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Chapter 1.
CREATING AND USING AN NVIDIA QUADRO VIRTUAL WORKSTATION INSTANCE FROM THE GOOGLE CLOUD PLATFORM MARKETPLACE

NVIDIA® Quadro® Virtual Workstation is an NVIDIA Virtual Machine Image (VMI) preconfigured with Quadro Virtual Workstation software and NVIDIA GPU hardware. The NVIDIA Quadro driver is preinstalled on the VMI and NVIDIA ensures that the image is always up to date with the latest Quadro ISV certifications, patches, and upgrades. Support and technical information to help you get started are available on the NVIDIA Quadro vWS on CSP Marketplace community forum and from additional resources.

1.1. Creating a GPU-Accelerated Virtual Workstation

Prepare for creating a GPU-accelerated virtual workstation from the Google Cloud Platform marketplace as follows:

‣ Ensure that you have a Google Cloud Platform account and an active subscription.
‣ Decide the machine type of the VM instance on which you want to deploy your GPU-accelerated virtual workstation.

For information about the machine types that support Quadro Virtual Workstation, see Quadro Virtual Workstation on Google Cloud Platform Release Notes.

‣ If you are creating an Ubuntu VM instance and want to use SSH public key authentication for the administrator account, generate an SSH public key.

1. In a web browser, log on to Google Cloud Platform portal (https://console.cloud.google.com/).
2. Go to the NVIDIA Quadro Virtual Workstation listing for the guest OS that you want to use:
   - NVIDIA Quadro Virtual Workstation - Windows Server 2019
   - NVIDIA Quadro Virtual Workstation - Windows Server 2016
   - NVIDIA Quadro Virtual Workstation - Ubuntu 18.04

3. Click LAUNCH ON COMPUTE ENGINE to go to the New deployment page for NVIDIA Quadro Virtual Workstation on your chosen operating system.

4. On the New deployment page, provide the project details and instance details.
   a) From the drop-down list at the top of the page, select your project.
   b) If you don't want the default assigned deployment name, enter the name that you want for your NVIDIA Quadro Virtual Workstation instance.
   c) Select the zone for your NVIDIA Quadro Virtual Workstation instance.
      Ensure that the GPU type that you want is available in the selected zone. Not all GPU types that support Quadro Virtual Workstation are available in all zones.
d) From the **Number of GPUs** drop-down list, select the number of GPUs that you want for your instance.

The number of GPUs selected limits the number of vCPUs allowed in your machine type. A maximum of 16 vCPUs is allowed for each GPU.

e) From the **GPU Type** drop-down list, select the GPU type that you want for your instance.

If the GPU type that you want to use is not listed, select a different zone until you find the GPU type that you want.

f) Specify the machine type with which you want to create your instance.

   ▪ To create an instance with a predefined machine type, from the drop-down list under **Machine type**, select the machine type that you want.
   
   ▪ To create an instance with custom virtualized hardware settings, follow the **Customize** link.

For guidance, see the following Google Cloud Platform documentation:

   ▪ GPUs on Compute Engine
   
   ▪ Regions and Zones
   
   ▪ Machine Types
   
   ▪ Creating a VM Instance with a Custom Machine Type

5. In the **Boot Disk** and **Networking** sections, review the default settings to see if they meet your requirements and change any settings as required.

   ![Boot Disk and Networking settings](image)

   For guidance, see the following Google Cloud Platform documentation:

   ▪ Storage Options
   
   ▪ Virtual Private Cloud (VPC) Network Overview

6. Click **Deploy**.

   Deployment is complete in a few minutes.
If you created a Windows VM instance, follow these instructions to create a password for the instance and connect to the VM instance:

1. Creating Passwords for Windows Instances in the Google Cloud Platform documentation
2. Connecting to a GPU-Accelerated Virtual Workstation on a Windows VM Instance

If you created a Linux VM instance, follow these instructions to connect to the VM instance and verify that it was created properly:

1. Connecting to Linux instances in the Google Cloud Platform documentation
2. Verifying the Creation of your GPU-Accelerated Virtual Workstation

1.2. Connecting to a GPU-Accelerated Virtual Workstation on a Windows VM Instance

Ensure that you have created a windows instance password as explain in Creating Passwords for Windows Instances in the Google Cloud Platform documentation.

1. On the Google Cloud Platform console VM instances page page, from the RDP drop-down list, select Download the RDP file.
2. When the download is complete, double-click the RDP file to start a Remote Desktop Connection session on the VM.
3. If you are warned that the publisher of the remote connection cannot be identified and are asked about whether to connect anyway, click Connect.
4. When you are prompted, log in to the VM with the credentials for the account that you specified when you created the password for your Windows VM Instance.

5. If you are warned that the publisher of the remote connection cannot be identified and are asked about whether to connect anyway, click Yes.

After connecting to your GPU-accelerated virtual workstation, verify that it was created properly as explained in Verifying the Creation of your GPU-Accelerated Virtual Workstation.

1.3. Verifying the Creation of your GPU-Accelerated Virtual Workstation

After connecting to your GPU-accelerated virtual workstation, verify that it was created properly by listing its GPUs. On a Windows VM instance you can also use NVIDIA Control Panel to verify that the NVIDIA driver is running.

For details, see:

- Verifying the Creation of a GPU-Accelerated Virtual Workstation on a Windows VM Instance
- Verifying the Creation of a GPU-Accelerated Virtual Workstation on a Linux VM Instance

After verifying the creation of your GPU-accelerated virtual workstation, you are now ready to run your design and engineering software.

1.3.1. Verifying the Creation of a GPU-Accelerated Virtual Workstation on a Windows VM Instance

1. Open a command prompt window and change to the folder that contains the nvidia-smi command.

   ```
   C:\Program Files (x86)\Google\Cloud SDK> cd C:\Program Files\NVIDIA Corporation\NVSMI
   C:\Program Files\NVIDIA Corporation\NVSMI>nvidia-smi
   ```

2. List the GPUs in your GPU-accelerated virtual workstation by running the nvidia-smi command without any options.
   The following example shows the output from nvidia-smi for a Windows VM instance configured with a single NVIDIA T4 GPU.

   ```
   C:\Program Files\NVIDIA Corporation\NVSMI>nvidia-smi
   Wed Apr 03 01:49:00 2019
   +---------------------------------------------------------------------+
<table>
<thead>
<tr>
<th>NVIDIA-SMI 412.16     Driver Version: 412.16       CUDA Version: 10.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPU  Name     TCC/WDDM</td>
</tr>
<tr>
<td>Fan  Temp Perf Pwr:Usage/Cap</td>
</tr>
<tr>
<td>================================================================-----</td>
</tr>
<tr>
<td>0  Tesla T4  WDDM</td>
</tr>
<tr>
<td>N/A  36C    P8  12W /  70W</td>
</tr>
</tbody>
</table>
   +---------------------------------------------------------------------+
   ```
Creating and Using an NVIDIA Quadro Virtual Workstation Instance from the Google Cloud Platform Marketplace

3. Start NVIDIA Control Panel to verify that the NVIDIA driver is running.
   a) Right-click on the desktop.
   b) From the menu that opens, choose NVIDIA Control Panel.

4. In the NVIDIA Control Panel, from the Help menu, choose System Information to get information about the GPU.

   NVIDIA Control Panel reports the GPU that is being used, its capabilities, and the NVIDIA driver version that is loaded.

---

1.3.2. Verifying the Creation of a GPU-Accelerated Virtual Workstation on a Linux VM Instance

List the GPUs in your GPU-accelerated virtual workstation by running the nvidia-smi command without any options.

The following example shows the output from nvidia-smi for a Linux VM instance configured with a single NVIDIA P100 GPU.

qvwsuser@nvidia-quadro-virtual-workstation-with-ubuntu-1-vm:~$ nvidia-smi

Wed Apr  3 02:01:30 2019

+-----------------------------------------------------------------------------+
| NVIDIA-SMI 410.92       Driver Version: 410.92       CUDA Version: 10.0     |
|-------------------------------+----------------------+----------------------+
| GPU  Name        Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap| Memory-Usage | GPU-Util  Compute M. |
|-----------------------------------------------------------------------------|
| qvwsuser@nvidia-quadro-virtual-workstation-with-ubuntu-1-vm:~$ nvidia-smi

qvwsuser@nvidia-quadro-virtual-workstation-with-ubuntu-1-vm:~$ nvidia-smi

Wed Apr  3 02:01:30 2019

+-----------------------------------------------------------------------------+
| NVIDIA-SMI 410.92       Driver Version: 410.92       CUDA Version: 10.0     |
|-------------------------------+----------------------+----------------------+
| GPU  Name        Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf  Pwr:Usage/Cap| Memory-Usage | GPU-Util  Compute M. |
1.4. Trying Out your GPU-Accelerated Virtual Workstation

Some third-party application vendors have endorsed the use of some of their apps with NVIDIA Quadro Virtual Workstation on Google Cloud Platform. If you can install an endorsed app in your VM, you can use the app to try out your cloud-based virtual workstation.

1.4.1. Trying Out your GPU-Accelerated Virtual Workstation with Adobe Premiere Pro

Adobe has endorsed the use of the Adobe Premiere Pro video editing app with NVIDIA Quadro Virtual Workstation on Google Cloud Platform. If you can install the Adobe Premiere Pro app in your VM, you can use the app to try out your cloud-based virtual workstation.

1. Open the sample project in Adobe Premiere Pro.
2. Scrub through the video and see that the video continues to play smoothly and without stutter.
3. Adjust colors, contrast, and shadows and notice that the adjustments are applied instantaneously.
4. Play the video and see that playback is remarkably smooth with no dropped frames.

1.4.2. Trying Out your GPU-Accelerated Virtual Workstation with Esri ArcGIS Pro

Esri has endorsed the use of the Esri ArcGIS Pro app with NVIDIA Quadro Virtual Workstation on Google Cloud Platform. If you can install the Esri ArcGIS Pro app in your VM, you can use the app to try out your cloud-based virtual workstation.

1. Open Esri ArcGIS Pro.
2. View geographic data and notice the responsiveness of the app.
The geoprocessing feature provided by Esri deep learning tools uses inferencing to detect palm trees.

With NVIDIA Quadro Virtual Workstation images from the Google Cloud Platform marketplace powered by NVIDIA GPUs, you can run complex graphics visualization applications with AI-enhanced features from anywhere.
Appendix A.
RESOURCES FOR NVIDIA QUADRO VIRTUAL WORKSTATION ON GOOGLE CLOUD PLATFORM

- *Quadro Virtual Workstation on Google Cloud Platform Release Notes*
- NVIDIA Quadro Virtual Workstation listings on Google Cloud Platform marketplace:
  - NVIDIA Quadro Virtual Workstation - Windows Server 2019
  - NVIDIA Quadro Virtual Workstation - Windows Server 2016
  - NVIDIA Quadro Virtual Workstation - Ubuntu 18.04
- Google Cloud Platform documentation:
  - GPUs on Compute Engine
  - Regions and Zones
  - Machine Types
  - Creating a VM Instance with a Custom Machine Type
  - Storage Options
  - Virtual Private Cloud (VPC) Network Overview
  - Creating Passwords for Windows Instances
  - Connecting to Linux instances
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