change the mode of the GPU to graphics mode. If you are unsure which mode your GPU is in, use the `gpumodeswitch` tool to find out the mode.

For more information, see [gpumodeswitch User Guide](#).

3.2. Installing the NVIDIA Virtual GPU Manager

Before guests enabled for NVIDIA vGPU can be configured, the NVIDIA Virtual GPU Manager must be installed in your chosen hypervisor. The process for installing the NVIDIA Virtual GPU Manager depends on the hypervisor that you are using.

If you need more detailed instructions, refer to the appropriate NVIDIA vGPU installation guide.

3.2.1. Installing the NVIDIA Virtual GPU Manager on VMware vSphere

The NVIDIA Virtual GPU Manager for VMware vSphere ESXi is distributed as a vSphere Installation Bundle (VIB) file.

1. Copy the NVIDIA Virtual GPU Manager VIB file to the ESXi host.
2. Put the ESXi host into maintenance mode.

```
$ esxcli system maintenanceMode set --enable true
```

3. Run the `esxcli` command to install the NVIDIA Virtual GPU Manager from the VIB file.

```
$ esxcli software vib install -v directory/NVIDIA**.vib
```

directory is the path to the directory that contains the VIB file.

4. Exit maintenance mode.

```
$ esxcli system maintenanceMode set --enable false
```

5. Reboot the ESXi host.

```
$ reboot
```

6. Verify that the NVIDIA kernel driver can successfully communicate with the physical GPUs in your system by running the `nvidia-smi` command without any options.

```
$ nvidia-smi
```

If successful, the `nvidia-smi` command lists all the GPUs in your system.

3.2.2. Installing the NVIDIA Virtual GPU Manager on Citrix Hypervisor

The NVIDIA Virtual GPU Manager for Citrix Hypervisor is distributed as an RPM Package Manager (RPM) file. It runs in the Citrix Hypervisor Control Domain (dom0) shell.

1. Copy the NVIDIA Virtual GPU Manager RPM file to the Citrix Hypervisor dom0 shell.

2. Run the `rpm` command to install the package.

```
[root@xenserver ~]# rpm -iv NVIDIA-*.rpm
```

3. Reboot the Citrix Hypervisor platform.

```
[root@xenserver ~]# shutdown -r now
```

4. After the Citrix Hypervisor host has rebooted, verify the installation of the NVIDIA Virtual GPU Manager package for Citrix Hypervisor by checking for the NVIDIA kernel driver in the list of kernel-loaded modules.

```
[root@xenserver ~]# lsmod |grep nvidia
nvidia 8152994 0
i2c_core 20294 2 nvidia,i2c_
```

3.3. Disabling and Enabling ECC Memory

Some GPUs that support NVIDIA vGPU software support error correcting code (ECC) memory with NVIDIA vGPU. ECC memory improves data integrity by detecting and handling double-bit errors. However, not all GPUs, vGPU types, and hypervisor software versions support ECC memory with NVIDIA vGPU.

On GPUs that support ECC memory with NVIDIA vGPU, ECC memory is supported with C-series and Q-series vGPUs, but not with A-series and B-series vGPUs. Although A-series and B-series vGPUs start on physical GPUs on which ECC memory is enabled, enabling ECC with vGPUs that do not support it might incur some costs.

On physical GPUs that do not have HBM2 memory, the amount of frame buffer that is usable by vGPUs is reduced. All types of vGPU are affected, not just vGPUs that support ECC memory.

The effects of enabling ECC memory on a physical GPU are as follows:

- ▶ ECC memory is exposed as a feature on all supported vGPUs on the physical GPU.
- ▶ In VMs that support ECC memory, ECC memory is enabled, with the option to disable ECC in the VM.
- ▶ ECC memory can be enabled or disabled for individual VMs. Enabling or disabling ECC memory in a VM does not affect the amount of frame buffer that is usable by vGPUs.

GPUs based on the Pascal GPU architecture and later GPU architectures support ECC memory with NVIDIA vGPU. These GPUs are supplied with ECC memory enabled.

Tesla M60 and M6 GPUs support ECC memory when used without GPU virtualization, but NVIDIA vGPU does not support ECC memory with these GPUs. In graphics mode, these GPUs are supplied with ECC memory disabled by default.

Some hypervisor software versions do not support ECC memory with NVIDIA vGPU.

If you are using a hypervisor software version or GPU that does not support ECC memory with NVIDIA vGPU and ECC memory is enabled, NVIDIA vGPU fails to start. In this situation, you must ensure that ECC memory is disabled on all GPUs if you are using NVIDIA vGPU.

3.3.1. Disabling ECC Memory

If ECC memory is unsuitable for your workloads but is enabled on your GPUs, disable it. You must also ensure that ECC memory is disabled on all GPUs if you are using NVIDIA vGPU with a hypervisor software version or a GPU that does not support ECC memory with NVIDIA vGPU. If your hypervisor software version or GPU does not support ECC memory and ECC memory is enabled, NVIDIA vGPU fails to start.

Where to perform this task from depends on whether you are changing ECC memory settings for a physical GPU or a vGPU.

- ▶ For a physical GPU, perform this task from the hypervisor host.
- ▶ For a vGPU, perform this task from the VM to which the vGPU is assigned.



ECC memory must be enabled on the physical GPU on which the vGPUs reside.

Before you begin, ensure that NVIDIA Virtual GPU Manager is installed on your hypervisor. If you are changing ECC memory settings for a vGPU, also ensure that the NVIDIA vGPU software graphics driver is installed in the VM to which the vGPU is assigned.

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

```
# nvidia-smi -q
=====NVSMI LOG=====
Timestamp                : Tue Feb 18 18:36:45 2020
Driver Version           : 440.53
Attached GPUs            : 1
GPU 0000:02:00.0
[...]
  Ecc Mode
    Current                : Enabled
    Pending                : Enabled
[...]
```

2. Change the ECC status to off for each GPU for which ECC is enabled.
 - ▶ If you want to change the ECC status to off for all GPUs on your host machine or vGPUs assigned to the VM, run this command:

```
# nvidia-smi -e 0
```

- ▶ If you want to change the ECC status to off for a specific GPU or vGPU, run this command:

```
# nvidia-smi -i id -e 0
```

id is the index of the GPU or vGPU as reported by `nvidia-smi`.

This example disables ECC for the GPU with index 0000:02:00.0.

```
# nvidia-smi -i 0000:02:00.0 -e 0
```

3. Reboot the host or restart the VM.
4. Confirm that ECC is now disabled for the GPU or vGPU.

```
# nvidia-smi -q
=====NVSMI LOG=====
Timestamp                : Tue Feb 18 18:37:53 2020
Driver Version           : 440.53
Attached GPUs            : 1
GPU 0000:02:00.0
[...]

  Ecc Mode
    Current                : Disabled
    Pending                 : Disabled
[...]
```

3.3.2. Enabling ECC Memory

If ECC memory is suitable for your workloads and is supported by your hypervisor software and GPUs, but is disabled on your GPUs or vGPUs, enable it.

Where to perform this task from depends on whether you are changing ECC memory settings for a physical GPU or a vGPU.

- ▶ For a physical GPU, perform this task from the hypervisor host.
- ▶ For a vGPU, perform this task from the VM to which the vGPU is assigned.



ECC memory must be enabled on the physical GPU on which the vGPUs reside.

Before you begin, ensure that NVIDIA Virtual GPU Manager is installed on your hypervisor. If you are changing ECC memory settings for a vGPU, also ensure that the NVIDIA vGPU software graphics driver is installed in the VM to which the vGPU is assigned.

1. Use `nvidia-smi` to list the status of all physical GPUs or vGPUs, and check for ECC noted as disabled.

```
# nvidia-smi -q
=====NVSMI LOG=====
Timestamp                : Tue Feb 18 18:36:45 2020
Driver Version           : 440.53
Attached GPUs            : 1
GPU 0000:02:00.0
[...]
```

```

Ecc Mode
  Current      : Disabled
  Pending     : Disabled

```

[...]

2. Change the ECC status to on for each GPU or vGPU for which ECC is enabled.
 - ▶ If you want to change the ECC status to on for all GPUs on your host machine or vGPUs assigned to the VM, run this command:

```
# nvidia-smi -e 1
```

- ▶ If you want to change the ECC status to on for a specific GPU or vGPU, run this command:

```
# nvidia-smi -i id -e 1
```

id is the index of the GPU or vGPU as reported by `nvidia-smi`.

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

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

3. Reboot the host or restart the VM.
4. Confirm that ECC is now enabled for the GPU or vGPU.

```

# nvidia-smi -q

=====NVSMI LOG=====

Timestamp                : Tue Feb 18 18:37:53 2020
Driver Version           : 440.53

Attached GPUs            : 1
GPU 0000:02:00.0
[...]

Ecc Mode
  Current      : Enabled
  Pending     : Enabled

[...]

```

3.4. Attaching an NVIDIA vGPU Profile to a VM

To attach an NVIDIA vGPU profile to a virtual machine (VM), you must configure the VM hardware. The process for attaching an NVIDIA vGPU profile to a VM depends on the hypervisor that you are using.

3.4.1. Configuring a vSphere VM with NVIDIA vGPU

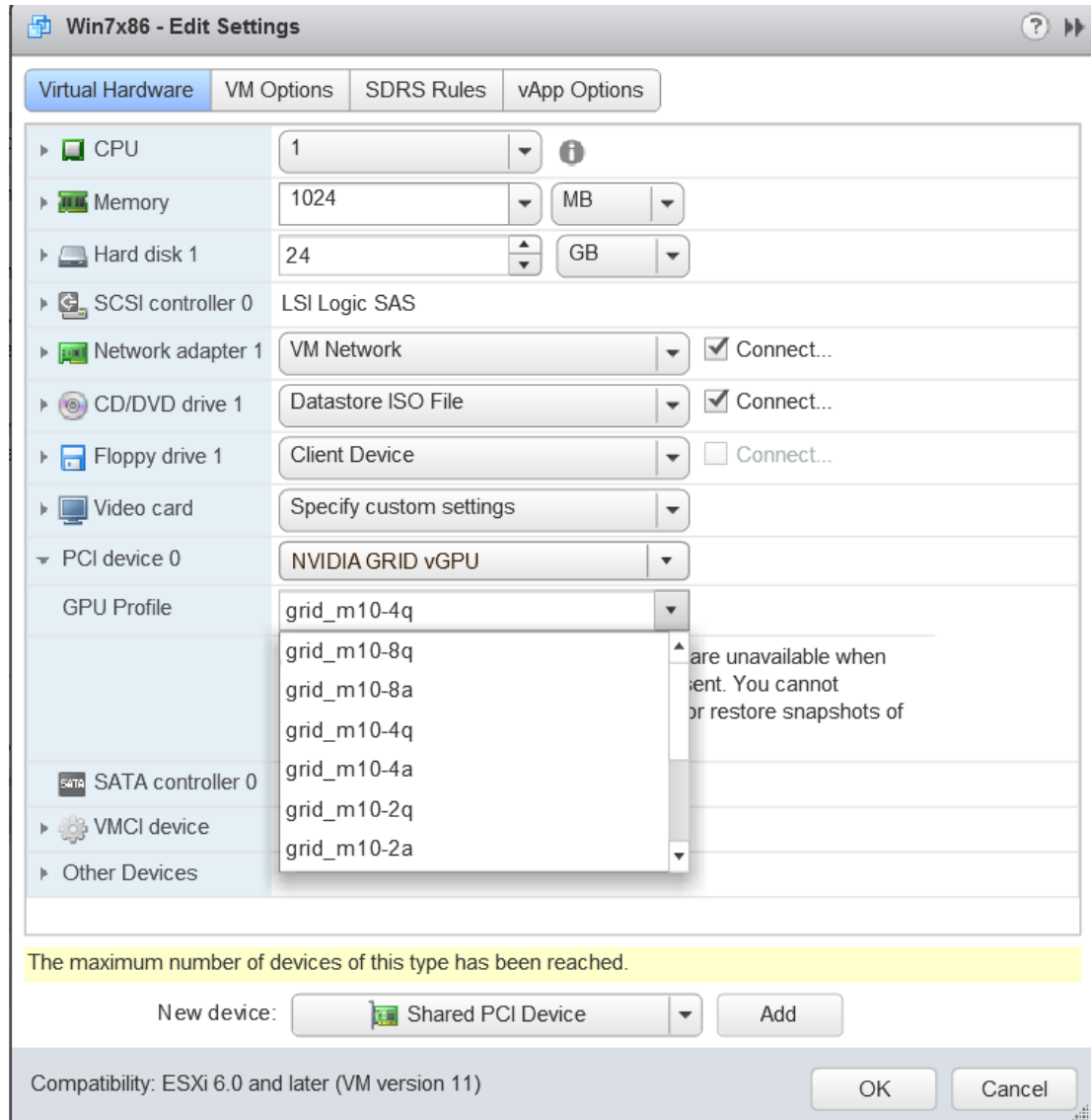


Caution Output from the VM console in the VMware vSphere Web Client is not available for VMs that are running vGPU. Make sure that you have installed an alternate means of accessing the VM (such as VMware Horizon or a VNC server) before you configure vGPU.

VM console in vSphere Web Client will become active again once the vGPU parameters are removed from the VM's configuration.

1. Open the vCenter Web UI.
2. In the vCenter Web UI, right-click the VM and choose **Edit Settings**.
3. Click the **Virtual Hardware** tab.
4. In the **New device** list, select **Shared PCI Device** and click **Add**.

The **PCI device** field should be auto-populated with **NVIDIA GRID vGPU**.



5. From the **GPU Profile** drop-down menu, choose the type of vGPU you want to configure and click **OK**.
6. Ensure that VMs running vGPU have all their memory reserved:
 - a) Select **Edit virtual machine settings** from the vCenter Web UI.

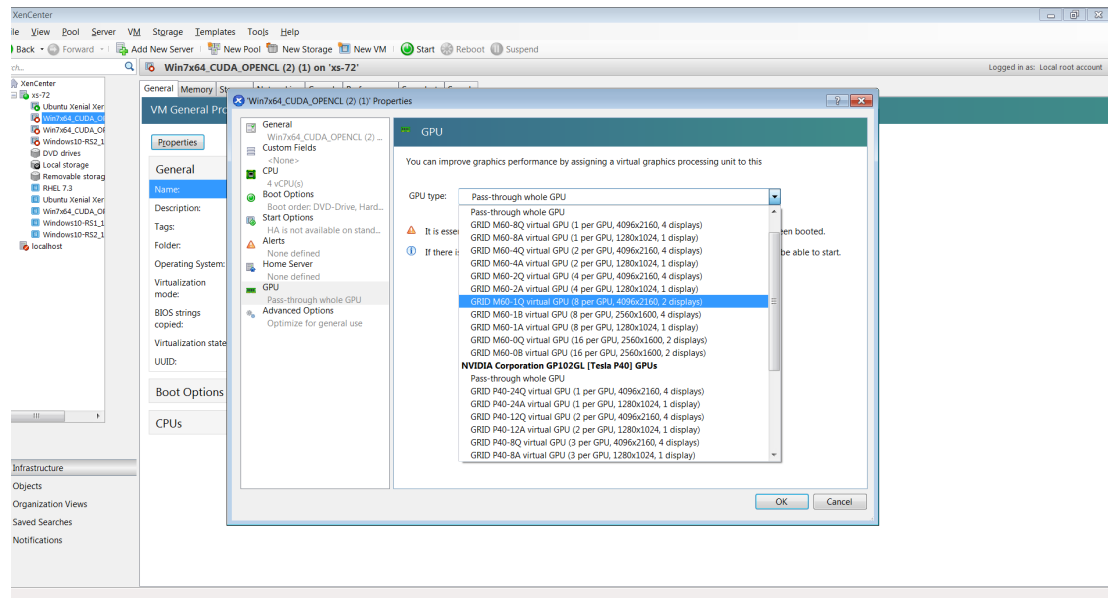
- b) Expand the **Memory** section and click **Reserve all guest memory (All locked)**.

After you have configured a vSphere VM with a vGPU, start the VM. VM console in vSphere Web Client is not supported in this vGPU release. Therefore, use VMware Horizon or VNC to access the VM's desktop.

3.4.2. Configuring a Citrix Hypervisor VM with Virtual GPU

1. Ensure the VM is powered off.
2. Right-click the VM in XenCenter, select **Properties** to open the VM's properties, and select the **GPU** property.

The available GPU types are listed in the GPU type drop-down list:



After you have configured a Citrix Hypervisor VM with a vGPU, start the VM, either from XenCenter or by using `xe vm-start` in a dom0 shell. You can view the VM's console in XenCenter.

3.5. Installing the NVIDIA vGPU Software Graphics Driver

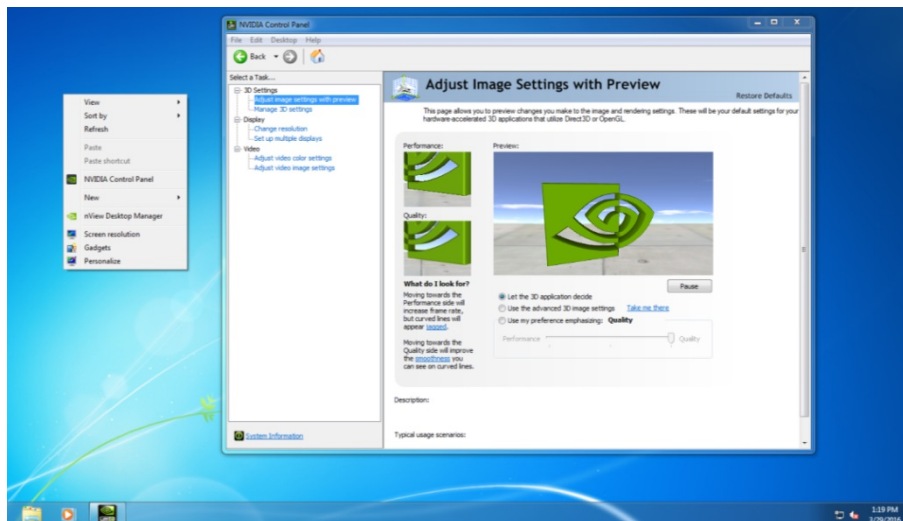
After you create a Windows VM on the hypervisor and boot the VM, the VM should boot to a standard Windows desktop in VGA mode at 800×600 resolution. You can use the Windows screen resolution control panel to increase the resolution to other standard resolutions, but to fully enable GPU operation, the NVIDIA vGPU software graphics driver must be installed.

1. Copy the NVIDIA Windows driver package to the guest VM where you are installing the driver.
2. Execute the package to unpack and run the driver installer.



3. Click through the license agreement.
4. Select **Express Installation** and click **NEXT**.
After the driver installation is complete, the installer may prompt you to restart the platform.
5. If prompted to restart the platform, do one of the following:
 - ▶ Select **Restart Now** to reboot the VM.
 - ▶ Exit the installer and reboot the VM when you are ready.

After the VM restarts, it boots to a Windows desktop.
6. Verify that the NVIDIA driver is running.
 - a) Right-click on the desktop.
 - b) From the menu that opens, choose **NVIDIA Control Panel**.
 - c) In the **NVIDIA Control Panel**, from the **Help** menu, choose **System Information**.
NVIDIA Control Panel reports the vGPU that is being used, its capabilities, and the NVIDIA driver version that is loaded.



3.6. Licensing an NVIDIA vGPU

Perform this task from the guest VM to which the vGPU is assigned.

The **NVIDIA Control Panel** tool that you use to perform this task detects that a vGPU is assigned to the VM and, therefore, provides no options for selecting the license type. After you license the vGPU, NVIDIA vGPU software automatically selects the correct type of license based on the vGPU type.



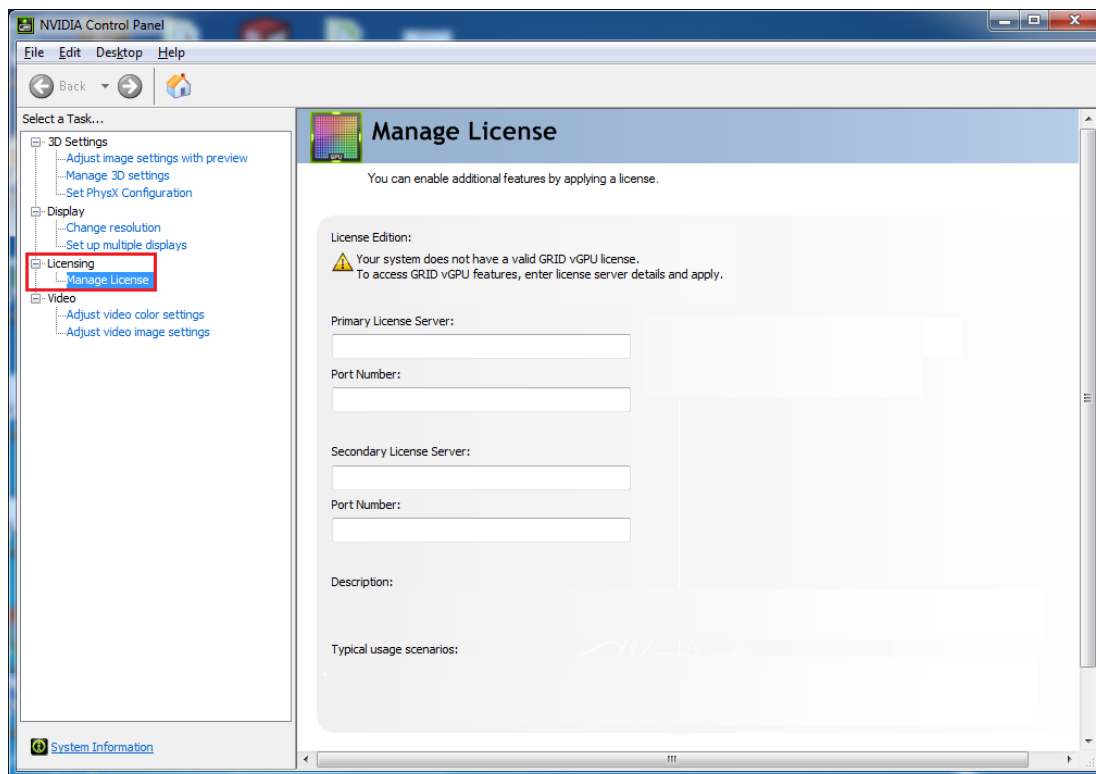
These instructions cover only licensing for a single-instance license server. If you configured a primary and secondary license server, refer to [Virtual GPU Client Licensing User Guide](#) for instructions for how to specify the address and port number of the primary and secondary license servers.

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 License** task in the **Licensing** section of the navigation pane.



If the **Licensing** section and **Manage License** task are not displayed in **NVIDIA Control Panel**, the system has been configured to hide licensing controls in **NVIDIA Control Panel**. For information about registry settings, see [Virtual GPU Client Licensing User Guide](#).

The **Manage License** task pane shows that NVIDIA vGPU is currently unlicensed.



3. In the **Primary License Server** field, enter the address of your NVIDIA vGPU software License Server.
The address can be a fully-qualified domain name such as `gridlicense1.example.com`, or an IP address such as `10.31.20.45`.
4. Leave the **Port Number** field under the **Primary License Server** field unset.
The port defaults to `7070`, which is the default port number used by NVIDIA vGPU software License Server.
5. Leave the **Secondary License Server** field and the **Port Number** field under it unset.
6. Click **Apply** to assign the settings.
The system requests the appropriate license for the current vGPU from the configured license server.

The vGPU within the VM should now exhibit full frame rate, resolution, and display output capabilities. The VM is now capable of running the full range of DirectX and OpenGL graphics applications.

You have now completed the process of installing NVIDIA vGPU software and setting up a single VM to use NVIDIA vGPU.

If the system fails to obtain a license, see *Virtual GPU Client Licensing User Guide* for guidance on troubleshooting.

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