



# Virtual GPU Management Pack for VMware vRealize Operations

User Guide

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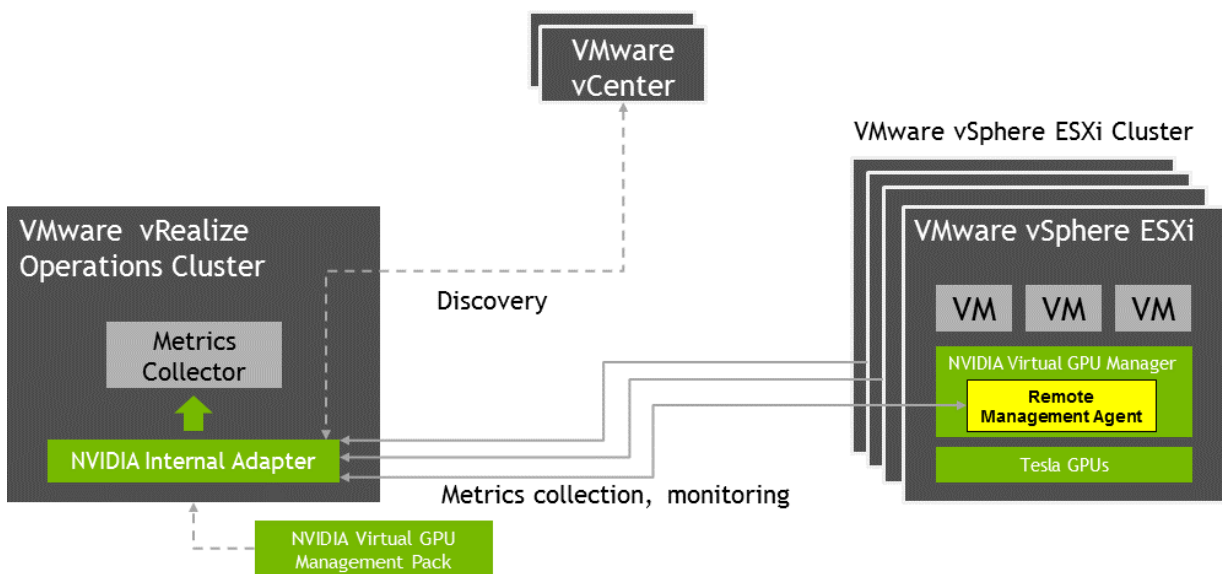
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# Chapter 1. Introduction to the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations

NVIDIA® Virtual GPU Management Pack for VMware vRealize Operations enables you to use a VMware vRealize Operations cluster to monitor the performance of NVIDIA physical GPUs and virtual GPUs.

VMware vRealize Operations provides integrated performance, capacity, and configuration management capabilities for VMware vSphere, physical and hybrid cloud environments. It provides a management platform that can be extended by adding third-party management packs. For more information, see the [VMware vRealize Operations documentation](#).

NVIDIA Virtual GPU Management Pack for VMware vRealize Operations collects metrics and analytics for NVIDIA vGPU software from virtual GPU manager instances. It then sends these metrics to the metrics collector in a VMware vRealize Operations cluster, where they are displayed in custom NVIDIA dashboards.



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# Chapter 2. Installing and Configuring the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations

You can install or update the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations on an on-premises installation of VMware vRealize Operations Manager or on VMware vRealize Operations Cloud. After installing the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations, you must configure it by creating an NVIDIA vGPU adapter instance and, if you haven't already done so, by creating a VMware vCenter adapter instance.

## 2.1. Installation and Configuration Prerequisites

Before installing and configuring the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations, ensure that supported versions of the required software are available and configured as follows:

- ▶ vRealize Operations Manager is installed or you have a VMware vRealize Operations Cloud account.
- ▶ The NVIDIA vGPU software driver package is installed and configured on the hosts in your VMware vSphere ESXi cluster.

For details about which releases of the required software are supported, refer to [Virtual GPU Management Pack for VMware vRealize Operations Release Notes](#).

If the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations has previously been installed, back up any customized dashboards before updating the management pack. The update will overwrite any NVIDIA dashboard of the same name.

## 2.2. Installing or Updating the Management Pack

You can install or update the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations on an on-premises installation of VMware vRealize Operations Manager or on VMware vRealize Operations Cloud.

### 2.2.1. Installing or Updating the Management Pack on Premises

For an installation on VMware vRealize Operations Manager on premises, the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations is distributed as a ZIP archive that contains a PAK (.pak) file.

1. Download the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations ZIP archive and extract the PAK (.pak) file.

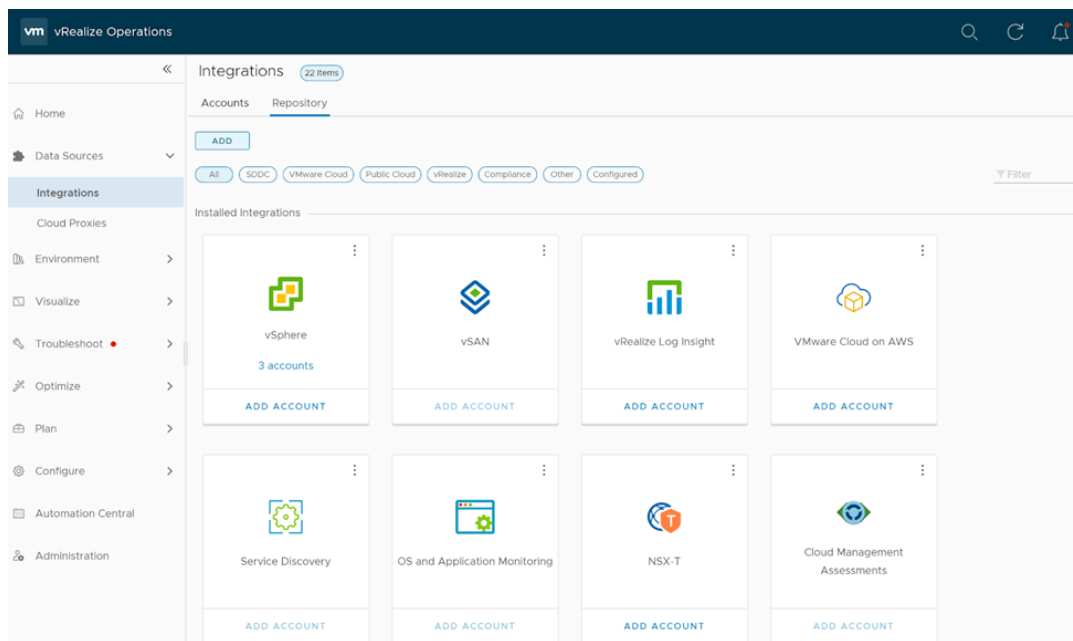
Ensure that the extracted file is accessible to the web browser that you are using to manage your **vRealize Operations Manager** instance.

2. Log in to your **vRealize Operations Manager** instance as an administrator user.
3. Start the **Add Solution** wizard.

How to start the wizard depends on your VMware vRealize Operations release.

► **Since VMware vRealize Operations 8.6:**

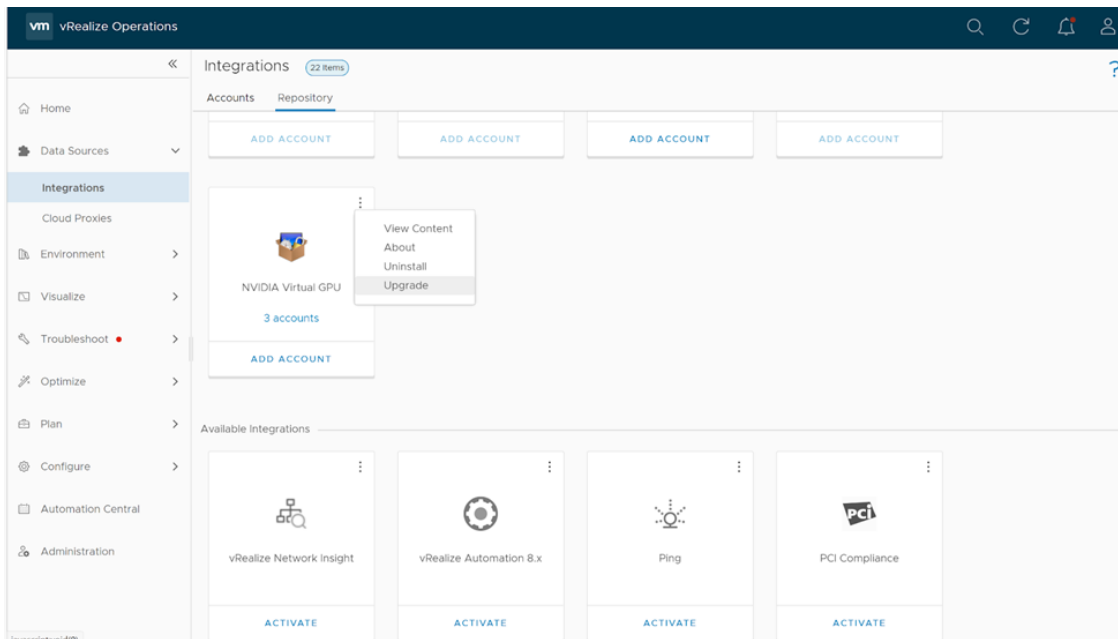
- a). On the **vRealize Operations Manager Home** page, expand **Data Sources** and select **Integrations**.
- b). On the **Integrations** page that opens, click the **Repository** tab.
- c). On the **Repository** tab, click **ADD**.



- ▶ **VMware vRealize Operations 8.0-8.5 only:**
  - a). On the **vRealize Operations Manager Home** page, follow the **Administration** link.
  - b). In the navigation bar, expand **Solutions** and select **Repository**.
  - c). On the **Repository** page that opens, scroll to the end of the **Native Management Packs** section, and click **ADD/UPGRADE**.
- 4. In the **Add Solution** wizard that opens, click **Browse**, navigate to your copy of the PAK file and select it, and click **Open**.
- 5. If you have previously installed the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations, select these options:
  - ▶ **Install the PAK file even if it is already installed**
  - ▶ **Reset Default Content**
- 6. Click **Upload**.
- 7. Accept the EULA for the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations and click **Next**.
- 8. When the installation is complete, click **Finish**.  
This last page displays progress details for the installation.
- 9. Confirm that the installation succeeded.  
How to confirm that the installation succeeded depends on your VMware vRealize Operations release.

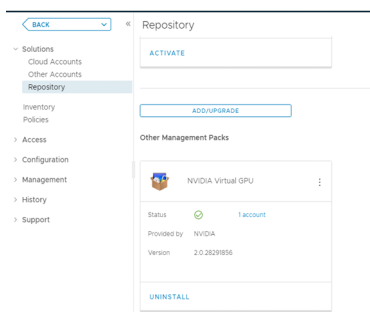
- ▶ **Since VMware vRealize Operations 8.6:**

On the **Repository** tab of the **Integrations** page, scroll through the **Installed Integrations** section until you see NVIDIA Virtual GPU Management Pack for VMware vRealize Operations.



► **VMware vRealize Operations 8.0-8.5 only:**

- a). In the navigation bar, expand **Solutions** and select **Repository**.
- b). On the **Repository** page that opens, scroll to the end of the **Native Management Packs** section, and confirm that NVIDIA Virtual GPU Management Pack for VMware vRealize Operations appears under **Other Management Packs**.



## 2.2.2. Installing or Updating the Management Pack on VMware vRealize Operations Cloud

For an installation on VMware vRealize Operations Cloud, the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations is available on the **Repository** tab of the **Integrations** page.

1. Log in to **VMware vRealize Operations Cloud** as an administrator user.
2. Navigate to the **Repository** tab of the **Integrations** page.
  - a). On the **VMware vRealize Operations Cloud** page, expand **Data Sources** and select **Integrations**.

- b). On the **Integrations** page that opens, click the **Repository** tab.
3. On the **Repository** tab, perform the step for installing or updating NVIDIA Virtual GPU Management Pack for VMware vRealize Operations.

Action	Step
<b>Install NVIDIA Virtual GPU Management Pack for VMware vRealize Operations if it is not already installed.</b>	In the <b>Available Integrations</b> area, locate NVIDIA Virtual GPU Management Pack for VMware vRealize Operations and click <b>GET</b> .
<b>Update an existing installation of NVIDIA Virtual GPU Management Pack for VMware vRealize Operations.</b>	In the <b>Installed Integrations</b> area, locate NVIDIA Virtual GPU Management Pack for VMware vRealize Operations and click <b>UPGRADE</b> .

After you perform this step, VMware vRealize Operations Cloud installs or updates the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations without prompting you for any information.

## 2.3. Creating an NVIDIA vGPU Adapter Instance

After installing the NVIDIA Virtual GPU Management Pack for VMware vRealize Operations, you must configure it by creating an NVIDIA vGPU adapter instance.



**Note:** If you haven't already done so, you must also create a VMware vCenter adapter instance.

An NVIDIA vGPU adapter instance connects to a VMware vCenter Server instance and retrieves data from vGPU-enabled hosts in the server instance. You must provide the host name of the VMware vCenter Server instance that the adapter instance will connect to and credentials to be used for connecting to the server instance.

1. If you are not already logged in, log in to your **vRealize Operations Manager** instance as an administrator user.
2. Navigate to the **Account Types** page.  
How to navigate to the **Account Types** page depends on your VMware vRealize Operations release.
  - ▶ **Since VMware vRealize Operations 8.6:**
    - a). On the **vRealize Operations Manager Home** page, expand **Data Sources** and select **Integrations**.
    - b). On the **Integrations** page that opens, click the **ADD ACCOUNT**.
  - ▶ **VMware vRealize Operations 8.0-8.5 only:**
    - a). On the **vRealize Operations Manager Home** page, follow the **Administration** link.



- b). In the navigation bar, expand **Solutions**, select **Other Accounts**, and click **ADD ACCOUNT**.
3. On the **Account Types** page that opens, select **NVIDIA vGPU Adapter**.  
The **New Account** page opens.

4. Provide the following information about the adapter instance that you are creating:

#### Display Name

Enter the name of the instance as you want it to appear in **vRealize Operations Manager**.

#### Description

Enter a description that can help distinguish this instance when multiple NVIDIA vGPU adapter instances are configured.

#### vCenter Server

Enter the IP address of the VMware vCenter Server.

#### Credential

Click the plus sign and in the **Manage Credential** dialog box that opens, add the credentials for the user that will connect to this vCenter Server instance.

#### Credential name

Enter the display name of the user.

**Username**

Enter the user login name.

**Password**

Enter the password of the user.

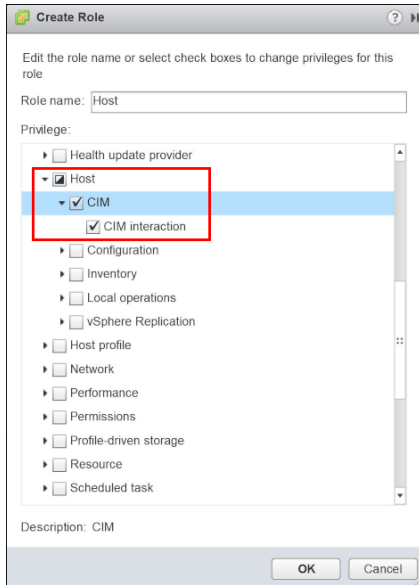
5. Back on the **New Account** page, click **TEST CONNECTION** to test the connection between the new adapter instance and the VMware vCenter Server
6. Click **ADD**.

After installing and configuring NVIDIA Virtual GPU Management Pack for VMware vRealize Operations, verify the installation and configuration as explained in [Viewing Data on NVIDIA Dashboards](#).

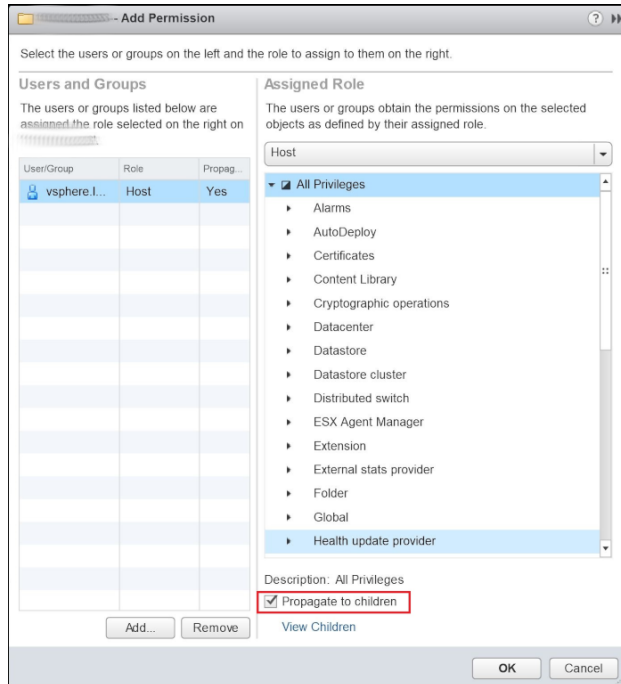
## 2.4. Assigning Privileges that the NVIDIA vGPU Adapter Requires

To collect data from hosts in VMware vCenter that are running NVIDIA GPUs and the NVIDIA vGPU Manager, each user of the NVIDIA vGPU adapter requires the CIM interaction privilege. If this privilege is not assigned, the user cannot use the NVIDIA vGPU adapter to collect data.

1. Log in to vCenter Server by using the vSphere Web Client.
2. Select **Administration** and, in the **Access Control** area, select **Roles**.
3. From the **Roles Provider** list, select your vCenter Server instance.
4. Click the **Create role action (+)** icon.
5. In the **Create Role** window that opens, define the properties of the role.
  - a). In the **Role name** field, type your choice of name for the role.
  - b). Expand the **Host** privilege and then expand the **CIM** privilege under the **Host** privilege.
  - c). Select the **Host**, **CIM**, and **CIM interaction** privileges.
  - d). Click **OK**.



6. In the navigation tree, select **Home > Hosts and Clusters > your-vCenter-Server-instance > Permissions**.
7. In the **Users and Groups** section of the **Add Permission** window, select the users and groups that will use the NVIDIA vGPU adapter.
  - a). Click the **Add permission (+)** icon.  
The **Select Users/Groups** window opens.
  - b). For each user or group, select the user or group and click **Add**.
  - c). After adding all the users or groups, click **OK** in the **Select Users/Groups** window.
8. In the **Assigned Role** section of the **Add Permission** window, select the role that you created from the list of roles and select the **Propagate to children** check box.



9. Click **OK**.

See also the following topics in the VMware vSphere documentation:

- ▶ [Using Roles to Assign Privileges](#)
- ▶ [Log in to vCenter Server by Using the vSphere Web Client](#)
- ▶ [Create a Custom Role](#)
- ▶ [Host CIM Privileges](#)
- ▶ [vSphere Permissions and User Management Tasks](#)

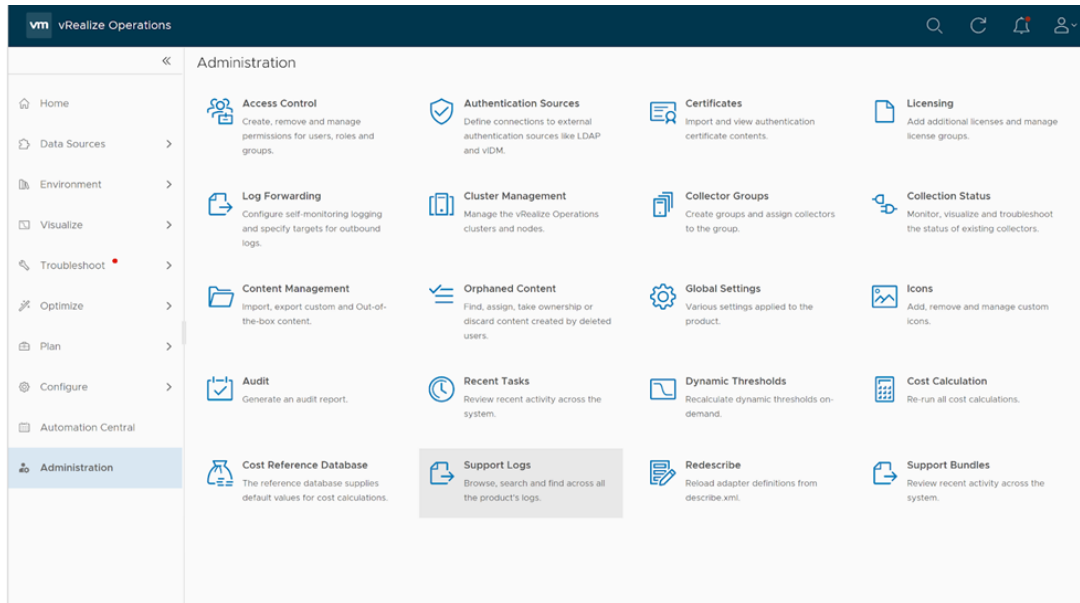
## 2.5. Adding a Class to vRealize Operations Logs

The NVIDIA vGPU Adapter adapter gathers data only for the classes that are added to the vRealize Operations logs. Required classes for debugging are added to the logs by default with a default logging level. If you want to gather data for any other class, you must add the class to the vRealize Operations logs.

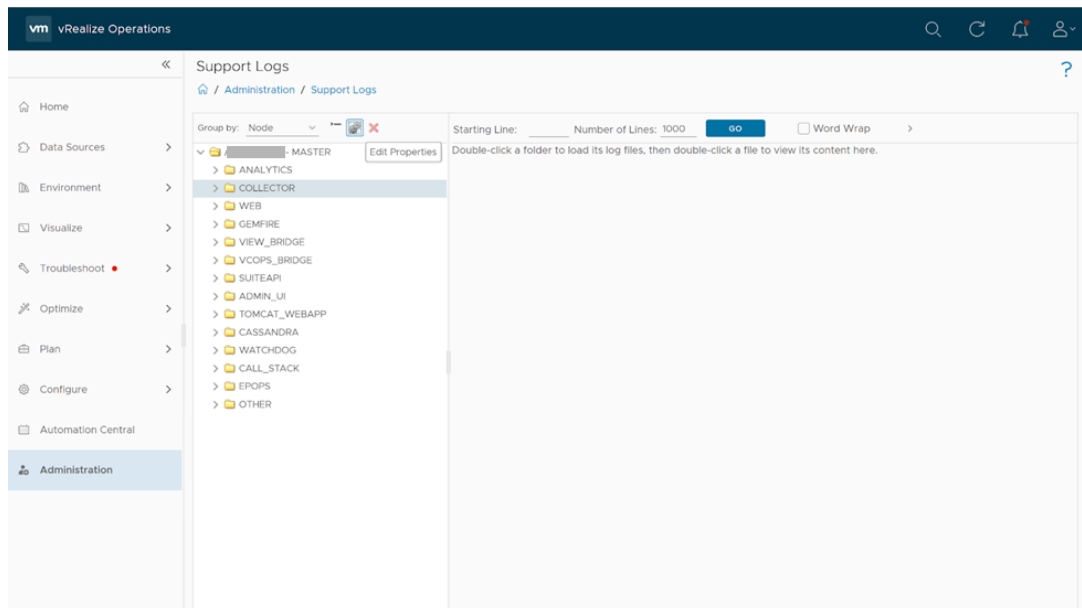
1. If you are not already logged in, log in to your **vRealize Operations Manager** instance as an administrator user.
2. Open the list of vRealize Operations log folders.  
How to open the list of vRealize Operations log folders depends on your VMware vRealize Operations release.

- ▶ **Since VMware vRealize Operations 8.6:**

- a). On the **vRealize Operations Manager Home** page, click **Administration** and in the **Administration** page that opens, select **Support Logs**.



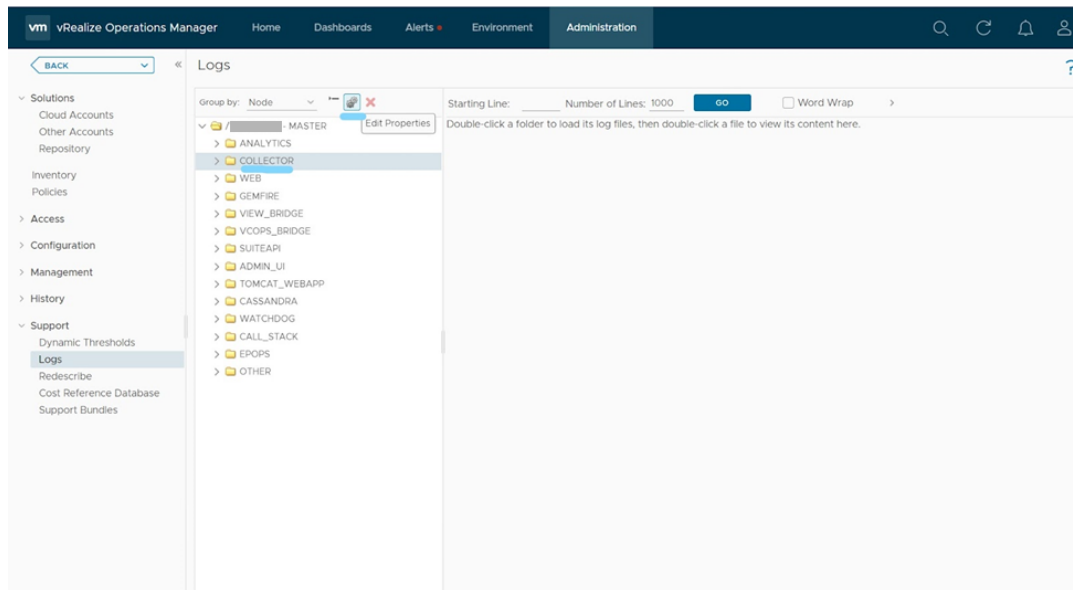
- b). On the **Support Logs** page that opens, expand the list of subfolders under the **vRealize Operations Manager** node.



► **VMware vRealize Operations 8.0-8.5 only:**

- a). On the **vRealize Operations Manager Home** page, click **Administration**.
- b). In the left navigation bar of the **Administration** page that opens, expand **Support** and select **Logs**.

- c). On the **Logs** page that opens, expand the list of subfolders under the **vRealize Operations Manager** node.



3. In the expanded list of subfolders, select **COLLECTOR** and click **Edit Properties**.
4. On the **Edit Logger Configuration** page that opens, click the plus sign that represents the **Add Log Class** button.
5. In the **Add Log Class** wizard that starts, specify the class that you want to add and set the logging level.

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# Chapter 3. Managing Metrics and Analytics for NVIDIA vGPU Software in VMware vRealize Operations

Managing metrics and analytics for NVIDIA vGPU software in VMware vRealize Operations involves viewing data on NVIDIA dashboards and changing the settings of the NVIDIA vGPU adapter and NVIDIA vGPU alert definitions.

## 3.1. Viewing Data on NVIDIA Dashboards

After installing and configuring NVIDIA Virtual GPU Management Pack for VMware vRealize Operations, you can view the data on NVIDIA dashboards to verify the installation and configuration. If you have just completed the installation and configuration, allow the adapter to work for ten to fifteen minutes to collect data to display on the dashboards.

1. On the **vRealize Operations Manager Home** page, click **Dashboards** in the menu bar.
2. In the **All Dashboards** drop-down list, select the **NVIDIA Dashboards** group.

This group contains the following dashboards:

- ▶ **NVIDIA Environment Overview**
- ▶ **NVIDIA Host Summary**
- ▶ **NVIDIA GPU Summary**
- ▶ **NVIDIA vGPU Summary**
- ▶ **NVIDIA Application Summary**

## 3.2. Changing the NVIDIA vGPU Adapter Collection Interval

If you need to change how frequently the NVIDIA vGPU adapter collects metrics, change the collection interval. The default collection interval is five minutes.

1. If you are not already logged in, log in to your **vRealize Operations Manager** instance as an administrator user.
2. On the **vRealize Operations Manager Home** page, follow the **Administration** link.
3. In the left pane, click **Configuration**.
4. Click **Inventory Explorer** and expand **Adapter Instances** in the center pane.
5. Expand **NVIDIA vGPU Adapter Instance** and select the adapter name.
6. In the right pane, on the **List** tab, select the adapter name and click **Edit Object**.
7. On **Advanced Settings**, enter the new collection interval in the **Collection Interval (Minutes)** field.



**Note:** The minimum value that you can set is 1 minute.

8. Click **OK**.

## 3.3. Changing the Threshold of a Symptom in an Alert Definition

An alert definition is a combination of symptoms that identify a problem area and generate alerts for that area. Each symptom in an alert is associated with a metric. For each symptom, a threshold value is defined for its associated metric. If the threshold value is reached, an alert is generated.

For detailed information about the alerts defined for NVIDIA vGPU metrics, including the default threshold values of symptoms in these alerts, see [NVIDIA vGPU Alert Definitions](#).

1. In the menu bar of the **vRealize Operations Manager Home** page, click **Alerts**.
2. In the left pane, click **Alert Settings**.
3. Click **Symptom Definitions**.
4. Click **All Filters**, then click **Object Type**, and type **GPU** or **vGPU**.  
The symptom definitions for the object type that you selected are listed.
5. Select the symptom definition that you want to change and click the **Edit** icon.
6. Change the threshold to the new value that you want and click **Save**.



**GPU : Utilization|Memory Utilization (%)**

Static Threshold

GPU Memory Utilization is moderate is Warning when metric is greater than or equal to 75

▶ **Advanced**

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# Appendix A. NVIDIA vGPU Alert Definitions

The management pack provides alert definitions for the NVIDIA vGPU metrics and analytics that it integrates with VMware vRealize Operations. Each alert definition is a combination of symptoms that identify a problem area and generate alerts for that area.

Alerts defined for GPU utilization can be generated by any of the GPU engines, namely:

- ▶ 3D/Compute
- ▶ Memory controller
- ▶ Video encoder
- ▶ Video decoder

## A.1. GPU Utilization Is High

This alert is generated when the utilization of any of the GPU engines is high.

Symptom	Associated Metric	Criticality	Threshold
GPU 3D/Compute Utilization is critically high	GPU: Utilization 3D/Compute Utilization	Immediate	90
GPU 3D/Compute Utilization is moderately high	GPU: Utilization 3D/Compute Utilization	Warning	75
GPU Memory Utilization is critically high	GPU: Utilization Memory Utilization	Immediate	90
GPU Memory Utilization is moderately high	GPU: Utilization Memory Utilization	Warning	75
GPU Encoder Utilization is critically high	GPU: Utilization Encoder Utilization	Immediate	90
GPU Encoder Utilization is moderately high	GPU: Utilization Encoder Utilization	Warning	75
GPU Decoder Utilization is critically high	GPU: Utilization Decoder Utilization	Immediate	90
GPU Decoder Utilization is moderately high	GPU: Utilization Decoder Utilization	Warning	75

## A.2. vGPU Utilization Is High

This alert is generated when the utilization of any of the GPU engines is high on any virtual GPU.

Symptom Name	Associated Metric	Criticality	Threshold
vGPU 3D/Compute Utilization is critically high	vGPU: Utilization 3D/Compute Utilization	Immediate	90
vGPU 3D/Compute Utilization is moderately high	vGPU: Utilization 3D/Compute Utilization	Warning	75
vGPU Memory Utilization is critically high	vGPU: Utilization Memory Utilization	Immediate	90
vGPU Memory Utilization is moderately high	vGPU: Utilization Memory Utilization	Warning	75
vGPU Encoder Utilization is critically high	vGPU: Utilization Encoder Utilization	Immediate	90
vGPU Encoder Utilization is moderately high	vGPU: Utilization Encoder Utilization	Warning	75
vGPU Decoder Utilization is critically high	vGPU: Utilization Decoder Utilization	Immediate	90
vGPU Decoder Utilization is moderately high	vGPU: Utilization Decoder Utilization	Warning	75

## A.3. vGPU Utilization Is High for Process

This alert is generated when the utilization of any of the GPU engines is high for any process on any virtual GPU.

Symptom Name	Associated Metric	Criticality	Threshold
vGPU 3D/Compute Utilization is critically high for Process	Process: 3D/Compute Utilization	Immediate	90
vGPU 3D/Compute Utilization is moderately high for Process	Process: 3D/Compute Utilization	Warning	75
vGPU Memory Utilization is critically high for Process	Process: Memory Utilization	Immediate	90
vGPU Memory Utilization is moderately high for Process	Process: Memory Utilization	Warning	75
vGPU Encoder Utilization is critically high for Process	Process: Encoder Utilization	Immediate	90
vGPU Encoder Utilization is moderately high for Process	Process: Encoder Utilization	Warning	75
vGPU Decoder Utilization is critically high for Process	Process: Decoder Utilization	Immediate	90

Symptom Name	Associated Metric	Criticality	Threshold
vGPU Decoder Utilization is moderately high for Process	Process: Decoder Utilization	Warning	75

## A.4. GPU Temperature Is High

This alert is generated when the GPU temperature is high enough to force slowdown or shutdown.

Symptom	Associated Metric	Criticality	Threshold
GPU Temperature is forcing slowdown	GPU: Temperature Current Temperature	Critical	Slowdown Temperature
GPU Temperature is forcing shutdown	GPU: Temperature Current Temperature	Immediate	Shutdown Temperature minus 5

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