

Foglight® for vCloud Director 7.1.0
User and Reference Guide



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Legend

-  **WARNING:** A WARNING icon indicates a potential for property damage, personal injury, or death.
-  **CAUTION:** A CAUTION icon indicates potential damage to hardware or loss of data if instructions are not followed.
-  **IMPORTANT NOTE, NOTE, TIP, MOBILE, or VIDEO:** An information icon indicates supporting information.

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Getting Started

Foglight® for vCloud Director allows you monitor virtual vCloud Director infrastructure. Foglight for vCloud Director alerts you about infrastructure problems as soon as they develop, enabling you to resolved issues proactively before end users are affected. Early intervention ensures consistent application performance at established service levels. Foglight for VMware monitors the health of your virtual system by tracking resource consumption such as CPU, network, and memory consumption for individual clusters, servers, and virtual machines in your integrated environment.

- [Before you Begin](#)
- [Introducing the vCloud Directory Infrastructure](#)

Before you Begin

- Ensure that Foglight for vCloud Director is installed on the Management Server. For installation instructions, see the *Foglight for VMware Release Notes*.
- If you want to monitor a Virtual Center, you need a running instance of the VMware Performance Agent. This agent is provided with Foglight for VMware. For more information about this product, see the *Managing Virtualized Environments User and Reference Guide*.
- If you want to collect Foglight for Storage Management data, you need the Foglight for Storage Management cartridge installed on the Management Server. For more information about this product, see the *Managing Storage in Virtual Environments User and Reference Guide*.

Introducing the vCloud Directory Infrastructure

VMware® vCloud Director® supplies an innovative mechanism for organizing access to a Web console to various members of an organization. It manages the use of organizational resources, virtual applications, and machines. Foglight® for vCloud Director accommodates environments of all sizes, that leverage the vCloud Director platform by analyzing the virtual environment and providing a knowledgeable and interactive view of its components.

A vCloud Director environment consists of objects that lend their resources to virtual clouds that can be accessed through Web-based and programmatic interfaces. This model allows users to manage and monitor the resources allocated to the system, to create and provision organizations, and to set policies and preferences that determine the end-users' capability of using the available virtual applications and resources.

Foglight for VMware focuses on the following main components of the monitored virtual infrastructure:

- *Provider vDCs*. A provider vDC combines the CPU, memory, and storage resources of the associated resource pools and datastores.
- *Org vDCs*. An organization vDC is a part of a provider vDC, encapsulating the CPU, memory, and storage resources, that are available to an organization.
- *Organizations*. An organization is a collection of users, groups, and resources that are available to users.

- *Virtual Machines.* A virtual machine resides on an ESX host. Virtual machines share many of the characteristics of physical systems (like storage and network interaction), but they do not have direct access to the hardware that is used to process their information. Each virtual machine runs on a guest operating system, for example, MS Windows XP, and is allocated access to a specific set of the server's resources, which includes the number of processors and the amount of memory it can leverage.
- *vSphere Resources.* vSphere resources represent the underlying vSphere resources provided by the associated datastores, ESX hosts, resource pools, and virtual centers.

Setting Up Monitoring Agents

Foglight for vCloud Director relies on vCloud Director Agents to collect data from the monitored system. When you install Foglight for VMware, you need to create monitoring agents to collect performance information from your environment.

If the vCloud Director® servers that you want to monitor belong to a vCloud server group, and you have connection information for at least one vCloud server in that group, use the **vCloud Discovery Wizard** to configure monitoring of the desired vCloud server.

If you want to create a new vCloud server group and have the connection information for the vCloud server that you want to monitor, simply create a new vCloud Director Agent instance using the **Create vCloud Agent** wizard.

- [Getting Started to Set Up and Administer Monitoring Agents](#)
- [Discovering Server Groups](#)
- [Configuring Monitoring Agents for Data Collection](#)
- [Configuring Agent Properties](#)
- [Managing certificates](#)

Getting Started to Set Up and Administer Monitoring Agents

Foglight for vCloud Director includes a set of dashboards that allow you to monitor your virtual environment and manage monitoring agents. The vCloud Environment dashboard consists of several tabs, each focusing on a specific aspect of your monitoring needs. The **Administration** tab

To access this tab, on the navigation panel, under **Dashboards**, choose **vCloud Director > vCloud Environment**, and then open the **Administration** tab.

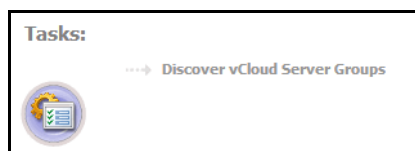
Figure 1. Administration tab



Exploring the Available Tasks

The **Tasks** area contains a link to the vCloud Discovery Wizard, **Discover vCloud Server Groups**. You can use this wizard to find a vCloud server group and the related cells in your environment. For more information, see [Discovering Server Groups](#) on page 10.

Figure 2. Tasks area



Exploring the Agents table

The **Agents** table lists the existing agent instances and allows you to manage them. It contains a set of columns that indicate various states of individual agent instances, along with several commands that you can issue to manage them. For example, to see if an agent instance is collecting data, look at the agent's **Data Collection** column. A green check mark indicates that the agent is collecting data.

Figure 3. Agents table

 A screenshot of the 'Agents' table in the Foglight interface. The table has columns for Agent Name, Foglight Agent Manager Host, Active, Data Collection, Alarms, Edit Properties, Download Log, and Agent Version. Two agent instances are listed: 'VCloud Agent 1' and 'VCloud Agent 2'. The 'Active' column shows green checkmarks for both, and the 'Data Collection' column also shows green checkmarks. The 'Agent Version' column shows 'Version Up To Date' for both. Above the table is a toolbar with buttons for Add, Refresh, Activate, Deactivate, Start Data Collection, Stop Data Collection, Remove, and Update Agent.

Agent Name	Foglight Agent Manager Host	Active	Data Collection	Alarms	Edit Properties	Download Log	Agent Version
VCloud Agent 1	Host1.example.com	✓	✓				Version Up To Date
VCloud Agent 2	Host2.example.com	✓	✓				Version Up To Date

Table 1. Agents table

Agent Name	The name of the agent instance.
Foglight Agent Manager Host	The name of the machine on which the Agent Manager process is running.
Active	Indicates if the agent process is running.
Data Collection	Indicates if the agent is collecting data from the monitored environment.
Alarms	The total numbers of Warning, Critical, and Fatal alarms.
Edit Properties	Allows you to edit the agent's properties.
Download Log	Allows you to download the agent log file.
Agent Version	Indicates if the agent is running the latest version of the agent package (Version Up To Date), or it needs to be updated (Update Agent).

Exploring the toolbar

The toolbar appearing on top of the **Agents** table provides a set of commands that allow you to manage agent instances. To issue any of the available commands, simply select one or more agent instances using the check boxes in the left-most column, and click the appropriate button on the toolbar. For example, to start an agent's data collection, select the agent and click **Start Data Collection**.

Figure 4. Agents table toolbar

Agents								
Add Refresh Activate Deactivate Start Data Collection Stop Data Collection Remove Update Agent								
<input type="checkbox"/>	Agent Name ▲	Foglight Agent Manager Host	Active	Data Collection	Alarms	Edit Properties	Download Log	Agent Version
<input type="checkbox"/>	VCloud Agent 1	zhuvmvfog.dev.quest.corp	✔	✔				✔ Version Up To Date
<input type="checkbox"/>	VCloud Agent 2	zhuvmvfog.dev.quest.corp	✔	✔				✔ Version Up To Date

Table 2. Agents table toolbar

Add	Starts a workflow for creating new agent instances. For more information, see Configuring Monitoring Agents for Data Collection on page 13.
Refresh	Refreshes the list of agent instances and their states.
Activate	Activates one or more selected agent instances. Activating an agent instance starts the agent process on the machine on which the agent is installed.
Deactivate	Deactivates one or more selected agent instances. Deactivating an agent stops the agent process on the machine on which the agent is installed.
Start Data Collection	Starts the data collection for one or more selected agent instances. Starting an agent's data collection causes the agent to begin monitoring the associated vCloud server and to send the collected metrics back to the Management Server.
Stop Data Collection	Stops the data collection for one or more selected agent instances. Stopping an agent's data collection causes the agent to stop monitoring the associated vCloud server.
Remove	Deletes the selected agent instance.
Update Agent	Updates the agent package to the latest version that is installed on the Management Server.

Discovering Server Groups

A vCloud Director® server group contains one or more vCloud Director servers. The vCloud Director servers use a shared database, and are associated with vCenter® servers and ESX® hosts. Each vCloud Director server is considered a cell in the server group, with established connections to the shared database, vCenter server, and any ESX hosts.

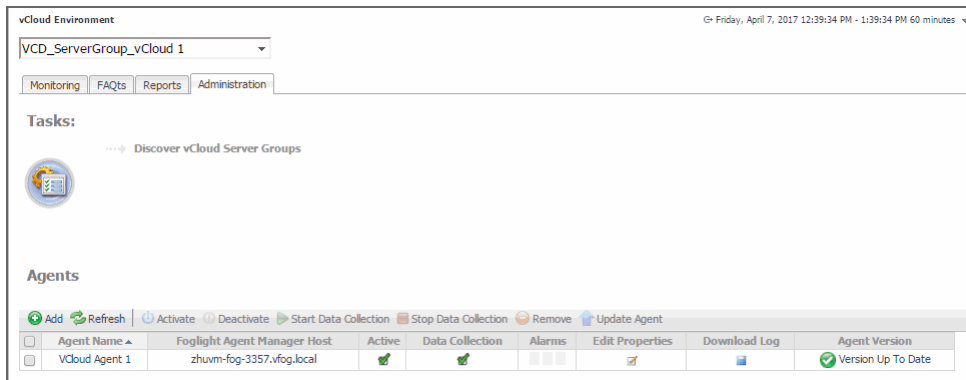
Given a vCloud Director server, the **vCloud Discovery Wizard** allows to locate a desired server group, and to configure monitoring for one or more server cells belonging to that group. This results in two or more agent instances: a vCloud Director agent (to monitor the vCloud server) and one or more VMware Performance agents (to monitor the associated vCenters).

i **NOTE:** In FIPS-compliant mode, you need to import the CA certificate or the self-signed certificate to the KeyStore of FglAM to use this option. For more information, see [Managing certificates](#) on page 16.

i **NOTE:** The VMware Performance Agent is provided with Foglight for VMware. Ensure this product is installed and enabled in your environment before running the vCloud Discovery wizard. For complete information about Foglight for VMware for VMware, see the *Foglight for VMware User and Reference Guide*.

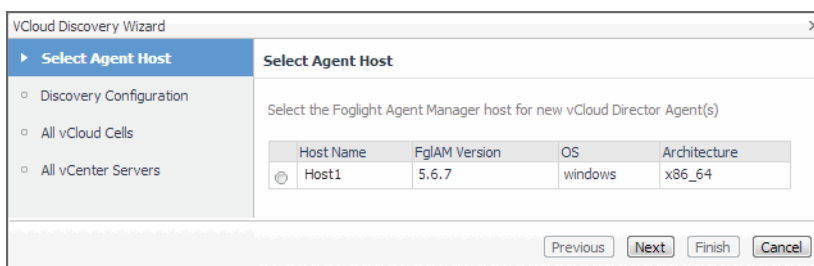
To start monitoring a vCloud Director server:

- 1 Log in to the Foglight browser interface.
- 2 On the navigation panel, under **Dashboards**, click **vCloud Director > vCloud Environment**.
- 3 Click the **Administration** tab.

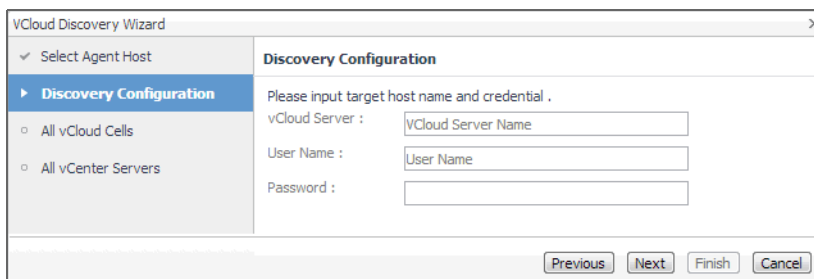


- 4 Under **Tasks**, click **Discover vCloud Server Groups** to launch the **vCloud Discovery Wizard**.

The **vCloud Discovery Wizard** appears, showing the **Select Agent Host** page. The page lists one or more hosts that are running Agent Manager instances.



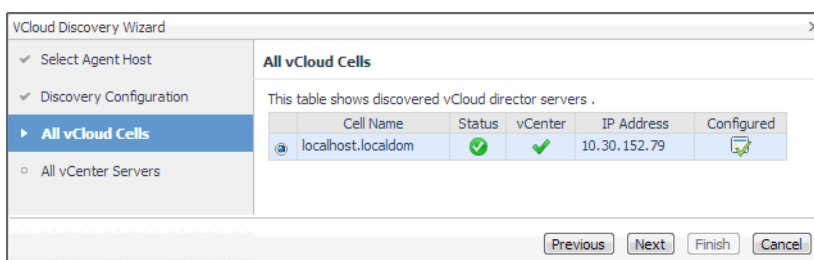
- 5 On the **Select Agent Host** page, select the running Agent Manager that you want to manage the monitoring agents you are about to create, and click **Next**.



- 6 On the **Discovery Configuration** page, provide the following information needed to connect to the vCloud server belonging to the group whose cell you want to monitor.

- **vCloud Server:** Type the vCloud server name.
- **User Name:** Type the user name needed to access the vCloud server.
- **Password:** Type the password needed to access the vCloud server, associated with the above user name.

- 7 Click **Next**.



- 8 On the **All vCloud Cells** page, select the vCloud server that you want to monitor, and click **Next**.
- 9 On the **All vCenter Servers** page, select one or more vCenter that you want to monitor.

i **IMPORTANT:** Monitoring a vCenter requires a running instance of the VMware Performance Agent. This agent is provided with Foglight for VMware. For more information about this product, see the *Foglight for VMware User and Reference Guide*.

- 10 **Optional**—Configure monitoring of a vCenter using the VMware Performance Agent.

- a On the **All vCenter Servers** page, in the row listing the vCenter that you want to configure, click the **Configure Agent** column.

The **VMware vCenter Agent: Configure Agent Properties** dialog box appears.

- b Provide the following information needed to connected to the vCloud server belonging to the group whose cell you want to monitor.
 - **VMware Agent Name:** If you want to specify a different name than the one provided by default (for example, *VMware Agent 1*), type it in this box.
 - **Port:** If you want to use a different port number than the one provided by default, 443, type it in this box.
 - **User Name:** Type the user name for the VMware Performance Agent to use to log in to the specified Virtual Center.
 - **Password:** Type the password needed to access the specified Virtual Center, associated with the above user name.
 - **Enable Storage Collection:** If you are running Foglight for Storage Management and want to enable the VMware Performance Agent to collect the Foglight for Storage Management data, select this check box. Otherwise, leave this box clear.

i **NOTE:** Foglight for Storage Management can help you optimize the VMware environment virtual storage and its underlying physical storage components. For more information about this product, see the Foglight for Storage Management documentation.

- c Click **Save**.

- 11 Click **Finish**.

- 12 The **vCloud Discovery Wizard** closes and the **Result For Agent(s) Creation** dialog box appears, showing a list of monitoring agents created during the discovery process.

Agent Name	Agent Type	Creation Status	Message
VCloud Agent 1	VCloudDirectorAgent	Success	Success creating and activating agent VCloud Agent 1.
VMware Agent 1	VMwarePerformance	Success	Success creating and activating agent VMware Agent 1.
VMware Agent 1	VMwarePerformance	Success	Error creating agent VMware Agent 1: Agent already exists.

Configuring Monitoring Agents for Data Collection

Foglight for vCloud Director uses the vCloud Director Agent to collect information from monitored hosts. Creating a vCloud Director Agent instance creates the agent process on the Agent Manager host. Activating the vCloud Director Agent starts that agent process. Starting an agent instance's data collection enables the agent to start collecting data from the monitored host and to send it to the Management Server.

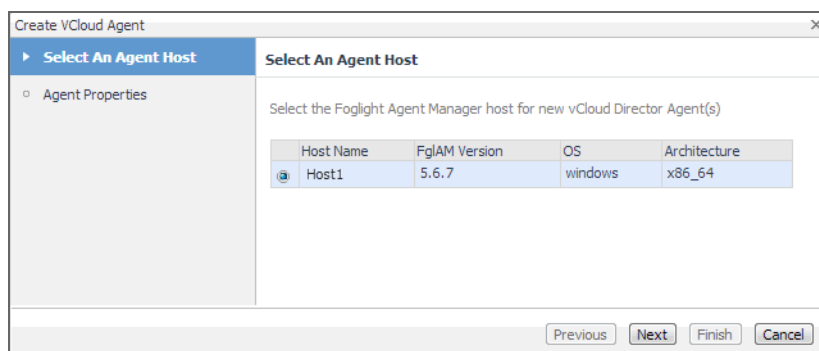
When the vCloud Director Agent package is successfully deployed, create one or more agent instances, activate them, and start their data collection. To perform these steps in a single operation for one or more monitored hosts, use the **Create vCloud Agent** wizard accessible from the **Agents** area on the **Administration** tab of the vCloud Environment dashboard.

To create and activate vCloud Director Agent instances, and start their data collection:

- 1 Log in to the Foglight browser interface.
- 2 On the navigation panel, under **Dashboards**, click **vCloud Director > vCloud Environment**.
- 3 Click the **Administration** tab.



- 4 Under **Agents**, click **Add** to launch the **Create vCloud Agent** wizard.



- 5 Select the host running the Agent Manager that you want to use to manage the agent instance you are about to create, and click **Next**.

- 6 On the **Agent Properties** page, provide the following information needed to create a vCloud associated with the server that you want to monitor.
 - **vCloud Server Group Name:** Type the name of the group to which the vCloud server that you want to monitor belongs.
 - **vCloud Server:** Type the vCloud server name.
 - **User Name:** Type the user name needed to access the vCloud server.
 - **Password:** Type the password needed to access the vCloud server and associated with the above user name.
- 7 Click **Finish**.
The wizard closes, and the **Agents** area refreshes, showing a newly created agent instance.
- 8 Select the agent instance in the list and click **Activate**.
- 9 Select the agent instance in the list and click **Start Data Collection**.

Configuring Agent Properties

The vCloud Director Agent collects data from the virtual infrastructure and sends it to the Management Server. The agent keeps track of resource utilization metrics and alerts you when certain pre-defined thresholds are reached.

When an agent connects to Foglight™, it is provided with sets of properties that it uses to configure its correct running state. Each agent is provided with a combination of two types of properties: agent properties and shareable properties.

Default versions of these properties are installed with Foglight for VMware. However, you can edit the default shareable and agent properties, configure agent properties that apply only to a specific agent instance, and create edited clones of shareable properties that are used by a subset of agents of a certain type.

For detailed information about working with agent properties, see the *Administration and Configuration Help*.

To modify agent properties:

- 1 Log in to the Foglight browser interface.
- 2 Open the Agent Status dashboard and navigate to the agent properties.
 - a On the navigation panel, under **Dashboards**, choose **Administration > Agents > Agent Status**.
 - b On the Agent Status dashboard, select the instance of the vCloud Director Agent whose properties you want to modify, and click **Edit Properties**.
 - c Click **Modify the private properties for this agent**.
The vCloud Director Agent properties appears in the display area.

The configuration of agent properties described in this section include:

- [Setting the Configuration Properties](#) on page 15
- [Setting the Data Collection Scheduler Properties](#) on page 15

Setting the Configuration Properties

The **Configuration** properties specify general settings the vCloud Director Agent needs to connect to the monitored vCloud server.

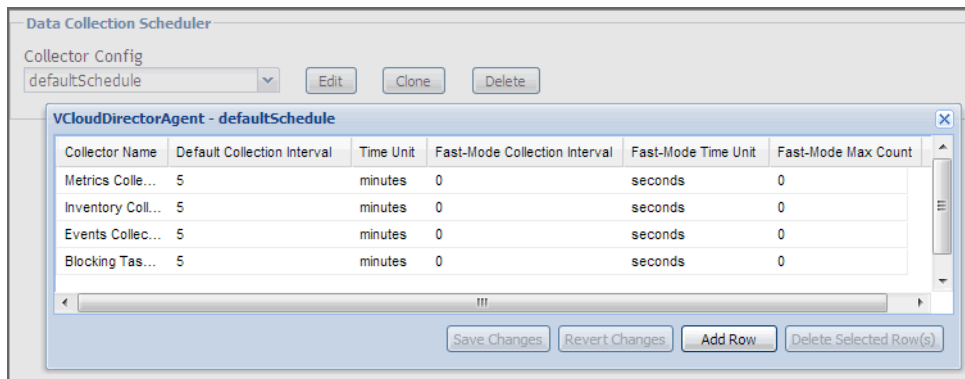
Figure 5. Configuration properties

- **vCloud Server Group Name:** The name of the group to which the vCloud server belongs. Changing the server group name causes the agent to be a part of a different group, while the data associated with the old group is preserved, which may lead to confusion. Therefore changing the server group is not recommended.
- **vCloud Server:** The vCloud server name.
- **User Name:** The user name needed to access the vCloud server.
- **Password:** The password needed to access the vCloud server and associated with the above user name.
- **Event Collection Disabled:** Event Collection is disabled by default.

Setting the Data Collection Scheduler Properties

Use the Data Collection Scheduler properties to adjust how frequently the vCloud Director Agent collects data from the monitored vCloud server.

Figure 6. Data Collection Scheduler properties



- **Collector Config:** A list containing the data collectors the agent uses. Each entry in the list includes the following columns:
 - **Collector Name:** The name of the collector the vCloud Director Agent uses to gather data.
 - **Default Collection Interval:** The number of milliseconds, seconds, minutes, hours, or days during which the vCloud Director Agent collects data.
 - **Time Unit:** The time unit associated with the **Default Collection Interval**.
 - **Fast-Mode Collection Interval:** The number of milliseconds, seconds, minutes, hours, or days during which the vCloud Director Agent collects data when working in the fast collection mode.
 - **Fast-Mode Time Unit:** The time unit associated with the **Fast-Mode Collection Interval**.
 - **Fast-Mode Max Count:** The maximum number of the times the vCloud Director Agent can stay in fast collection mode.

Managing certificates

Syntax Conventions

In order to successfully make use of the Foglight commands in your monitoring environment, review the syntax conventions before getting started. The syntax conventions are as follows:

- Generic examples follow the UNIX path structure that uses forward slashes '/' to separate directories.
- Platform-specific examples follow standard platform conventions. For example, UNIX-specific examples use forward slashes '/' as directory delimiters, while Windows examples use backslashes '\'.
- `<foglight_home>` is a placeholder that represents the path to the Foglight Management Server installation.
- `<foglight_agent_mgr_home>` is a placeholder that represents the path to the Foglight Agent Manager installation. This can be the location of the Foglight Agent Manager installation on a monitored host, or the home directory of the Foglight Agent Manager that comes embedded with the Foglight Management Server. For example:

Path to the Foglight Agent Manager installation on a monitored host (Windows):

`C:\Quest\Foglight_Agent_Manager`

Path to the embedded Foglight Agent Manager installation (Windows):

`C:\Quest\Foglight\fglam`

- Unless otherwise specified, Foglight commands are case-sensitive.

Managing certificates for FglAM

Foglight Evolve agents use Foglight Agent Manager (FglAM) to manage certificates for SSL encryption connection.

Prerequisite

All the certificate-related command line options require that FglAM be **up and running**.

Add a certificate

```
bin/fglam --add-certificate "user alias 1"="/path/to/certificate/file
```

- Validate the certificate and ensure the following:
 - It is not expired.
 - It is an X.509 format.
 - FglAM requires the Base64 format. To verify if the certificate file is encoded with Base64, open the certificate with a notepad and the certificate should be similar to the following example:

```
-----BEGIN CERTIFICATE-----
XXXXXXXXXX=
-----END CERTIFICATE-----
```
- i** **NOTE:** If the certificate is not Base64 format, use openssl command to convert the certificate file into a Base64 file. Use either of the following commands depending on the source form:
- ```
openssl x509 -inform DER -in xxx.cer -out xxx.crt
or
openssl x509 -inform PEM -in xxx.cer -out xxx.crt
```
- The `alias` is required and is used in the list and delete operations to refer to the certificate. It can be anything.

## List installed certificates

```
bin/fglam --list-certificates
```

Print out a list of certificates and the aliases that refer to them.

Refer to the example output below:

```
List of installed certificates:

Alias Certificate Info

user alias 1 XXXX
```

## Delete a certificate

Remove a certificate referred to by an alias.

```
bin/fglam --delete-certificate "user alias 1"
```

## A full example for managing certificate for FglAM

- Add an example certificate into FglAM certificate store

```
C:\Quest\Foglight\fglam\bin>fglam.exe --add-certificate "Evolve-test"="D:/Evolve-test.crt"
```

...

```
2020-02-27 16:31:01.000 INFO [native] Certificate added: Certificate from
D:\Evolve-test.crt added as Evolve-test
```

- **List the example certificate in the FglAM certificate store**

```
C:\Quest\Foglight\fglam\bin>fglam.exe --list-certificate
```

...

| Alias       | Certificate        |
|-------------|--------------------|
| -----       | -----              |
| Evolve-test | Issuer:<br>CN: XXX |

- **Delete the example certificate from the FglAM certificate store**

```
C:\Quest\Foglight\fglam\bin>fglam.exe --delete-certificate "Evolve-test"
```

...

```
2020-02-27 16:28:21.000 INFO [native] Certificate deleted: Certificate
Evolve-test deleted
```

# Investigating Resource Consumption Levels

When you deploy Foglight™ for vCloud Director and set up the monitoring agents for data collection, a set of predefined dashboards enables you to review the performance of your virtual system at a glance. They allow you to ensure consistent application performance, by drilling down for details from higher-level components to physical servers and virtual machines, and viewing details about each component, such as CPU utilization and network I/O.

- [Exploring your vCloud Director Environment](#)
- [Monitoring Organizations, Organization vDCs, and Provider vDCs](#)
- [Monitoring vSphere Resources](#)
- [Monitoring Virtual Machines](#)
- [Reviewing Frequently Asked Questions](#)
- [Generating Reports](#)

## Exploring your vCloud Director Environment

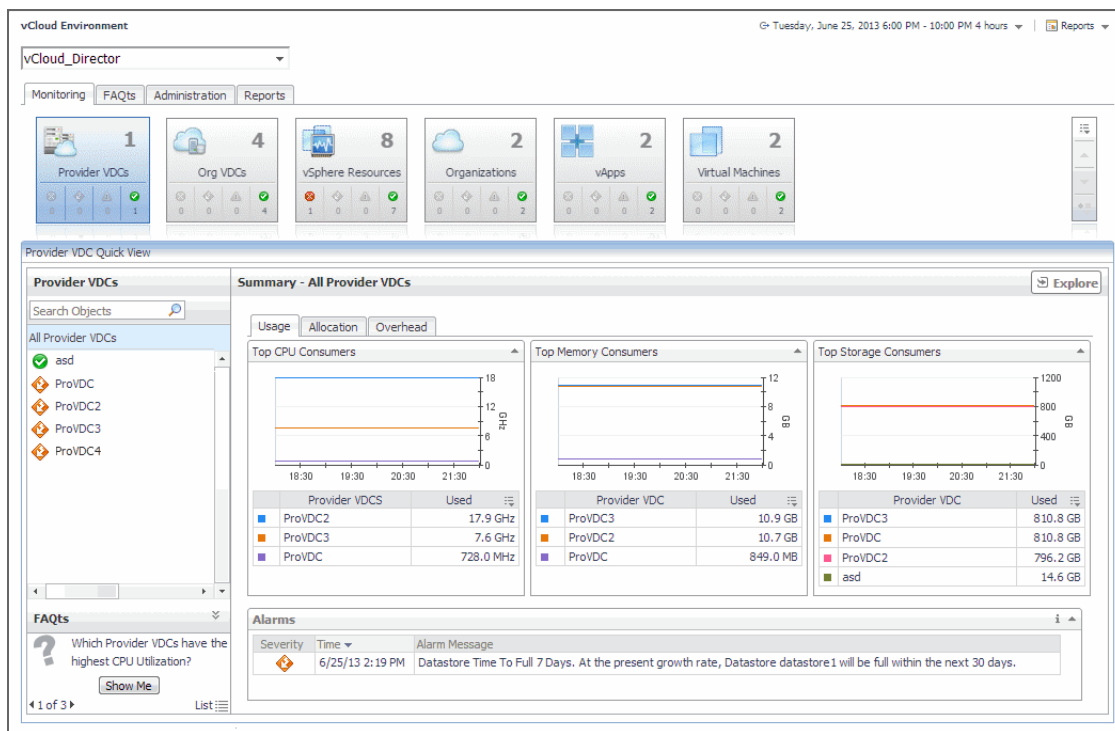
A typical vCloud Director® environment contains a set of vDCs, organizations, and virtual machines. You can view the overall state of these components on the vCloud Environment dashboard. To access this dashboard, under **Dashboards**, choose **vCloud Director > vCloud Environment**.

This dashboard provides a set of tabs, each displaying a different aspect of your monitored system:

- **Monitoring:** Use this tab to review data specific to the main components of your monitored environment such as provider vDCs, organization vDCs, vSphere resources, organizations, and virtual machines. This chapter describes the features available on this tab.
- **FAQts:** Use this tab to review the answers to common questions about your monitored systems. For more information, see [Reviewing Frequently Asked Questions](#) on page 40.
- **Reports:** Use this tab to find out more about predefined templates that can be used to report on the various aspects of your virtual environment. For more information, see [Generating Reports](#) on page 41.
- **Administration:** Use this tab to discover vCloud server groups and to manage vCloud Director agent instances. For more information, see [Setting Up Monitoring Agents](#) on page 8.

When you navigate to the vCloud Environment dashboard for the first time, the **Monitoring** tab appears open. This tab provides an overall summary of your monitored environment.

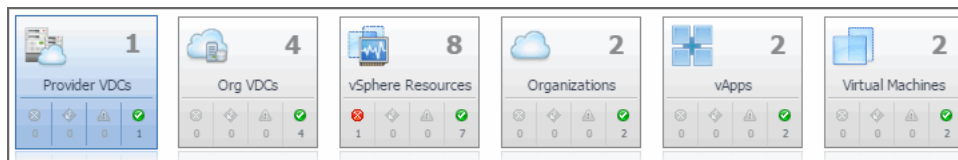
**Figure 7. Monitoring tab**



## Selecting Monitored Objects

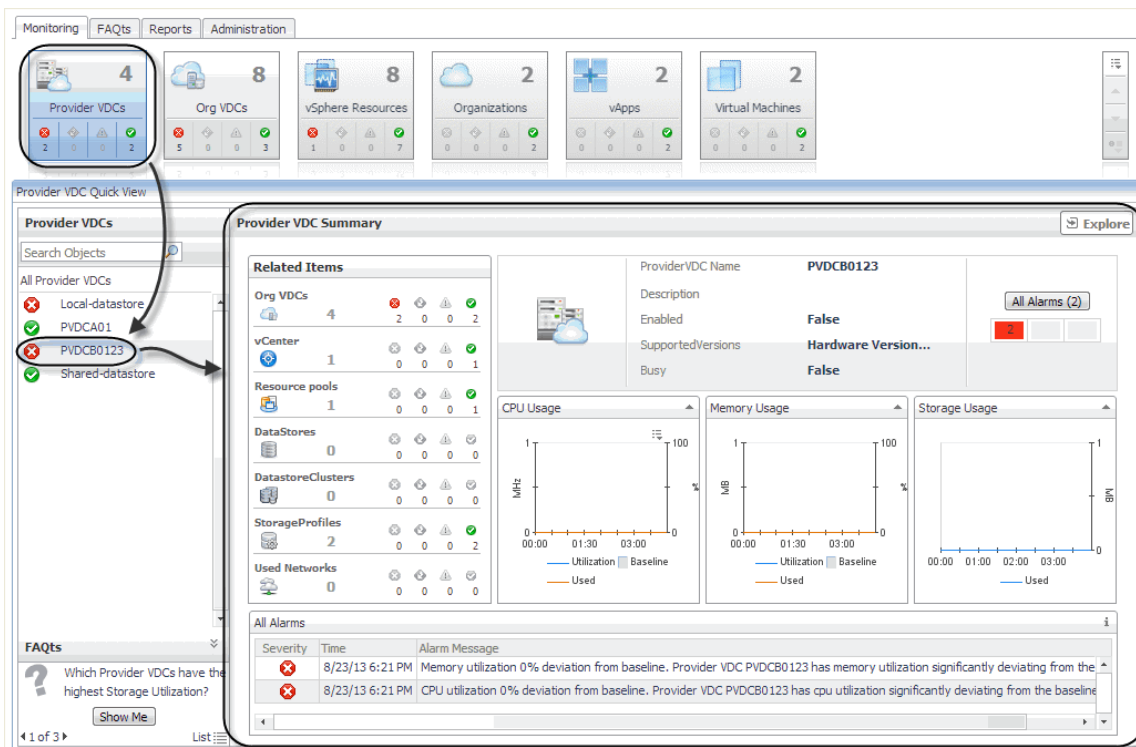
A set of tiles along the top of this tab gives you a quick overview of the monitored objects: provider vDCs, organization vDCs, vSphere resources, organizations, and virtual machines. Each tile represents a collection of a specific object type, shows the object count, and the count of objects in each alarm state (Normal, Warning, Critical, and Fatal).

**Figure 8. Monitored object collections**



The Quick View appearing immediately below the tiles allows you to select a specific instance of the tile selection. From here, you can drill down on a desired object instance, and review the related monitoring metrics.

Figure 9. Drilling down on a monitored object



## Managing Alarms

If any alarms are generated against the selected object, they appear along the bottom of the summary view. Drill down on an alarm to find out what triggered it, and to take steps to investigate further.

Figure 10. Drilling down on an alarm

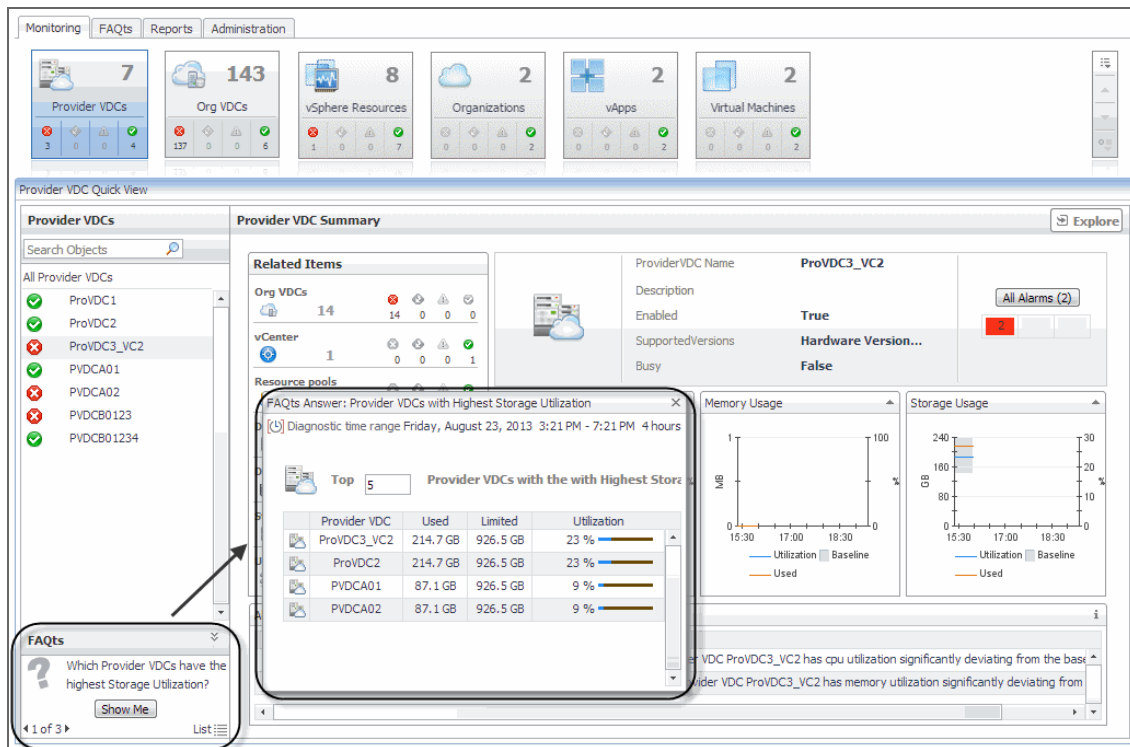
The screenshot displays the Foglight for vCloud Director interface. At the top, there are tabs for Monitoring, FAQs, Reports, and Administration. Below the tabs is a dashboard with several resource monitors: Provider VDCs (7), Org VDCs (143), vSphere Resources (8), Organizations (2), vApps (2), and Virtual Machines (2). The main area is divided into a left sidebar for 'Provider VDC Quick View' and a central 'Provider VDC Summary' section. The summary section shows related items like Org VDCs, vCenter, Resource pools, DataStores, DatastoreClusters, StorageProfiles, and Used Networks. An 'All Alarms' section at the bottom left lists two alarms for ProVDC3\_VC2. An arrow points from one of these alarms to a detailed 'Alarm Created at 8/20/13 10:22 PM' window. This window displays alarm details including Host, Agent, Agent Type, Instance, Origin, and Default Drilldown. It also includes a 'Message and Help' section with a description of the CPU utilization deviation and a 'Has Service Level Impact on 0 Services' section. At the bottom of the alarm window is a table with columns for Created Time, Sev, Dur, Ack'd Info, Clearing Info, and Notes. The table shows one entry for the alarm at 8/20/13 10:22 PM with a severity of 3 and a duration of 3.2 m. The Ack'd Info column shows 'Not Ack'd'. Below the table are buttons for Acknowledge, Acknowledge Until Normal, Clear, Find Historic Occurrences, and Cancel.

For complete information about alarms in Foglight for vCloud Director, see the *Foglight for vCloud Director User Guide*.

## Reviewing FAQs on the Monitoring Tab

In the bottom-left corner of the Quick View you can navigate through the questions associated to the selected components type, and to review the answers.

Figure 11. Reviewing FAQs on the Monitoring tab



You can review these questions in more detail using the **FAQs** tab. For more information, see [Reviewing Frequently Asked Questions](#) on page 40.

## Reviewing Related Items

When you select an object in the left pane of the Quick View, you can quickly find out which objects are associated with the selected object, and to find out their alarm state. The combination of items in this view depends on the type of object selected. For example, if you select an organization object, this view identifies the related organization vDCs, vApps, running virtual machines, groups, and users. Selecting a provider vDC displays the associated organization vDCs, vCenter, resource pools, datastores, datastore clusters, storage profiles, and used networks.

Figure 12. Reviewing Related Items

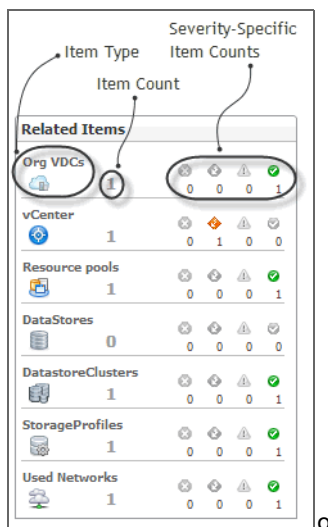


Table 3. Related Item details

|                                      |                                                                                                                                                            |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Item Type</b>                     | The type of the related item. For example, organization vDCs, vCenter, resource pools, datastores, datastore clusters, storage profiles, or used networks. |
| <b>Item Count</b>                    | The number of items in this category.                                                                                                                      |
| <b>Severity-Specific Item Counts</b> | The number of items in each severity state.                                                                                                                |

## Monitoring Organizations, Organization vDCs, and Provider vDCs

An *organization* in vCloud Director® terms is a collection of users, groups, and resources that are available to users. Encapsulated CPU, memory, and storage resources, that are available to an organization comprise an *organization vDC* (virtual datacenter). A *provider vDC* combines the CPU, memory, and storage resources of the associated resource pools and datastores.

You can monitor the collective resource usage, allocation, and overhead of these monitored objects when you select them on the **Monitoring** tab. The information appearing in this view can help you discover potential resource-level issues such as spikes in CPU, memory and disk usage, and to reallocate resources where they are most needed.

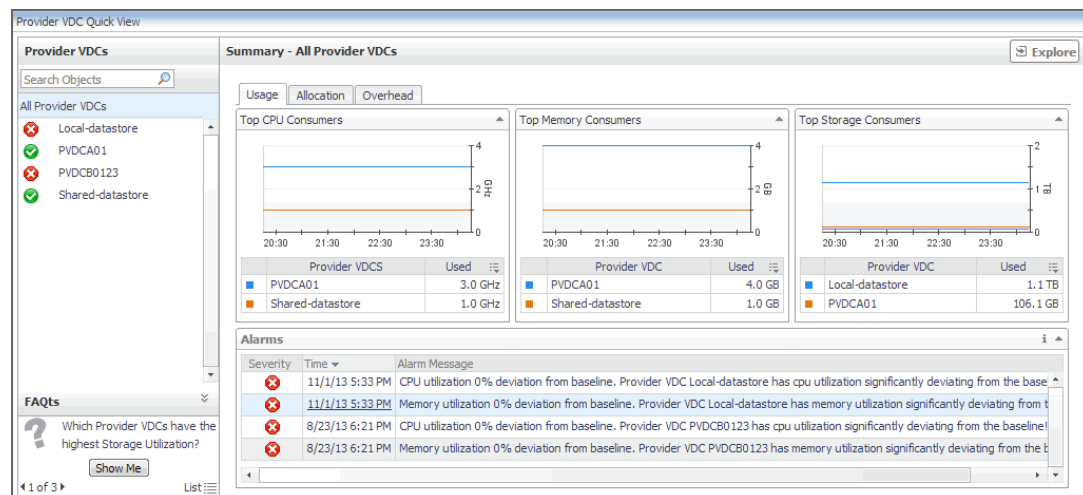
### To explore organizations, organization vDCs, and provider vDCs:

- 1 On the navigation panel, under **Dashboards**, click **vCloud Director > vCloud Environment**.
- 2 On the vCloud Environment dashboard, on the **Monitoring** tab, click one of the following tiles: **Provider vDCs**, **Organization vDCs**, or **Organization**.

The Quick View refreshes, showing the performance summary of all selected components in the right pane. For example, if you select the **Provider vDC** tile in this step, the **Provider vDC Quick View** displays the **Summary - All Provider vDCs** view on the right.



Figure 13. Summary - All Provider vDCs view

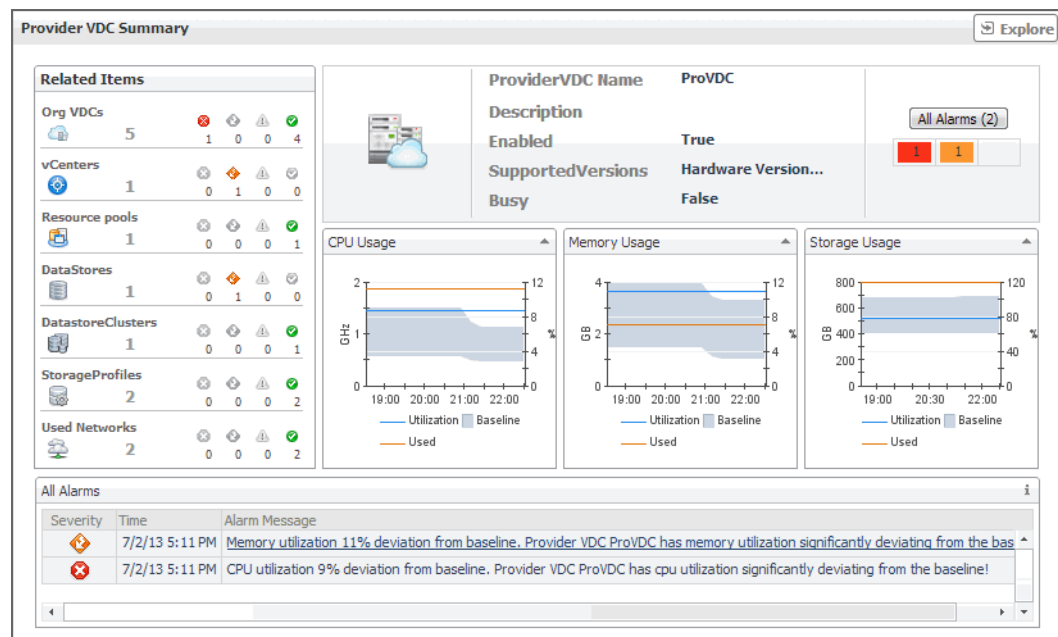


This view displays the overall resource utilization information for all objects of the selected type (organizations, organization vDCs, or provider vDCs) in the monitored vCloud, and identifies the elements that consume the highest amount of system resources. For more information, see [Exploring the Collective Use of All Organization, Organization vDC, or Provider vDC Resources](#) on page 26.

- 3 In the left pane, select an object (an organization, organization vDC, or provider vDC).

The Quick View refreshes, showing an object summary view on the right. For example, if you select a provider vDC, the **Provider vDC Quick View** displays the **Provider vDC Summary** view on the right.

Figure 14. Provider vDC Summary view



This view displays the overall resource utilization and the amounts of system resource consumption for a selected organization, organization vDC, or provider vDC. For more information, see [Exploring the Use of Individual Organization, Organization vDC, or Provider vDC Resources](#) on page 29.

# Exploring the Collective Use of All Organization, Organization vDC, or Provider vDC Resources

The following views display the levels of resource utilization for all organizations, organization vDCs, or provider vDCs objects:

- **Summary - All Organizations**
- **Summary - All Organization vDCs**
- **Summary - All Provider vDCs**

These views identify the elements that consume the highest amount of system resources. They can help you learn about the resource levels used by all organizations, organization vDCs, or provider vDCs in your environment, and to identify and prevent potential bottlenecks by reallocating resources where they are most needed. These summary views appear on the right of the Quick View when you select the **Organization**, **Organization vDCs**, or **Provider vDCs** tile.

Figure 15. Summary view



The information appearing on this view is organized into the following tabs:

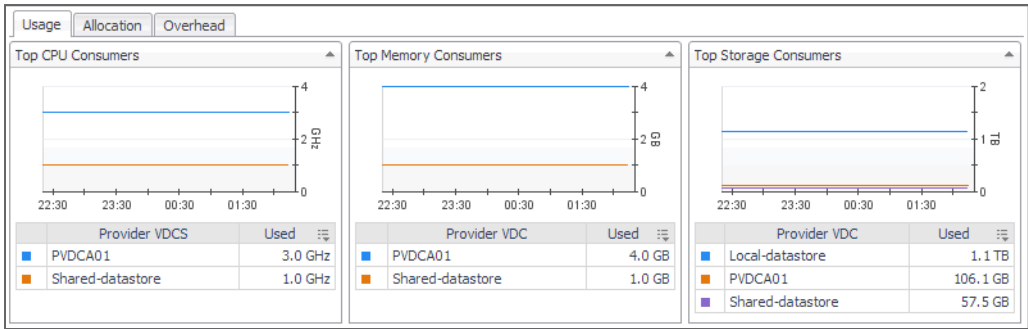
- **Usage tab**
- **Allocation tab**
- **Overhead tab**

For information about the **All Alarms** view also appearing in this summary, see [Managing Alarms](#) on page 21.

## Usage tab

Use this tab to identify the organizations, organization vDCs, or provider vDCs with the highest usage of CPU, memory, and disk resources. The information appearing on this tab can help you to quickly identify the objects whose usage exceeds projected expectations. In most cases, allocating additional resources to these components can help avoid potential bottlenecks.

Figure 16. Usage tab



For each of the identified organizations, organization vDCs, or provider vDCs, the graphs and tables appearing on this tab display the following information. Foglight™ for vCloud Director populates these files using the values stored as metrics collected from monitored organizations, organization vDCs, and provider vDCs.

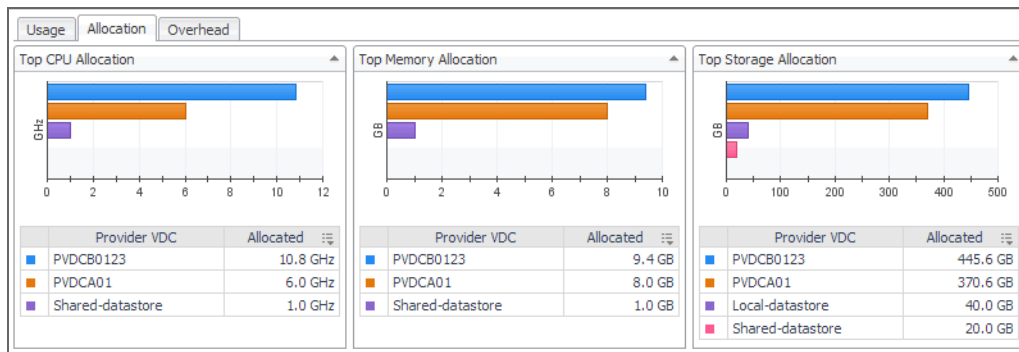
Table 4. Usage tab

| Data                         | Description                                                                            | Metrics                             |
|------------------------------|----------------------------------------------------------------------------------------|-------------------------------------|
| <b>Top CPU Consumers</b>     |                                                                                        |                                     |
| Used                         | The amount of CPU resources used by an organization, organization vDC, or provider vDC | VMVCloudOrganization cpuUsed        |
|                              |                                                                                        | VMVCloudOrganizationVDC cpuUsed     |
|                              |                                                                                        | VMVCloudProviderVDC cpuUsed         |
| <b>Top Memory Consumers</b>  |                                                                                        |                                     |
| Used                         | The amount of memory used by an organization, organization vDC, or provider vDC        | VMVCloudOrganization memoryUsed     |
|                              |                                                                                        | VMVCloudOrganizationVDC memoryUsed  |
|                              |                                                                                        | VMVCloudProviderVDC memoryUsed      |
| <b>Top Storage Consumers</b> |                                                                                        |                                     |
| Used                         | The amount of disk space used by an organization, organization vDC, or provider vDC    | VMVCloudOrganization storageUsed    |
|                              |                                                                                        | VMVCloudOrganizationVDC storageUsed |
|                              |                                                                                        | VMVCloudProviderVDC storageUsed     |

Allocation tab

Use this tab to identify the organizations, organization vDCs, or provider vDCs with the highest amounts of CPU, memory, and disk resources allocated to them. The information appearing on this tab can help you to quickly identify the objects that may require additional resources allocated to them in order to avoid potential bottlenecks.

**Figure 17. Allocation tab**



For each of the identified organizations, organization vDCs, or provider vDCs, the graphs and tables appearing on this tab display the following information. Foglight for VMware populates these tiles using the values stored as metrics collected from monitored organizations, organization vDCs, and provider vDCs.

**Table 5. Allocation tab**

| Data                          | Description                                                                                 | Metrics                                                                                                          |
|-------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>Top CPU Allocation</b>     |                                                                                             |                                                                                                                  |
|                               | The amount of CPU resources allocated to an organization, organization vDC, or provider vDC | <a href="#">VMVCloudOrganization cpuAllocated</a>                                                                |
| <b>Allocated</b>              |                                                                                             | <a href="#">VMVCloudOrganizationVDC cpuAllocated</a><br><a href="#">VMVCloudProviderVDC cpuAllocated</a>         |
| <b>Top Memory Allocation</b>  |                                                                                             |                                                                                                                  |
|                               | The amount of memory allocated to an organization, organization vDC, or provider vDC        | <a href="#">VMVCloudOrganization memoryAllocated</a>                                                             |
| <b>Allocated</b>              |                                                                                             | <a href="#">VMVCloudOrganizationVDC memoryAllocated</a><br><a href="#">VMVCloudProviderVDC memoryAllocated</a>   |
| <b>Top Storage Allocation</b> |                                                                                             |                                                                                                                  |
|                               | The amount of disk allocated to an organization, organization vDC, or provider vDC          | <a href="#">VMVCloudOrganization storageAllocated</a>                                                            |
| <b>Allocated</b>              |                                                                                             | <a href="#">VMVCloudOrganizationVDC storageAllocated</a><br><a href="#">VMVCloudProviderVDC storageAllocated</a> |

## Overhead tab

Use this tab to identify the organizations, organization vDCs, or provider vDCs with the highest amounts of memory overhead. The information appearing on this tab can help you to quickly identify the objects that may require additional memory resources in order to avoid potential bottlenecks.

Figure 18. Overhead tab



For each of the identified organizations, organization vDCs, or provider vDCs, the graph and table appearing on this tab display the following information. Foglight for VMware populates these tiles using the values stored as metrics collected from monitored organizations, organization vDCs, and provider vDCs.

Table 6. Overhead tab

| Data     | Description                                                                                   | Metrics                                                |
|----------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Overhead | The amount of memory overhead generated by an organization, organization vDC, or provider vDC | <a href="#">VMVCloudOrganization memoryOverhead</a>    |
|          |                                                                                               | <a href="#">VMVCloudOrganizationVDC memoryOverhead</a> |
|          |                                                                                               | <a href="#">VMVCloudProviderVDC memoryOverhead</a>     |

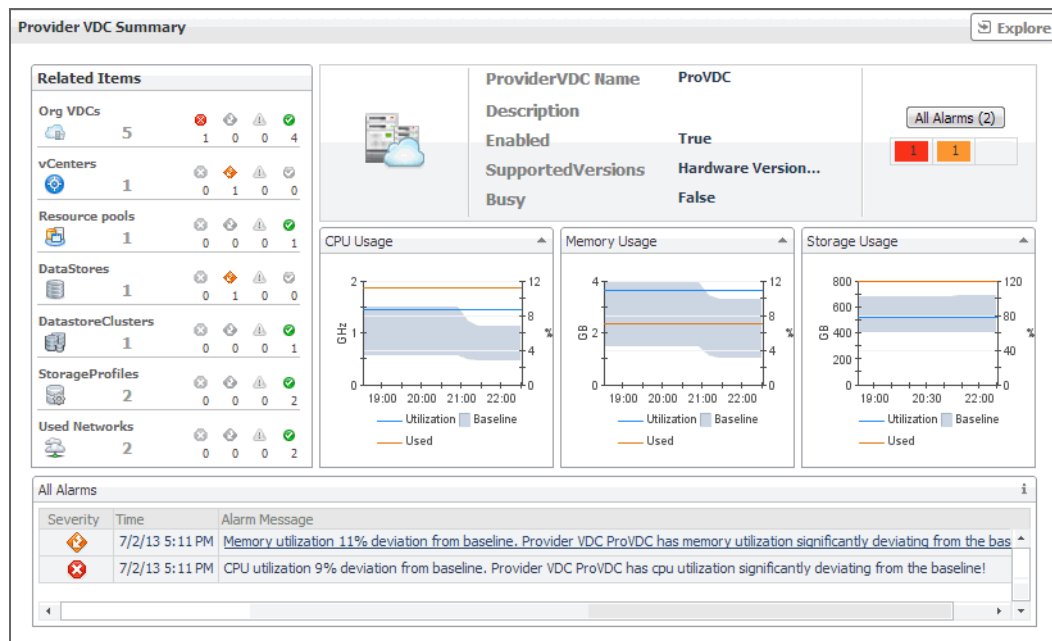
# Exploring the Use of Individual Organization, Organization vDC, or Provider vDC Resources

The following views display the amounts of system resource consumption for a selected organization, organization vDC, or provider vDC:

- **Organization Summary**
- **Organization vDC Summary**
- **Provider vDC Summary**

These views can help you find out the configuration properties of a selected object, such as its name and state, and to identify and prevent potential bottlenecks. They appear on the right in the Quick View when you select an organization, organization vDC, or provider vDC in the left pane.

Figure 19. Provider vDC Summary view



The resource usage and configuration information appearing on this view is organized into the following views:

- [Configuration Properties views](#)
- [CPU, Memory, and Storage Usage views](#)

For information about the **Related Items** and **All Alarms** views also appearing in this summary, see the following sections:




- [Managing Alarms](#) on page 21
- [Reviewing Related Items](#) on page 23

## Configuration Properties views

Use this view to find out the name and description of a selected organization, organization vDC, or provider vDC. The information appearing in this view also offers some basic configuration properties such as the object's current state or allocation model (if applicable).

The combination of items in this view depends on the type of the selected object. For example, if you select an organization, this view displays its name, full name, description, and indicates if the view can publish or is enabled. Selecting a provider vDC shows its name, description supported versions, and indicates if the view is enabled or busy. If any alarms are generated against the selected object, the counts of alarms in each severity state are displayed.

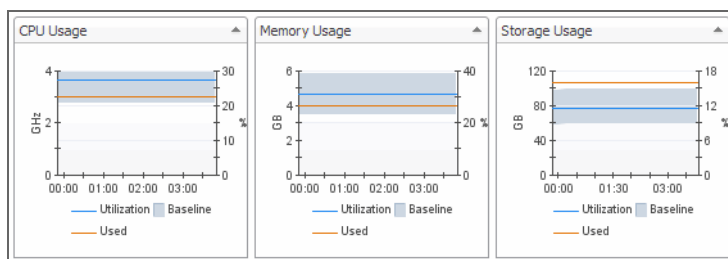
Table 7. Organization, Organization vDC, and Provider vDC properties

|                                    |                                                                                   |
|------------------------------------|-----------------------------------------------------------------------------------|
| Figure 20. Organization properties |                                                                                   |
| Organization                       |  |
|                                    | Name <b>dsg</b>                                                                   |
|                                    | Full Name <b>Dell Software Gr...</b>                                              |
|                                    | Description                                                                       |
|                                    | Enabled <b>True</b>                                                               |
|                                    |                                                                                   |
| Organization vDC                   |  |
|                                    | Organization Name <b>Jay_test_01</b>                                              |
|                                    | ProviderVDC Name <b>PVDCB0123</b>                                                 |
|                                    | Allocation Model <b>Pay-As-You-Go</b>                                             |
|                                    | Enabled <b>True</b>                                                               |
|                                    |                                                                                   |
| Provider vDC                       |  |
|                                    | ProviderVDC Name <b>PVDCA01</b>                                                   |
|                                    | Description                                                                       |
|                                    | Enabled <b>True</b>                                                               |
|                                    | SupportedVersions <b>Hardware Version...</b>                                      |
|                                    |                                                                                   |
| Provider vDC                       | Busy <b>False</b>                                                                 |
|                                    |                                                                                   |

## CPU, Memory, and Storage Usage views

Use this view to find out the percentages of CPU, memory, or memory utilization the selected organization, organization vDC, or provider vDC spends over the selected time range.

Figure 23. CPU, Memory, and Storage Usage views



For each of the identified organizations, organization vDCs, or provider vDCs, the graphs appearing on this tab display the following information. Foglight for VMware populates these tiles using the values stored as metrics collected from monitored organizations, organization vDCs, and provider vDCs.

Table 8. CPU, Memory, and Storage Usage views

| Data               | Description                                                                                                               | Metrics                                                                                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CPU Usage</b>   |                                                                                                                           |                                                                                                                                                                     |
|                    | The percentage of CPU resources an organization, organization vDC, or provider vDC spends during the selected time range. | <a href="#">VMVCloudOrganization cpuUtilization</a><br><a href="#">VMVCloudOrganizationVDC cpuUtilization</a><br><a href="#">VMVCloudProviderVDC cpuUtilization</a> |
| <b>Utilization</b> |                                                                                                                           |                                                                                                                                                                     |

Table 8. CPU, Memory, and Storage Usage views

| Data                 | Description                                                                                                                                                                                  | Metrics                                    |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| <b>Used</b>          | The amount of CPU resources an organization, organization vDC, or provider vDC spends during the selected time range.                                                                        | VMVCloudOrganization cpuUsed               |
|                      |                                                                                                                                                                                              | VMVCloudOrganizationVDC cpuUsed            |
|                      |                                                                                                                                                                                              | VMVCloudProviderVDC cpuUsed                |
| <b>Baseline</b>      | The expected CPU usage range for an organization, organization vDC, or provider vDC. The data range is not based on the current metric values, but on calculations using historical data.    |                                            |
| <b>Memory Usage</b>  |                                                                                                                                                                                              |                                            |
| <b>Utilization</b>   | The percentage of memory resources an organization, organization vDC, or provider vDC spends during the selected time range.                                                                 | VMVCloudOrganization memoryUtilization     |
|                      |                                                                                                                                                                                              | VMVCloudOrganizationVDC memoryUtilization  |
|                      |                                                                                                                                                                                              | VMVCloudProviderVDC memoryUtilization      |
| <b>Used</b>          | The amount of memory resources an organization, organization vDC, or provider vDC spends during the selected time range.                                                                     | VMVCloudOrganization memoryUsed            |
|                      |                                                                                                                                                                                              | VMVCloudOrganizationVDC memoryUsed         |
|                      |                                                                                                                                                                                              | VMVCloudProviderVDC memoryUsed             |
| <b>Baseline</b>      | The expected memory usage range for an organization, organization vDC, or provider vDC. The data range is not based on the current metric values, but on calculations using historical data. |                                            |
| <b>Storage Usage</b> |                                                                                                                                                                                              |                                            |
| <b>Utilization</b>   | The percentage of disk space an organization, organization vDC, or provider vDC spends during the selected time range.                                                                       | VMVCloudOrganization storageUtilization    |
|                      |                                                                                                                                                                                              | VMVCloudOrganizationVDC storageUtilization |
|                      |                                                                                                                                                                                              | VMVCloudProviderVDC storageUtilization     |
| <b>Used</b>          | The amount of disk space an organization, organization vDC, or provider vDC spends during the selected time range.                                                                           | VMVCloudOrganization storageUsed           |
|                      |                                                                                                                                                                                              | VMVCloudOrganizationVDC storageUsed        |
|                      |                                                                                                                                                                                              | VMVCloudProviderVDC storageUsed            |
| <b>Baseline</b>      | The expected disk usage range for an organization, organization vDC, or provider vDC. The data range is not based on the current metric values, but on calculations using historical data.   |                                            |

## Monitoring vSphere Resources

A typical vSphere® infrastructure consists of the following objects:

- *Virtual centers*: Software used to manage virtual environments that are built on the VMware virtualization platform. Each virtual center creates a hierarchical structure of virtual objects that enables a system administrator to logically lay out their virtual infrastructure configuration.
- *ESX® hosts*: Physical machines hosting one or more virtual machines.
- *Resource pools*: Mechanisms that enable the administrator to fine-tune resource allocations within a server cluster.



- **Datastores:** Storage location for virtual machine files.
- **Datastore clusters:** Collections of servers that share common storage resources.

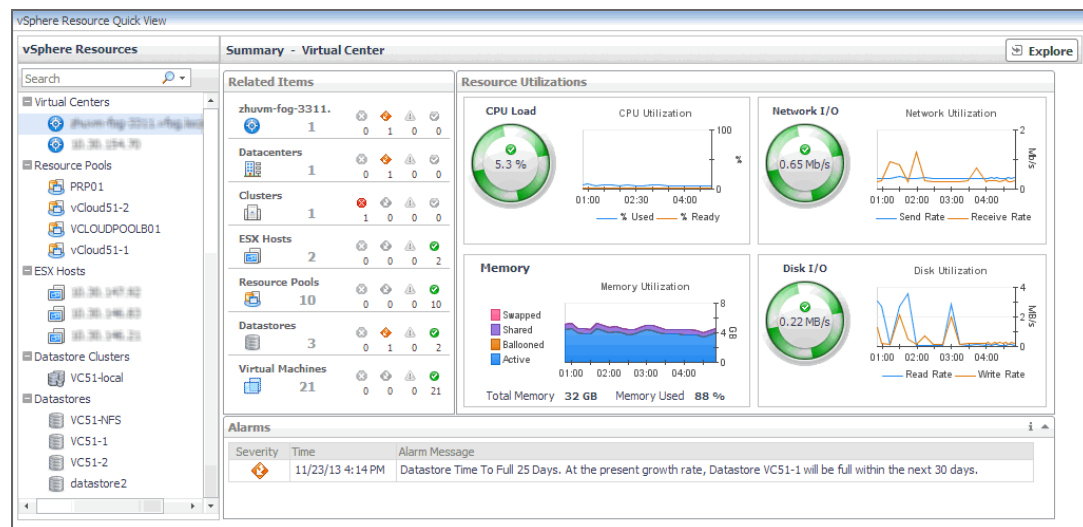
You can monitor the resource usage, allocation, and overhead of these elements when you select them in the Quick View. The information appearing in this view can help you discover potential resource-level issues such as spikes in CPU, memory and disk usage, and to reallocate resources, when required.

### To explore vSphere resources:

- 1 On the navigation panel, under **Dashboards**, click **vCloud Director > vCloud Environment**.
- 2 On the vCloud Environment dashboard, on the **Monitoring** tab, click the **vSphere Resources** tile.

The **vSphere Resource Quick View** appears, showing the performance summary for a component selected in the **vSphere Resources** pane on the left.

**Figure 24. vSphere Resource Quick View**



This view displays the overall resource utilization the selected virtual center, resource pool, or ESX host. For more information, see [Exploring the Use of Virtual Center, Resource Pool, or ESX Host Resources](#) on page 33.

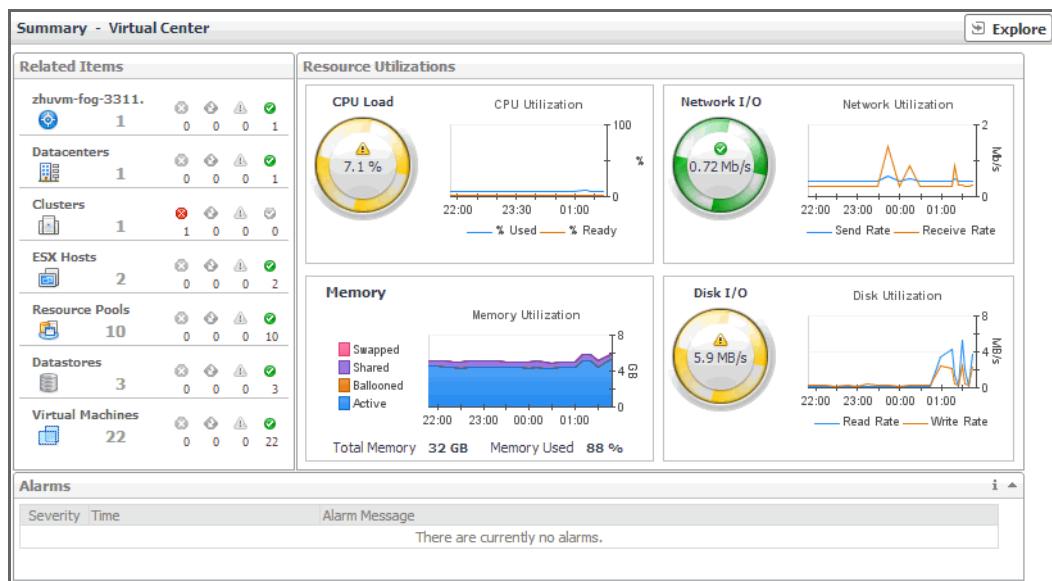
## Exploring the Use of Virtual Center, Resource Pool, or ESX Host Resources

The following views display the amounts of system resource consumption for a selected virtual center, resource pool, or ESX® host:

- **Summary - Virtual Center**
- **Summary - Resource Pool**
- **Summary - ESX Host**

These views can help you to identify and prevent potential bottlenecks by reallocating resources where they are most needed. They appear on the right in the Quick View when you select a virtual center, resource pool, or ESX host in the left pane.

Figure 25. Summary - Virtual Center view



The information appearing on this view is displayed in the [Resource Utilizations view](#).

For information about the **Related Items** and **All Alarms** views also appearing in this summary, see the following sections:

- [Managing Alarms](#) on page 21
- [Reviewing Related Items](#) on page 23

## Resource Utilizations view

Use this view to review the levels of CPU, network, memory, and disk utilization and overall consumption, broken down into four simple views. Foglight™ for vCloud Director populates these values using the metrics collected by Foglight for VMware. For more information about the metrics appearing in these views, see the *Foglight for VMware User and Reference Guide*.

Table 9. Resource Utilizations view

| Data                | Description                                                                                                                                   |
|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CPU Load</b>     | The current percentage of the selected object's CPU load, used to execute system code and user programs, based on the total CPU capacity.     |
| <b>% Used</b>       | The percentage of the selected object's CPU resources spent on executing system code and user programs during the selected time period.       |
| <b>% Ready</b>      | The percentage of the selected object's CPU resources that is ready to execute system code and user programs during the selected time period. |
| <b>Network I/O</b>  | The current rate at which the selected object transfers data from and to the network.                                                         |
| <b>Send Rate</b>    | The rate at which the selected object sends data to the network during the selected time period.                                              |
| <b>Receive Rate</b> | The rate at which the selected object receives data from the network during the selected time period.                                         |
| <b>Memory</b>       |                                                                                                                                               |

Table 9. Resource Utilizations view

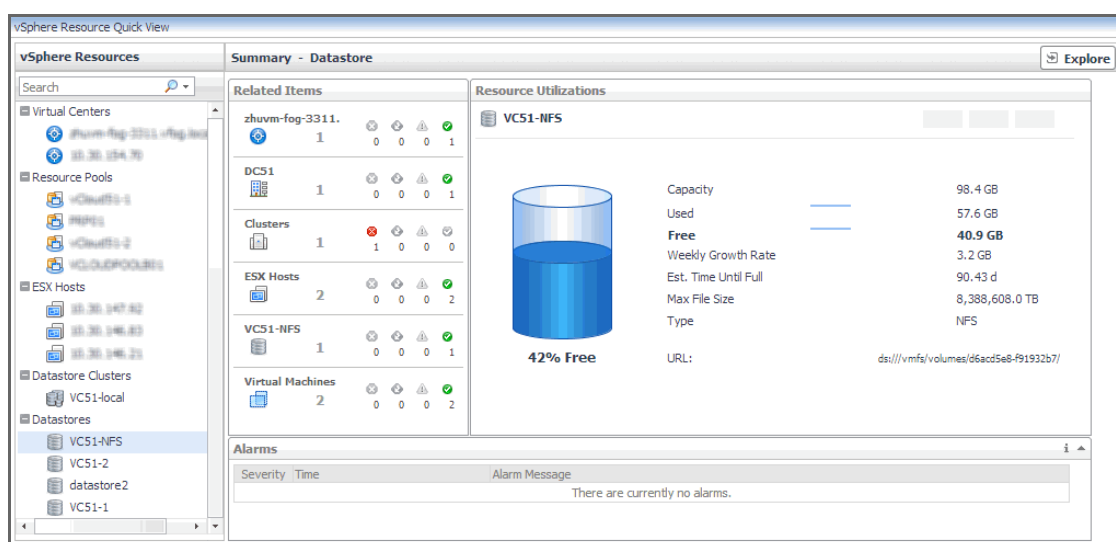
| Data                | Description                                                                                                                                     |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Swapped</b>      | The amount of memory that is stored in disk swap space.                                                                                         |
| <b>Shared</b>       | The amount of the selected object's memory that is freed up due to transparent page sharing.                                                    |
| <b>Ballooned</b>    | The amount of physical memory that is actively being used by the VMware Memory Control Driver to allow the guest OS to selectively swap memory. |
| <b>Active</b>       | The amount of the available memory that the selected object uses during the selected time period.                                               |
| <b>Total Memory</b> | The total amount of memory available to the selected object.                                                                                    |
| <b>Memory Used</b>  | The percentage of memory the selected object currently uses.                                                                                    |
| <b>Disk I/O</b>     | The current disk I/O rate for the selected object.                                                                                              |
| <b>Read Rate</b>    | The rate at which the selected object reads data from the disk during the selected time period.                                                 |
| <b>Write Rate</b>   | The rate at which the selected object writes data to the disk during the selected time period.                                                  |

## Exploring the Use of Datastore or Datastore Cluster Resources

The **Summary - Datastore** and **Summary - Datastore Cluster** views display the levels of storage capacity and growth for a datastore or datastore cluster. These views help you predict the amount of time after which the selected object's storage resources will be full and no longer available. It can help you identify and prevent potential bottlenecks by reallocating storage space where it is most needed.

This summary view appears on the right side of the Quick View when you select a datastore or a datastore cluster.

Figure 26. Summary - Datastore view



The information appearing on this view is displayed in the [Resource Utilizations view](#).

For information about the **Related Items** and **All Alarms** views also appearing in this summary, see the following sections:

- [Managing Alarms](#) on page 21
- [Reviewing Related Items](#) on page 23

## Resource Utilizations view

Use this view to review the levels of disk utilization for a datastore or a datastore cluster. The combination of items in this view depends on the type of the selected object. For example, both datastore and datastore cluster display the total disk capacity, amounts of used and free disk space, percentage of free space, estimated weekly rate, and estimated time after which the disk will be full. For each datastore, this view also shows the maximum file size and file system type, while for datastore clusters this view also contains the amount of uncommitted storage space.

Table 10. Resource Utilizations view

Figure 27. Datastore Resource Utilizations view

**Datastore**

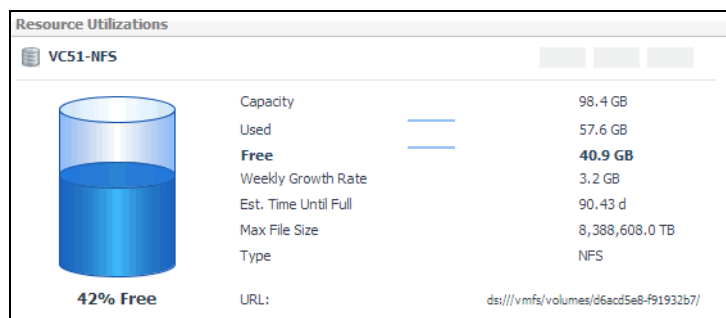
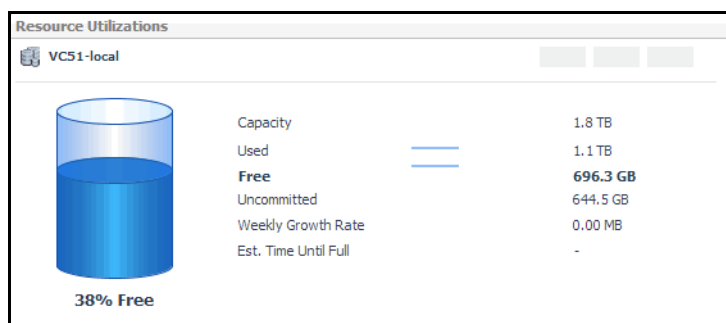


Figure 28. Datastore Cluster Resource Utilizations view

**Datastore Cluster**



## Monitoring Virtual Machines

Virtual machines share many of the characteristics of physical systems (like storage and network interaction), but they do not have direct access to the hardware that is used to process. Each virtual machine runs on a guest operating system (for example, Microsoft® Windows® XP), and is allocated access to a specific set of the server's resources. This includes the number of processors and the amount of memory it can leverage.

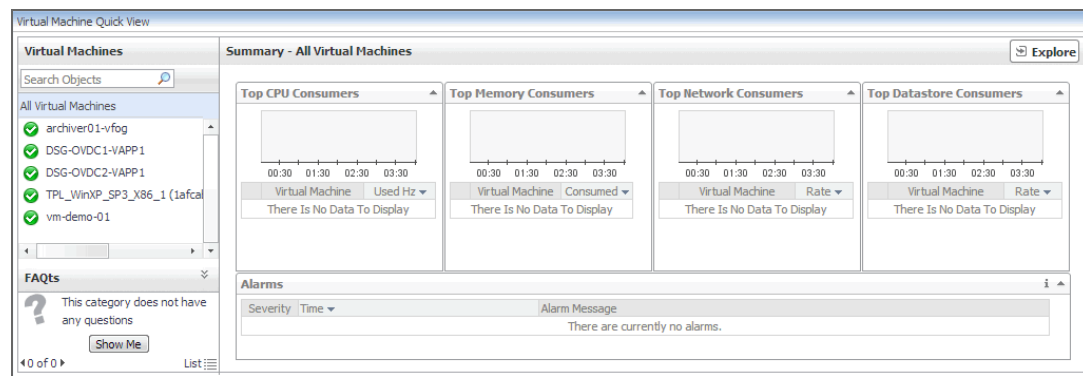
You can monitor the usage of virtual machine resources when you select one or all virtual machines in the Quick View. The information appearing in this view can help you discover potential resource-level issues such as spikes in CPU, memory and disk usage, and to reallocate resources, when required.

### To explore virtual machines:

- 1 On the navigation panel, under **Dashboards**, click **vCloud Director > vCloud Environment**.
- 2 On the vCloud Environment dashboard, on the **Monitoring** tab, click the **Virtual Machines** tile.

The Quick View refreshes, showing the performance summary of all selected virtual machines in the **Summary - All Virtual Machines** view.

Figure 29. Summary - All Virtual Machines view

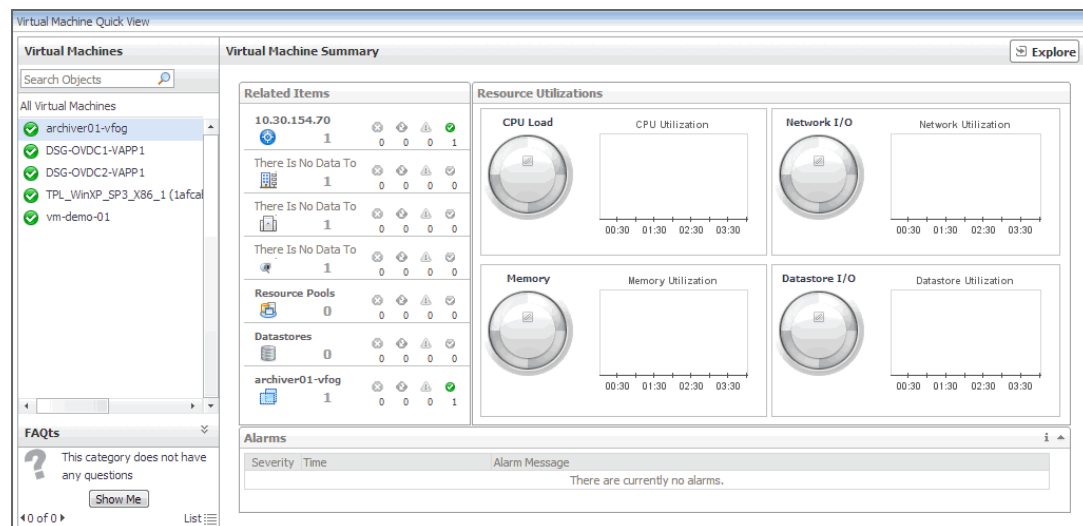


This view displays the overall resource utilization information for all virtual machines in the monitored vCloud, and identifies the elements that consume the highest amount of system resources. For more information, see [Exploring the Collective Use of All Virtual Machine Resources](#) on page 37.

- 3 In the left pane, select a virtual machine.

The Quick View refreshes, showing a virtual machine summary view on the right.

Figure 30. Virtual Machine Summary view



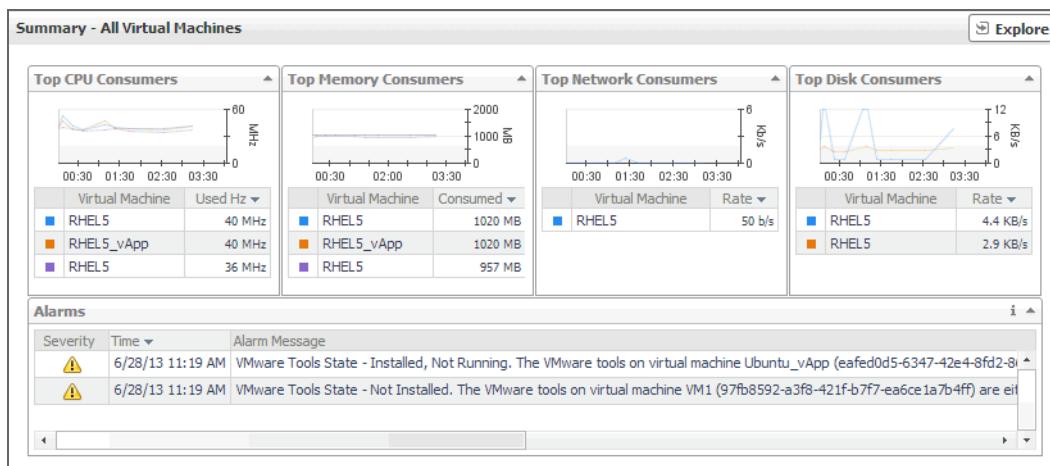
This view displays the levels of system resource consumption for a selected organization, organization vDC, or provider vDC. For more information, see [Exploring the Use of Individual Organization, Organization vDC, or Provider vDC Resources](#) on page 29.

## Exploring the Collective Use of All Virtual Machine Resources

The **Summary - All Virtual Machines** view displays the levels of resource utilization for all virtual machines, broken down into four simple views. This view identifies the virtual machines that consume the highest amount of system resources. It can help you learn about the resource levels used by all virtual machines, and to identify and prevent potential bottlenecks by reallocating resources where they are most needed.

This summary view appears on the right of the Quick View when you select the **Virtual Machines** tile.

Figure 31. Summary - All Virtual Machines view



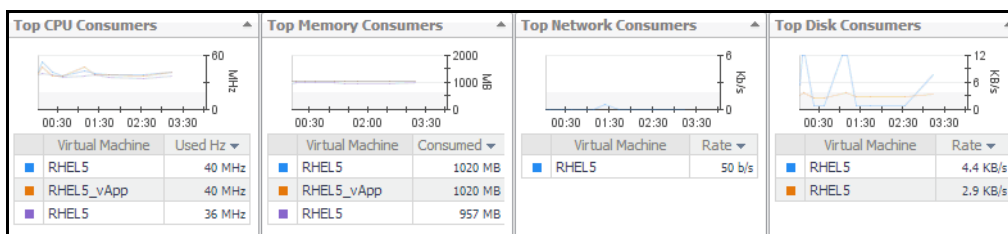
The information appearing on this view is organized into four views: [Top CPU](#), [Memory](#), [Network](#), and [Datastore Consumers](#) views.

For information about the **All Alarms** view also appearing in this summary, see [Managing Alarms](#) on page 21.

## Top CPU, Memory, Network, and Datastore Consumers views

Use these views to identify the virtual machines with the highest consumption of CPU, memory, network, and disk resources.

Figure 32. Top CPU, Memory, Network, and Datastore Consumers views



Foglight™ for vCloud Director populates these views using the metrics collected by Foglight for VMware. For more information about the metrics appearing in these views, see the *Managing Virtualized Environments User and Reference Guide*.

Table 11. Top CPU, Memory, Network, and Datastore Consumers views

| Data                         | Description                                                                                                                               |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Virtual Machine</b>       | The name of the virtual machine.                                                                                                          |
| <b>Top CPU Consumers</b>     |                                                                                                                                           |
| <b>Used Hz</b>               | The amount of CPU processing speed the virtual machine spends on executing system code and user programs, during the selected time range. |
| <b>Top Memory Consumers</b>  |                                                                                                                                           |
| <b>Consumed</b>              | The amount of memory the virtual machine consumes during the selected time range.                                                         |
| <b>Top Network Consumers</b> |                                                                                                                                           |
| <b>Rate</b>                  | The rate at which the virtual machine transfers data to or from the network during the selected time range.                               |

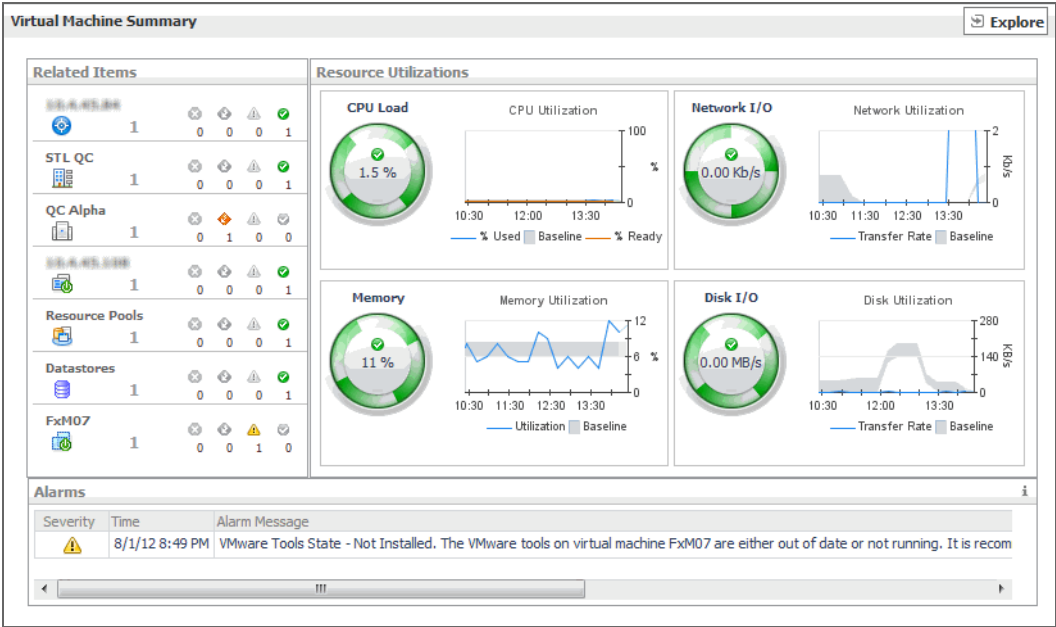
Table 11. Top CPU, Memory, Network, and Datastore Consumers views

| Data               | Description                                                                                             |
|--------------------|---------------------------------------------------------------------------------------------------------|
| Top Disk Consumers |                                                                                                         |
| Rate               | The rate at which the virtual machines reads or writes data to the disk during the selected time range. |

# Exploring the Use of Individual Virtual Machine Resources

The **Virtual Machine Summary** view displays the amounts of system resource consumption for a selected virtual machine. This view can help you to identify and prevent potential bottlenecks by reallocating resources where they are most needed. It appears on the right in the Quick View when you select a virtual machine in the **Virtual Machines** pane.

Figure 33. Virtual Machine Summary view



The information appearing on this view is displayed in the [Resource Utilizations view](#). For information about the **Related Items** and **All Alarms** views also appearing in this summary, see the following sections:

- [Managing Alarms](#) on page 21
- [Reviewing Related Items](#) on page 23

## Resource Utilizations view

Use this view to review the levels of CPU, network, memory, and disk utilization and overall consumption, broken into four simple views. Foglight™ for vCloud Director populates these values using the metrics collected by Foglight for VMware. For more information about the metrics appearing in these views, see the *Managing Virtualized Environments User and Reference Guide*.

Table 12. Resource Utilizations view

| Data                 | Description                                                                                                                                            |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CPU Load</b>      | The current percentage of the selected virtual machine's CPU load, used to execute system code and user programs, based on the total CPU capacity.     |
| <b>% Used</b>        | The percentage of the selected virtual machine's CPU utilization, spent on executing system code and user programs, during the selected time period.   |
| <b>Baseline</b>      | The expected CPU utilization range, based on historical data.                                                                                          |
| <b>% Ready</b>       | The percentage of the selected virtual machine's CPU resources that is ready to execute system code and user programs during the selected time period. |
| <b>Network I/O</b>   | The current rate at which the selected virtual machine transfers data from and to the network.                                                         |
| <b>Transfer Rate</b> | The rate at which the selected virtual machine transfers data from and to the network during the selected time period.                                 |
| <b>Baseline</b>      | The expected network utilization range based on historical data.                                                                                       |
| <b>Memory</b>        | The current percentage of the average memory usage by the selected virtual machine, based on the total memory capacity.                                |
| <b>Utilization</b>   | The percentage of memory used by the virtual machine during the selected time period.                                                                  |
| <b>Baseline</b>      | The expected memory utilization range based on historical data.                                                                                        |
| <b>Disk I/O</b>      | The current disk I/O rate for the selected virtual machine.                                                                                            |
| <b>Transfer Rate</b> | The rate at which the selected virtual machine transfers data from and to the disk during the selected time period.                                    |
| <b>Baseline</b>      | The expected disk utilization range based on historical data.                                                                                          |

## Reviewing Frequently Asked Questions

Foglight™ for vCloud Director offers a collection of frequently asked questions that provide quick insight into resource utilization levels for organization and provider vDCs in your monitored system. The question mechanism is interactive, guiding you to choose a category and specify additional parameters.

You can find the available questions on the **FAQts** tab of the vCloud Monitoring dashboard.



Figure 34. FAQs tab

vCloud Environment

Monday, June 24, 2013 11:29 PM - 3:29 AM 4 hours | Reports

vCloud\_Director

Monitoring | **FAQs** | Administration | Reports

**Categories**

- All Questions
- Favorites
- My Questions
- Organizations
- Organization VDCs
- Provider VDCs

**Questions**

Which Organizations have the highest CPU Utilization?

Which Organizations have the highest Memory Utilization?

Which Organizations have the highest Storage Utilization?

Which Organization VDCs have the highest CPU Utilization?

Which Organization VDCs have the highest Memory Utilization?

Which Organization VDCs have the highest Storage Utilization?

Which Provider VDCs have the highest CPU Utilization?

Which Provider VDCs have the highest Memory Utilization?

Which Provider VDCs have the highest Storage Utilization?

**Which Organizations have the highest CPU Utilization?**

Top 5 Organizations with the Highest CPU Utilization

| Organization | Used    | Limited | Utilization |
|--------------|---------|---------|-------------|
| Org1         | 2.0 GHz | 0.0 MHz |             |

**Related Questions**

- Which Organization VDCs have the highest Memory Utilization?
- Which Organizations have the highest Storage Utilization?
- Which Provider VDCs have the highest Storage Utilization?

On this tab, the **Categories** pane several question groups. Selecting a category shows the questions belonging to that category in the **Questions** pane. From there, clicking a question shows the answer on the right.

Figure 35. FAQs tab, selecting a question from a desired category

vCloud Environment

Monday, June 24, 2013 11:29 PM - 3:29 AM 4 hours | Reports

vCloud\_Director

Monitoring | **FAQs** | Administration | Reports

**Categories**

- All Questions
- Favorites
- My Questions
- Organizations
- Organization VDCs
- Provider VDCs

**Questions**

Which Organizations have the highest CPU Utilization?

Which Organizations have the highest Memory Utilization?

Which Organizations have the highest Storage Utilization?

Which Organization VDCs have the highest CPU Utilization?

Which Organization VDCs have the highest Memory Utilization?

Which Organization VDCs have the highest Storage Utilization?

Which Provider VDCs have the highest CPU Utilization?

Which Provider VDCs have the highest Memory Utilization?

Which Provider VDCs have the highest Storage Utilization?

**Which Organizations have the highest CPU Utilization?**

Top 5 Organizations with the Highest CPU Utilization

| Organization | Used    | Limited | Utilization |
|--------------|---------|---------|-------------|
| Org1         | 2.0 GHz | 0.0 MHz |             |

**Related Questions**

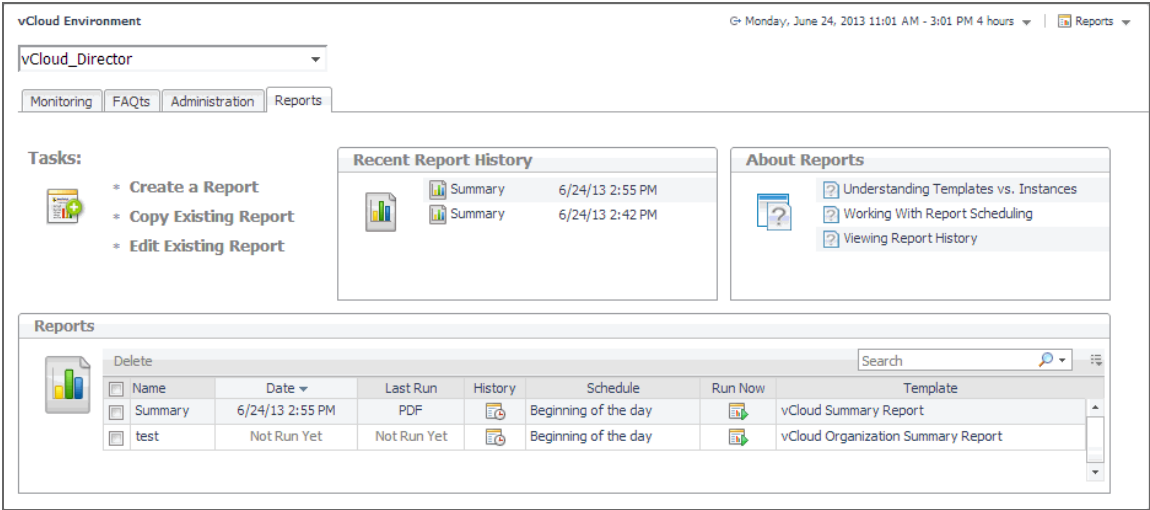
- Which Organization VDCs have the highest Memory Utilization?
- Which Organizations have the highest Storage Utilization?
- Which Provider VDCs have the highest Storage Utilization?

## Generating Reports

Foglight™ for vCloud Director includes a report generation ability. This allows you to create reports using a set of predefined templates to report on the various aspects of your virtual environment. Foglight for VMware includes a collection of predefined report templates.

You can generate, copy, and edit reports using the **Reports** tab on the vCloud Environment dashboard, or alternatively the Reports dashboard included with the Management Server.

Figure 36. Reports tab



For more information on how to use this tab to create and manage reports, see the *Managing Capacity in Virtual Environments User Guide*. For complete information about the Reports dashboard, see the *Foglight User Help*.

The following templates are available with Foglight for VMware.

Table 13. Report templates

| Report Template                           | Use it to...                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>vCloud Organization Summary Report</b> | Compile a list of vCloud Director <sup>®</sup> provider and organization vDCs. For each provider and organization vDC, the list indicates if the vDC is enabled and its alarm state, the levels of used, allocated, and limited CPU, memory, and storage resources, along with a health history bar. In addition, the report shows the allocation model associated with each organization vDC.             |
| <b>vCloud Summary Report</b>              | Compile a list of vCloud provider and organization vDCs, organizations. For each provider vDC, organization vDC, and organization, the list indicates if the vDC is enabled and its alarm state, the levels of used, allocated, and limited CPU, memory, and storage resources, along with a health history bar. In addition, the report shows the allocation model associated with each organization vDC. |

# Investigating Object Dependencies

A typical vCloud Director® environment consists of many interrelated components. Understanding the dependencies between logical and virtual components in your monitored environment, and the levels of resources they consume, allows you to better understand resource-related issues, potentially affecting the stability of your system. This can help you predict the impact a potential outage may have on your environment, and to prevent such events, by reallocating resources where they are most needed.

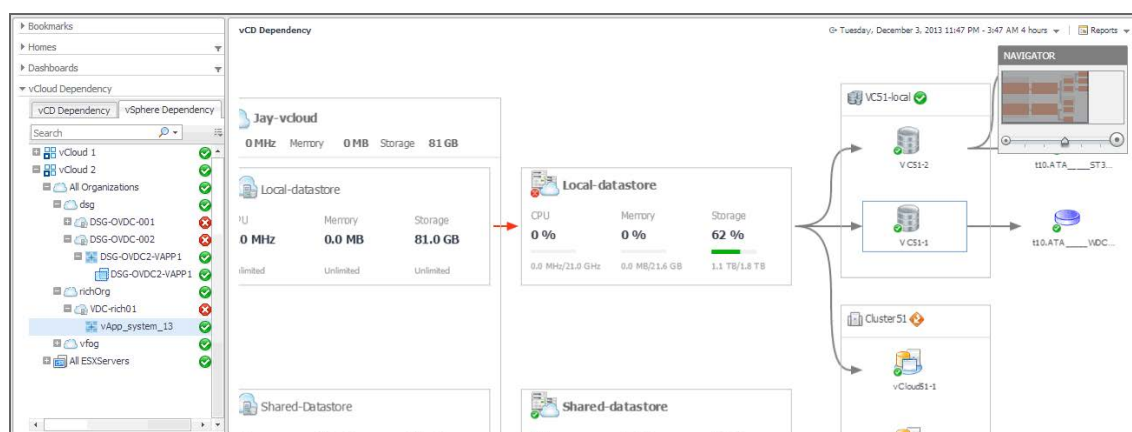
- [Getting Started with the Dependency Map](#)
- [Starting your Investigation](#)

## Getting Started with the Dependency Map

The vCloud VM Dependency dashboard visualizes the relationships between the different objects in your environment through an interactive map. The map illustrates how different components relate to each other, and the levels of the available resources available to them.

To access this dashboard, under **Dashboards**, choose **vCloud Director > vCloud Dependency**.

Figure 37. vCloud VM Dependency dashboard



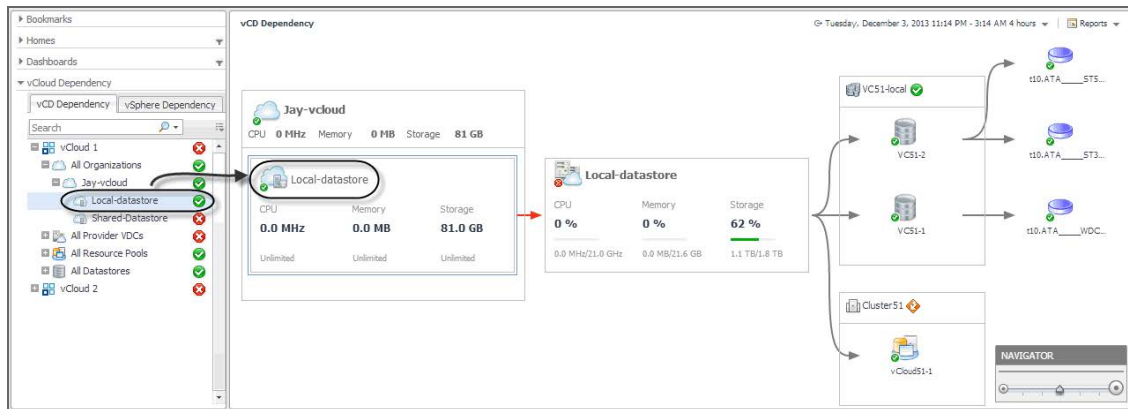
## Navigating the Object Hierarchy

The **vCloud Dependency** view appearing on the navigation tab shows a navigation tree representing a simplified map of your monitored objects, and pertinent alarm information.

On the right of each object in the **vCloud Dependency** view status indicators are displayed. Each status indicator represents the alarm of the highest severity that is generated against the object. For an object type container, the status indicator represents the alarm of highest severity that is outstanding for all objects of that type.

When you select an object from the **vCloud Dependency** view, the vCloud Logic Dependency dashboard displays a dependency map showing the selected object and any dependencies that it may have with other physical and virtual components in your monitored environment.

**Figure 38. Dependency map**



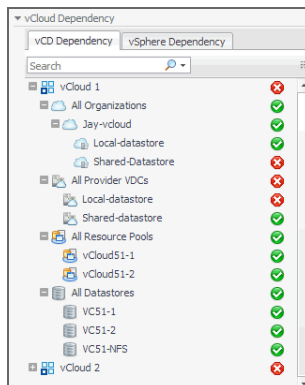
The information appearing in this view is organized into two tabs:

- **vCD Dependency tab**
- **vSphere Dependency tab**

## vCD Dependency tab

The **vCD Dependency** tab illustrates the logical dependencies between the monitored objects. To open this tab, on the navigation panel, under **vCloud Dependency**, click **vCD Dependency**.

**Figure 39. vCD Dependency tab**



On this tab, your monitored vCloud appears as the root of the navigation tree, with all of its organizations, provider vDCs, resource pools, and datastores. Organization vDCs appear as child nodes of organizations. This structure illustrates the hierarchy of monitored objects in your vCloud Director infrastructure. Use this view to quickly locate a desired object using the logical hierarchy within your vCloud, and to explore any related dependencies.

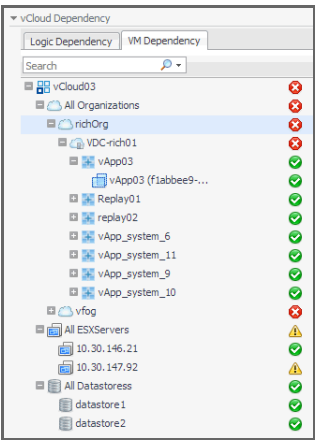
## vSphere Dependency tab

The **vSphere Dependency** tab focuses on the relationships between organizations and virtual machines. To open this tab, on the navigation panel, under **vCloud Dependency**, click **vSphere Dependency**.

Like the **vCD Dependency tab**, this tab also displays the monitored vCloud Director® as the root of the navigation tree, with organizations, ESX hosts, and datastores immediately below. The tree also displays virtual machines

organized into vApps. Use this view to quickly find any of these components and investigate their effect on the performance of virtual machines in your environment.

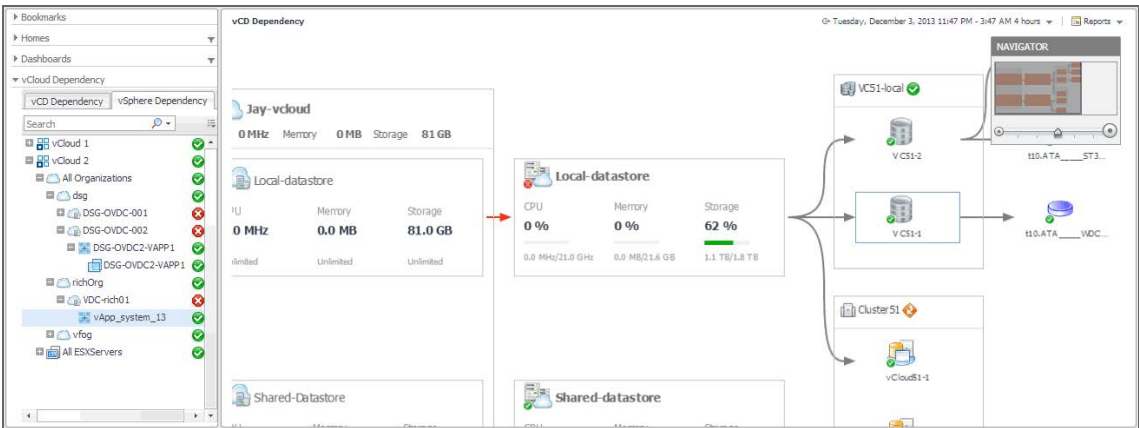
Figure 40. vSphere Dependency tab



# Identifying Dependency Map Elements

In a dependency map, some objects are represented with container tiles, others with single-object tiles or just icons. Dependencies between the objects in a map are illustrated with single-directional arrows.

Figure 41. Dependency map elements










The complexity of the information representing an object depends on its type and any dependencies it has with other objects in a monitored environment. Object dependencies are represented with arrow lines.

Every object is represented with an icon, representing its type. This allows you quickly recognize main elements in a dependency map.

Table 14. Object type icons

|                   |  |
|-------------------|--|
| Cluster           |  |
| Datastore         |  |
| Datastore Cluster |  |

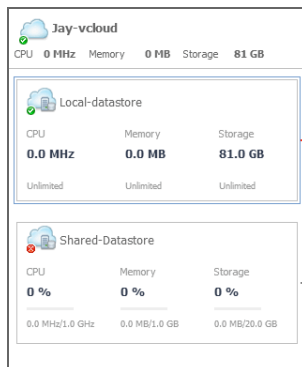
Table 14. Object type icons

|                  |                                                                                   |
|------------------|-----------------------------------------------------------------------------------|
| ESX Host         |  |
| Organization     |  |
| Organization vDC |  |
| Provider vDC     |  |
| Resource Pool    |  |
| vApp             |  |
| vCloud           |  |
| Virtual Machine  |  |

## Organization tile

The organization tile displays the levels of resource utilization (CPU, memory, and disk storage) for an entire organization. It also shows the organization's alarm severity state. These tiles also contain one or more tiles representing organization vDCs associated with that organization.

Figure 42. Organization tile



Foglight™ for vCloud Director populates the organization tile using the values stored as metrics collected from monitored organizations.

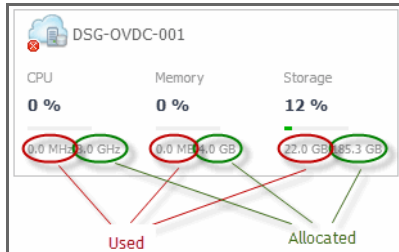
Table 15. Organization tile

| Data           | Description                                                                                      | Metric                                           |
|----------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------|
| <b>CPU</b>     | The amount of the organization's CPU resources spent on executing system code and user programs. | <a href="#">VMVCloudOrganization cpuUsed</a>     |
| <b>Memory</b>  | The amount of the organization's memory resources that are currently in use.                     | <a href="#">VMVCloudOrganization memoryUsed</a>  |
| <b>Storage</b> | The amount of the organization's disk resources that are currently in use.                       | <a href="#">VMVCloudOrganization storageUsed</a> |

## Organization vDC tile

The organization vDC tile displays the levels of CPU, memory, and disk storage usage, and the amounts of allocated resources. It also shows the alarm severity state of the organization vDC.

Figure 43. Organization vDC tile



Foglight for VMware populates these tiles using the values stored as metrics collected from monitored organization vDCs.

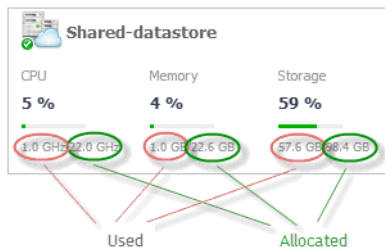
Table 16. Organization vDC tile

| Data             | Description                                                                                                                              | Metric                                                     |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| <b>CPU</b>       | The percentage of the organization vDC's CPU resources spent on executing system code and user programs during the selected time period. | <a href="#">VMVCloudOrganizationVDC cpuUtilization</a>     |
| <b>Used</b>      | The amount of CPU resources spent on executing system code and user programs.                                                            | <a href="#">VMVCloudOrganizationVDC cpuUsed</a>            |
| <b>Allocated</b> | The total amount of CPU resources allocated to the organization vDC.                                                                     | <a href="#">VMVCloudOrganizationVDC cpuAllocated</a>       |
| <b>Memory</b>    | The percentage of the organization vDC's memory resources that are currently in use.                                                     | <a href="#">VMVCloudOrganizationVDC memoryUtilization</a>  |
| <b>Used</b>      | The amount of the organization vDC's memory resources that are currently in use.                                                         | <a href="#">VMVCloudOrganizationVDC memoryUsed</a>         |
| <b>Allocated</b> | The total amount of memory resources that are allocated to the organization vDC.                                                         | <a href="#">VMVCloudOrganizationVDC memoryAllocated</a>    |
| <b>Storage</b>   | The percentage of the organization vDC's disk resources that are currently in use.                                                       | <a href="#">VMVCloudOrganizationVDC storageUtilization</a> |
| <b>Used</b>      | The amount of the organization vDC's disk resources that are currently in use.                                                           | <a href="#">VMVCloudOrganizationVDC storageUsed</a>        |
| <b>Allocated</b> | The total amount of disk resources that are allocated to the organization vDC.                                                           | <a href="#">VMVCloudOrganizationVDC storageAllocated</a>   |

## Provider vDC tiles

The provider vDC tile displays the percentages of resource utilization (CPU, memory, and disk storage) for a provider vDC, and its severity state. It also shows the current resource usage and the total amount of resources available to the provider vDC.

**Figure 44. Provider vDC tile**



Foglight for VMware populates these tiles using the values stored as metrics collected from monitored provider vDCs.

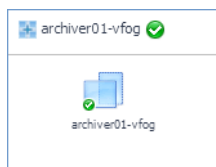
**Table 17. Provider vDC tile**

| Data             | Description                                                                                                                          | Metric                                                 |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| <b>CPU</b>       | The percentage of the provider vDC's CPU resources spent on executing system code and user programs during the selected time period. | <a href="#">VMVCloudProviderVDC cpuUtilization</a>     |
| <b>Allocated</b> | The total amount of CPU resources available to the provider vDC.                                                                     | <a href="#">VMVCloudProviderVDCcpuAllocated</a>        |
| <b>Used</b>      | The amount of CPU resources spent on executing system code and user programs.                                                        | <a href="#">VMVCloudProviderVDC cpuUsed</a>            |
| <b>Memory</b>    | The percentage of the provider vDC's memory resources that are currently in use.                                                     | <a href="#">VMVCloudProviderVDC memoryUtilization</a>  |
| <b>Allocated</b> | The total amount of memory resources that are available to the provider vDC.                                                         | <a href="#">VMVCloudProviderVDC memoryAllocated</a>    |
| <b>Used</b>      | The amount of the provider vDC's memory resources that are currently in use.                                                         | <a href="#">VMVCloudProviderVDC memoryUsed</a>         |
| <b>Storage</b>   | The percentage of the provider vDC's disk resources that are currently in use.                                                       | <a href="#">VMVCloudProviderVDC storageUtilization</a> |
| <b>Allocated</b> | The total amount of disk resources that are available to the provider vDC.                                                           | <a href="#">VMVCloudProviderVDC storageAllocated</a>   |
| <b>Used</b>      | The amount of the provider vDC's disk resources that are currently in use.                                                           | <a href="#">VMVCloudProviderVDC storageUsed</a>        |

## vApp, Cluster, and Datastore tiles

The vApp, cluster, and datastore tiles are somewhat simpler in that they displays just the name of the component and its severity state, and also the name and severity state of the containing objects: virtual machines, resource pools, and datastores.

**Figure 45. vApp tile**

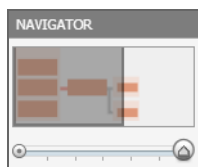




# Setting the Zoom Level

In larger multi-component environments, a typical dependency map is likely complex and cannot fit your screen. The **NAVIGATOR** in the top-right corner allows you to easily set the zoom level by dragging the slider into the appropriate position. You can also display a desired part of the map by dragging the grey rectangle.

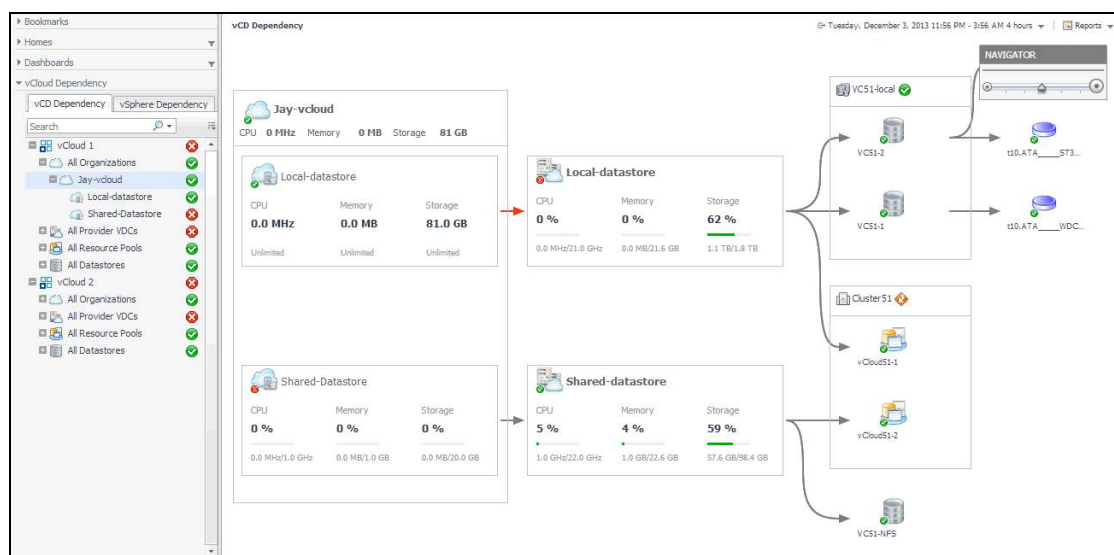
Figure 46. Navigator



## Starting your Investigation

To get started with your investigation, first select a desired object in the navigation tree. The vCD Dependency dashboard refreshes showing your object and any related dependencies. Observe related components and their alarm states. This can give you a good indication of any potential bottlenecks or performance issues.

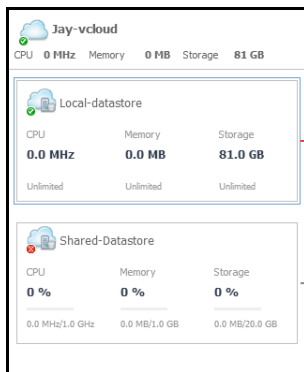
Figure 47. vCD Dependency dashboard



Some objects in the dependency map are displayed in multi- and single component tiles, and object icons. The type and range of the objects appearing on the vCD Dependency dashboard depends on the selected objects and the dependencies that object has within your integrated infrastructure. To better understand the map, every object type is identified with an icon. For more information, see [Identifying Dependency Map Elements](#) on page 45.

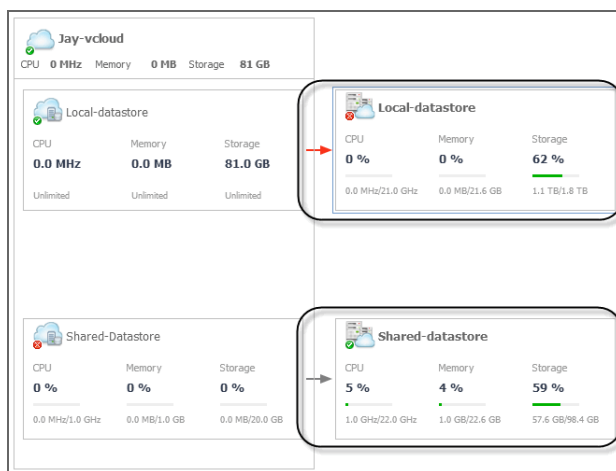
For example, when you select an organization in the navigation tree, the dependency map displays a tile representing the organization object consisting of one or more organization vDCs.

**Figure 48. Organization tile**



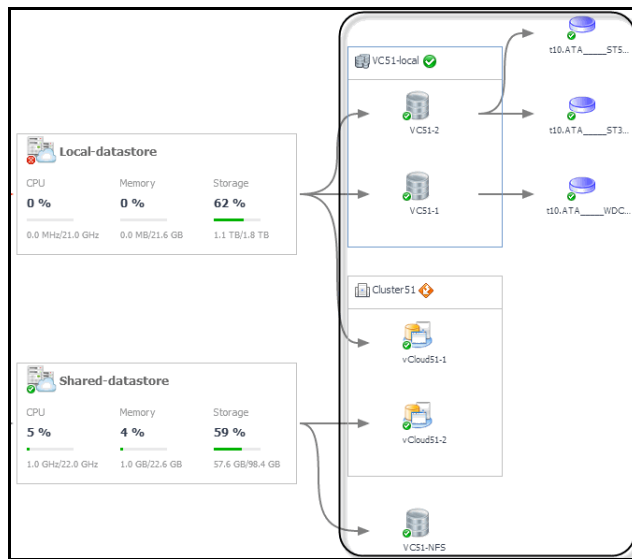
The tile displays the current CPU, memory, and disk usage for the organization object as a whole, and for any organization vDCs that belong to the selected organization. Alarm states are also given for the organization and any comprising organization vDCs. Next, the map shows any provider vDCs on which these organization vDCs depend.

**Figure 49. Provider vDCs**



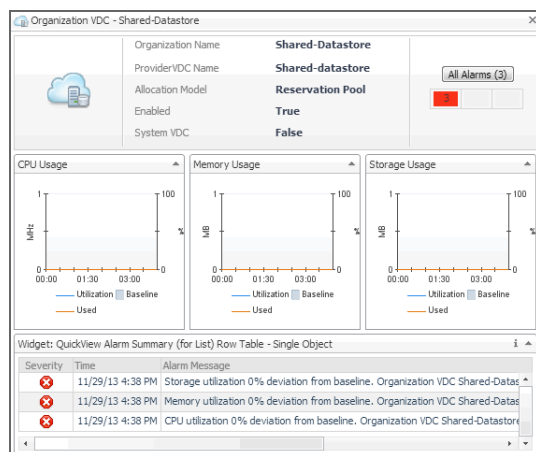
CPU, memory, and disk usage metrics appear for the provider vDCs, along with their alarm states. The map also shows the datastores and resource pools the provider vDCs use, and the elements in and elements associated with these objects, such as datastore and VMware clusters.

**Figure 50. Datastores and resource pools associated with provider vDCs**



To find out more information about any of the displayed components, click the appropriate tile to display more information. For example, if you see an object that is in Fatal state, you can drill down on it to review the existing alarms and investigate further the root cause of the issue.

**Figure 51. Drilling down on organization vDC**



# Reference

This chapter contains reference information about rules and metrics that are defined in Foglight for vCloud Director. Read this chapter to find out details about these components.

- [Rules](#)
- [Metric Collections](#)

## Rules

Foglight allows you to create flexible rules that can be applied to complex, interrelated data from multiple sources within your distributed system. You can associate several different actions with a rule, configure a rule so that it does not fire repeatedly, and associate a rule with schedules to define when it should and should not be evaluated.

Different types of data can be used in rules, including registry variables, raw metrics, derived metrics, and topology object properties.

There are two types of rules in Foglight for vCloud Director: simple rules and multiple-severity rules. A simple rule has a single condition, and can be in one of three states: *Fire*, *Undefined*, or *Normal*. A multiple-severity rule can have up to five severity levels: *Undefined*, *Fatal*, *Critical*, *Warning*, and *Normal*.

Rule conditions are regularly evaluated against monitoring data (metrics and topology object properties collected from your monitored environment and transformed into a standard format). Therefore, the state of the rule can change if the data changes. For example, if a set of monitoring data matches a simple rule's condition, the rule enters the *Fire* state. If the next set does not match the condition, the rule exits the *Fire* state and enters the *Normal* state.

A rule condition is a type of expression that can be true or false. When it evaluates to true, the rule is said to fire, causing any actions that are associated with the rule or severity level to be performed. You can configure a rule to perform one or more actions upon entering or exiting each state. When a multiple-severity rule fires, an alarm also appears in Foglight for vCloud Director.

For more information see the *Foglight for vCloud Director Administration and Configuration Help*.

Foglight for VMware provides an effective monitoring solution for the vCloud infrastructure. The rules included with this product alert you about virtual infrastructure problems.

When service degradations are detected, Foglight for vCloud Director sends alerts to the event console. Optionally, Foglight for vCloud Director can be configured to send emails, pager messages, or perform other actions you define. Performance data can be viewed, analyzed, and reported using Foglight for vCloud Director.

Foglight for VMware includes the following groups of rules:

- [vCloud Director Dependencies Rule](#) on page 52
- [vCloud Director Rules](#) on page 53

## vCloud Director Dependencies Rule

This section describes the vCloud Director Dependency rule:

- [vCloudDependenciesRefresher rule](#) on page 53

## vCloudDependenciesRefresher rule

### Purpose

This rule refreshes all objects found in the vCloud dependency map.

## vCloud Director Rules

This section lists and describes the vCloud Director rules. Rules in this section:

- [VCloud Agent Updates rule](#) on page 53
- [VCloud Check Virtual Center Monitoring Status rule](#) on page 53
- [VCloud OrganizationVDC CPU Utilization rule](#) on page 54
- [VCloud OrganizationVDC Memory Utilization rule](#) on page 54
- [VCloud OrganizationVDC Storage Utilization rule](#) on page 54
- [VCloud ProviderVDC CPU Utilization rule](#) on page 55
- [VCloud ProviderVDC Memory Utilization rule](#) on page 55
- [VCloud ProviderVDC Storage Utilization rule](#) on page 55

## VCloud Agent Updates rule

### Purpose

This rule monitors the activity of monitoring vCloud Director Agent instances.

### Scope

Agent

Table 18. Rule Definition

| Conditions                                                                                                                                                                                                                                          | State    | Action |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------|
| The monitoring vCloud Director Agent instances are active and collecting data.                                                                                                                                                                      | Normal   | None   |
| A vCloud Director Agent instance has not collected any data for 10 minutes (600 seconds). This time period is set by the <code>VCL:agent.lastUpdated.critical</code> registry variable. The default global value of this variable is 600 (seconds). | Critical | None   |

## VCloud Check Virtual Center Monitoring Status rule

### Purpose

This rule checks if the Virtual Centers associated with the monitored vCloud environment are configured for monitoring.

### Scope

VMVCloudServerGroup.vCenters

**Table 19. Rule Definition**

| Conditions                                                                                                                                      | State   | Action |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------|
| All Virtual Centers associated with the monitored vCloud environment are configured for monitoring.                                             | Normal  | None   |
| A Virtual Center is currently not monitored. A VMware Performance Agent instance should be configured to collect data from this Virtual Center. | Warning | None   |

## VCloud OrganizationVDC CPU Utilization rule

### Purpose

This rule monitors the CPU utilization of organization vDCs, and generates alarms if it determines that the CPU utilization significantly deviates from the baseline values.

### Scope

VMVCloudOrganizationVDC

**Table 20. Rule Definition**

| Conditions                                                                        | State    | Action |
|-----------------------------------------------------------------------------------|----------|--------|
| The CPU utilization of all organization vDCs is within the normal baseline range. | Normal   | None   |
| The CPU utilization of an organization vDC has reached 97% of the baseline value. | Critical | None   |
| The CPU utilization of an organization vDC has reached 99% of the baseline value. | Fatal    | None   |

## VCloud OrganizationVDC Memory Utilization rule

### Purpose

This rule monitors the memory utilization of organization vDCs, and generates alarms if it determines that the memory utilization significantly deviates from the baseline values.

### Scope

VMVCloudOrganizationVDC

**Table 21. Rule Definition**

| Conditions                                                                           | State    | Action |
|--------------------------------------------------------------------------------------|----------|--------|
| The memory utilization of all organization vDCs is within the normal baseline range. | Normal   | None   |
| The memory utilization of an organization vDC has reached 97% of the baseline value. | Critical | None   |
| The memory utilization of an organization vDC has reached 99% of the baseline value. | Fatal    | None   |

## VCloud OrganizationVDC Storage Utilization rule

### Purpose

This rule monitors the disk storage utilization of organization vDCs, and generates alarms if it determines that the storage utilization significantly deviates from the baseline values.

## Scope

VMVCloudOrganizationVDC

**Table 22. Rule Definition**

| Conditions                                                                            | State    | Action |
|---------------------------------------------------------------------------------------|----------|--------|
| The storage utilization of all organization vDCs is within the normal baseline range. | Normal   | None   |
| The storage utilization of an organization vDC has reached 97% of the baseline value. | Critical | None   |
| The storage utilization of an organization vDC has reached 99% of the baseline value. | Fatal    | None   |

## VCloud ProviderVDC CPU Utilization rule

### Purpose

This rule monitors the CPU utilization of provider vDCs, and generates alarms if it determines that the CPU utilization significantly deviates from the baseline values.

### Scope

VMVCloudProviderVDC

**Table 23. Rule Definition**

| Conditions                                                                    | State    | Action |
|-------------------------------------------------------------------------------|----------|--------|
| The CPU utilization of all provider vDCs is within the normal baseline range. | Normal   | None   |
| The CPU utilization of a provider vDC has reached 97% of the baseline value.  | Critical | None   |
| The CPU utilization of a provider vDC has reached 99% of the baseline value.  | Fatal    | None   |

## VCloud ProviderVDC Memory Utilization rule

### Purpose

This rule monitors the memory utilization of provider vDCs, and generates alarms if it determines that the memory utilization significantly deviates from the baseline values.

### Scope

VMVCloudProviderVDC

**Table 24. Rule Definition**

| Conditions                                                                       | State    | Action |
|----------------------------------------------------------------------------------|----------|--------|
| The memory utilization of all provider vDCs is within the normal baseline range. | Normal   | None   |
| The memory utilization of a provider vDC has reached 97% of the baseline value.  | Critical | None   |
| The memory utilization of a provider vDC has reached 99% of the baseline value.  | Fatal    | None   |

## VCloud ProviderVDC Storage Utilization rule

### Purpose

This rule monitors the disk storage utilization of provider vDCs, and generates alarms if it determines that the storage utilization significantly deviates from the baseline values.

## Scope

VMVCloudProviderVDC

Table 25. Rule Definition

| Conditions                                                                        | State    | Action |
|-----------------------------------------------------------------------------------|----------|--------|
| The storage utilization of all provider vDCs is within the normal baseline range. | Normal   | None   |
| The storage utilization of a provider vDC has reached 97% of the baseline value.  | Critical | None   |
| The storage utilization of a provider vDC has reached 99% of the baseline value.  | Fatal    | None   |

## Metric Collections

vCloud Director agents collect data from monitored environment and store it in the Foglight™ topology model as topology objects. Each monitored object is represented with a topology object. For example, a `VMVCloudProviderVDC` object instance represents a specific provider vDC. Foglight for VMware includes a set of topology types representing the different monitoring targets. Each object type comes with a unique collection of metric properties that store metric data collected from the monitored objects. The following topology types are used for storing collected metrics:

- [VMVCloudOrganization](#)
- [VMVCloudProviderVDC](#)
- [VMVCloudOrganizationVDC](#)
- [VMWStorageProfile](#)
- [VMVCloudProviderVDCStorageProfile](#)
- [VMVCloudVApp](#)
- [VMVCloudVAppTemplate](#)
- [VMVCloudServerGroup](#)
- [VMVCloudOrgVDCStorageProfile](#)
- [VMVCloudNetworkPool](#)

Table 26. VMVCloudOrganization

| Metric                      | Unit  | Derived Metric? | Description                                                                 |
|-----------------------------|-------|-----------------|-----------------------------------------------------------------------------|
| <b>catalogCount</b>         | count | No              | The number of catalogs in the organization.                                 |
| <b>cpuAllocated</b>         | count | No              | The amount of CPU resources in MHz that are allocated to the organization.  |
| <b>cpuAllocationPercent</b> | %     | No              | The percentage of all CPU resources that are allocated to the organization. |
| <b>cpuLimit</b>             | count | No              | The limit of CPU resources in MHz that is imposed to the organization.      |
| <b>cpuOverhead</b>          | count | No              | The amount of CPU overhead in MHz that are incurred by the organization.    |
| <b>cpuReserved</b>          | count | No              | The amount of CPU resources in MHz that are reserved for the organization.  |
| <b>cpuUsed</b>              | count | No              | The amount of CPU resources in MHz that the organization currently uses.    |
| <b>cpuUtilization</b>       | %     | No              | The percentage of CPU resources that are in use by the organization.        |



Table 26. VMVCloudOrganization

| Metric                          | Unit  | Derived Metric? | Description                                                                     |
|---------------------------------|-------|-----------------|---------------------------------------------------------------------------------|
| <b>diskCount</b>                | count | No              | The number of disks in the organization.                                        |
| <b>groupCount</b>               | count | No              | The number of groups in this organization.                                      |
| <b>memoryAllocated</b>          | MB    | No              | The amount of memory resources in MB that are allocated to the organization.    |
| <b>memoryAllocationPercent</b>  | %     | No              | The percentage of all memory resources that are allocated to the organization.  |
| <b>memoryLimit</b>              | MB    | No              | The limit of memory resources in MB imposed to the organization.                |
| <b>memoryOverhead</b>           | MB    | No              | The amount of memory overhead in MB that are incurred by the organization.      |
| <b>memoryReserved</b>           | MB    | No              | The amount of memory resources in MB that are reserved for the organization.    |
| <b>memoryUsed</b>               | MB    | No              | The amount of memory resources in MB that the organization currently uses.      |
| <b>memoryUtilization</b>        | %     | No              | The percentage of memory resources that are in use by the organization.         |
| <b>orgVDCCount</b>              | count | No              | The number of organization vDCs in the organization.                            |
| <b>runningVMCount</b>           | count | No              | The number of running virtual machines in the organization.                     |
| <b>storageAllocated</b>         | MB    | No              | The amount of storage resources in MB that are allocated to the organization.   |
| <b>storageAllocationPercent</b> | %     | No              | The percentage of all storage resources that are allocated to the organization. |
| <b>storageLimit</b>             | MB    | No              | The limit of storage resources in MB imposed to the organization.               |
| <b>storageOverhead</b>          | MB    | No              | The amount of storage overhead in MB that are incurred by the organization.     |
| <b>storageReserved</b>          | MB    | No              | The amount of storage resources in MB that are reserved for the organization.   |
| <b>storageUsed</b>              | MB    | No              | The amount of storage resources in MB that the organization currently uses.     |
| <b>storageUtilization</b>       | %     | No              | The percentage of storage resources that are in use by the organization.        |
| <b>userCount</b>                | count | No              | The number of users belonging to the organization.                              |
| <b>vAppCount</b>                | count | No              | The number of vApps in the organization.                                        |

Table 27. VMVCloudProviderVDC

| Metric                      | Unit  | Derived Metric? | Description                                                                 |
|-----------------------------|-------|-----------------|-----------------------------------------------------------------------------|
| <b>cpuAllocated</b>         | count | No              | The amount of CPU resources in MHz that are allocated to the provider vDC.  |
| <b>cpuAllocationPercent</b> | %     | No              | The percentage of all CPU resources that are allocated to the provider vDC. |
| <b>cpuLimit</b>             | count | No              | The limit of CPU resources in MHz imposed to the provider vDC.              |
| <b>cpuOverhead</b>          | count | No              | The amount of CPU overhead in MHz that are incurred by the provider vDC.    |

Table 27. VMVCloudProviderVDC

| Metric                                        | Unit  | Derived Metric? | Description                                                                             |
|-----------------------------------------------|-------|-----------------|-----------------------------------------------------------------------------------------|
| <b>cpuReserved</b>                            | count | No              | The amount of CPU resources in MHz that are reserved for the provider vDC.              |
| <b>cpuUsed</b>                                | count | No              | The amount of CPU resources in MHz that the provider vDC currently uses.                |
| <b>cpuUtilization</b>                         | %     | No              | The percentage of CPU resources that are in use by the provider vDC.                    |
| <b>datastoreCount</b>                         | count | No              | The number of datastores in the provider vDC.                                           |
| <b>memoryAllocated</b>                        | MB    | No              | The amount of memory resources in MB that are allocated to the provider vDC.            |
| <b>memoryAllocationPercent</b>                | %     | No              | The percentage of all memory resources that are allocated to the provider vDC.          |
| <b>memoryLimit</b>                            | MB    | No              | The limit of memory resources in MB imposed to the provider vDC.                        |
| <b>memoryOverhead</b>                         | MB    | No              | The amount of memory overhead in MB that are incurred by the provider vDC.              |
| <b>memoryReserved</b>                         | MB    | No              | The amount of memory resources in MB that are reserved for the provider vDC.            |
| <b>memoryUsed</b>                             | MB    | No              | The amount of memory resources in MB that the provider vDC currently uses.              |
| <b>memoryUtilization</b>                      | %     | No              | The percentage of memory resources that are in use by the provider vDC.                 |
| <b>orgVDCCount</b>                            | count | No              | The number of organization vDCs in this provider vDC.                                   |
| <b>storageAllocated</b>                       | MB    | No              | The amount of storage resources in MB that are allocated to the provider vDC.           |
| <b>storageAllocationPercent</b>               | %     | No              | The percentage of all storage resources that are allocated to the provider vDC.         |
| <b>storageLimit</b>                           | MB    | No              | The limit of storage resources in MB imposed to the provider vDC.                       |
| <b>storageOverhead</b>                        | MB    | No              | The amount of storage overhead in MB that are incurred by the provider vDC.             |
| <b>storageProfileCount</b>                    | count | No              | The number of storage profiles in the provider vDC.                                     |
| <b>storageReserved</b>                        | MB    | No              | The amount of storage resources in MB that are reserved for the provider vDC.           |
| <b>storageUsed</b>                            | MB    | No              | The amount of storage resources in MB that the provider vDC currently uses.             |
| <b>storageUtilization</b>                     | %     | No              | The percentage of storage resources that are in use by the provider vDC.                |
| <b>sumOfProviderVDCDatastoresCapacityUsed</b> | %     | Yes             | The percentage of the datastores capacity that is currently in use in the provider vDC. |
| <b>sumOfProviderVDCDatastoresFreeSpace</b>    | MB    | Yes             | The amount of free space available to all datastores in the provider vDC.               |
| <b>orgVDCCount</b>                            | count | No              | The number of organization vDCs in this provider vDC.                                   |
| <b>storageAllocated</b>                       | MB    | No              | The amount of storage resources in MB that are allocated to the provider vDC.           |

Table 27. VMVCloudProviderVDC

| Metric                                        | Unit  | Derived Metric? | Description                                                                             |
|-----------------------------------------------|-------|-----------------|-----------------------------------------------------------------------------------------|
| <b>storageAllocationPercent</b>               | %     | No              | The percentage of all storage resources that are allocated to the provider vDC.         |
| <b>storageLimit</b>                           | MB    | No              | The limit of storage resources in MB imposed to the provider vDC.                       |
| <b>storageOverhead</b>                        | MB    | No              | The amount of storage overhead in MB that are incurred by the provider vDC.             |
| <b>storageProfileCount</b>                    | count | No              | The number of storage profiles in the provider vDC.                                     |
| <b>storageReserved</b>                        | MB    | No              | The amount of storage resources in MB that are reserved for the provider vDC.           |
| <b>storageUsed</b>                            | MB    | No              | The amount of storage resources in MB that the provider vDC currently uses.             |
| <b>storageUtilization</b>                     | %     | No              | The percentage of storage resources that are in use by the provider vDC.                |
| <b>sumOfProviderVDCDatastoresCapacityUsed</b> | %     | Yes             | The percentage of the datastores capacity that is currently in use in the provider vDC. |
| <b>sumOfProviderVDCDatastoresFreeSpace</b>    | MB    | Yes             | The amount of free space available to all datastores in the provider vDC.               |
| <b>vCpuRatingMhz</b>                          | count | No              | The vCPU rating in Mhz for the provider vDC.                                            |

Table 28. VMVCloudOrganizationVDC

| Metric                         | Unit  | Derived Metric? | Description                                                                        |
|--------------------------------|-------|-----------------|------------------------------------------------------------------------------------|
| <b>cpuAllocated</b>            | count | No              | The amount of CPU resources in MHz that are allocated to the organization vDC.     |
| <b>cpuAllocationPercent</b>    | %     | No              | The percentage of all CPU resources that are allocated to the organization vDC.    |
| <b>cpuLimit</b>                | count | No              | The limit of CPU resources in MHz imposed to the organization vDC.                 |
| <b>cpuOverhead</b>             | count | No              | The amount of CPU overhead in Mhz that are incurred by the organization vDC.       |
| <b>cpuReserved</b>             | count | No              | The amount of CPU resources in MHz that are reserved for the organization vDC.     |
| <b>cpuUsed</b>                 | count | No              | The amount of CPU resources in MHz that the organization vDC currently uses.       |
| <b>cpuUtilization</b>          | %     | No              | The percentage of CPU resources that are in use by the organization vDC.           |
| <b>memoryAllocated</b>         | MB    | No              | The amount of memory resources in MB that are allocated to the organization vDC.   |
| <b>memoryAllocationPercent</b> | %     | No              | The percentage of all memory resources that are allocated to the organization vDC. |
| <b>memoryLimit</b>             | MB    | No              | The limit of memory resources in MB imposed to the organization vDC.               |
| <b>memoryOverhead</b>          | MB    | No              | The amount of memory overhead in MB that are incurred by the organization vDC.     |
| <b>memoryReserved</b>          | MB    | No              | The amount of memory resources in MB that are reserved for the organization vDC.   |

Table 28. VMVCloudOrganizationVDC

| Metric                          | Unit  | Derived Metric? | Description                                                                                                                                                                                                                                         |
|---------------------------------|-------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>memoryUsed</b>               | MB    | No              | The amount of memory resources in MB that the organization vDC currently uses.                                                                                                                                                                      |
| <b>memoryUtilization</b>        | %     | No              | The percentage of memory resources that are in use by the organization vDC.                                                                                                                                                                         |
| <b>networkQuota</b>             | count | No              | The maximum number of network objects that can be deployed in the organization vDC. The default value is zero '0', which specifies an unlimited number.                                                                                             |
| <b>nicQuota</b>                 | count | No              | The maximum number of virtual NICs that are allowed in the organization vDC. The default value is zero '0', which specifies an unlimited number.                                                                                                    |
| <b>runningVMCountOnOrgVDC</b>   | count | Yes             | The number of running virtual machines in the organization vDC.                                                                                                                                                                                     |
| <b>storageAllocated</b>         | MB    | No              | The amount of storage resources in MB that are allocated to the organization vDC.                                                                                                                                                                   |
| <b>storageAllocationPercent</b> | %     | No              | The percentage of all storage resources that are allocated to the organization vDC.                                                                                                                                                                 |
| <b>storageLimit</b>             | MB    | No              | The limit of storage resources in MB imposed to the organization vDC.                                                                                                                                                                               |
| <b>storageOverhead</b>          | MB    | No              | The amount of storage overhead in MB that are incurred by the organization vDC.                                                                                                                                                                     |
| <b>storageReserved</b>          | MB    | No              | The number of storage profiles in the organization vDC.                                                                                                                                                                                             |
| <b>storageUsed</b>              | MB    | No              | The amount of storage resources in MB that the organization vDC currently uses.                                                                                                                                                                     |
| <b>storageUtilization</b>       | %     | No              | The percentage of storage resources that are in use by the organization vDC.                                                                                                                                                                        |
| <b>usedNetworkCount</b>         | count | No              | The number of networks used by the organization vDC.                                                                                                                                                                                                |
| <b>vAppCount</b>                | count | No              | The number of vApps in the organization vDC.                                                                                                                                                                                                        |
| <b>vmQuota</b>                  | count | No              | The number of virtual machines that can be created in the organization vDC. This number includes the virtual machines in both vApps and vApp templates, deployed, or otherwise. The default value is zero '0', which specifies an unlimited number. |

Table 29. VMWStorageProfile

| Metric                     | Unit | Derived Metric? | Description                                                                       |
|----------------------------|------|-----------------|-----------------------------------------------------------------------------------|
| <b>capacityTotal</b>       | MB   | No              | The amount of total storage capacity in MB for the VMware storage profile.        |
| <b>capacityUsed</b>        | MB   | No              | The amount of used storage capacity in MB for the VMware storage profile.         |
| <b>capacityUtilization</b> | %    | No              | The percentage of used storage capacity for the VMware storage profile.           |
| <b>provisionedPercent</b>  | %    | No              | The percentage of provisioned storage resources for the VMware storage profile.   |
| <b>requestedPercent</b>    | %    | No              | The percentage of requested storage resources for the VMware storage profile.     |
| <b>storageProvisioned</b>  | MB   | No              | The amount of provisioned storage resources in MB for the VMware storage profile. |
| <b>storageRequested</b>    | MB   | No              | The amount of requested storage resources in MB for the VMware storage profile.   |

Table 30. VMVCloudProviderVDCStorageProfile

| Metric                     | Unit | Derived Metric? | Description                                                                             |
|----------------------------|------|-----------------|-----------------------------------------------------------------------------------------|
| <b>capacityTotal</b>       | MB   | No              | The amount of total storage capacity in MB for the provider vDC storage profile.        |
| <b>capacityUsed</b>        | MB   | No              | The amount of used storage capacity in MB for the provider vDC storage profile.         |
| <b>capacityUtilization</b> | %    | No              | The percentage of used storage capacity for the provider vDC storage profile.           |
| <b>provisionedPercent</b>  | %    | No              | The percentage of provisioned storage resources for the provider vDC storage profile.   |
| <b>requestedPercent</b>    | %    | No              | The percentage of requested storage resources for the provider vDC storage profile.     |
| <b>storageProvisioned</b>  | MB   | No              | The amount of provisioned storage resources in MB for the provider vDC storage profile. |
| <b>storageRequested</b>    | MB   | No              | The amount of requested storage resources in MB for the provider vDC storage profile.   |

Table 31. VMVCloudVApp

| Metric                       | Unit          | Derived Metric? | Description                                                                                                                                                                                                   |
|------------------------------|---------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>cpuAllocation</b>         | count         | No              | The amount of CPU resources in MHz that are allocated to the vApp.                                                                                                                                            |
| <b>cpuPercentReady</b>       | %             | Yes             | The percentage of CPU resources that ready for use, originating from the virtual machines that are associated with this vApp.                                                                                 |
| <b>cpuUsed</b>               | count         | Yes             | The amount of CPU resources in MHz, originating from the virtual machines that are associated with this vApp, that the vApp currently uses.                                                                   |
| <b>cpuUtilization</b>        | %             | Yes             | The percentage of CPU resources, originating from the virtual machines that are associated with this vApp, that are in use by the vApp.                                                                       |
| <b>datastoreRead</b>         | KB/se<br>cond | Yes             | The rate at which the datastores, used by the virtual machines associated with this vApp, read data.                                                                                                          |
| <b>datastoreTransferRate</b> | KB/se<br>cond | Yes             | The rate at which the datastores associated with this vApp transfer data.                                                                                                                                     |
| <b>datastoreWrite</b>        | KB/se<br>cond | Yes             | The rate at which the datastores, used by the virtual machines associated with this vApp, write data.                                                                                                         |
| <b>memoryActive</b>          | KB            | Yes             | Memory active from VMs memory<br>The amount of the available memory, that the virtual machines associated with the vApp, are currently using.                                                                 |
| <b>memoryAllocation</b>      | MB            | No              | The amount of memory resources in MB that are allocated to the vApp.                                                                                                                                          |
| <b>memoryBalloon</b>         | KB            | Yes             | The amount of physical memory that is actively being used by the VMware Memory Control Driver to allow the guest OS to selectively swap memory, for those virtual machines that are associated with the vApp. |
| <b>memoryConsumed</b>        | KB            | Yes             | The amount of memory resources in KB that are consumed from memory available to the virtual machines that are associated with this vApp.                                                                      |
| <b>memoryShared</b>          | KB            | Yes             | The amount of the virtual machine memory that is freed up due to transparent page sharing.                                                                                                                    |

Table 31. VMVCloudVApp

| Metric                     | Unit           | Derived Metric? | Description                                                                                                                                |
|----------------------------|----------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>memoryUtilization</b>   | %              | Yes             | The percentage of memory resources, originating from the virtual machines that are associated with this vApp, that are in use by the vApp. |
| <b>networkTransferRate</b> | bit/se<br>cond | Yes             | The rate of network transfer incurred by the vApp.                                                                                         |
| <b>numberOfRunningVMs</b>  | count          | Yes             | Number of all virtual machines associated with this vApp, that are currently powered on.                                                   |
| <b>numberOfVMs</b>         | count          | No              | The number of virtual machines that are associated with the vApp.                                                                          |
| <b>receiveRate</b>         | b/s            | Yes             | The rate at which the virtual machines associated with the vApp receive data from the network.                                             |
| <b>sendRate</b>            | b/s            | Yes             | The rate at which the virtual machines associated with the vApp send data to the network.                                                  |
| <b>storageAllocation</b>   | MB             | No              | The amount of storage resources in MB that are allocated to the vApp.                                                                      |

Table 32. VMVCloudVAppTemplate

| Metric                   | Unit  | Derived Metric? | Description                                                                    |
|--------------------------|-------|-----------------|--------------------------------------------------------------------------------|
| <b>cpuAllocation</b>     | count | No              | The amount of CPU resources in MHz that are allocated to the vApp template.    |
| <b>memoryAllocation</b>  | MB    | No              | The amount of memory resources in MB that are allocated to the vApp template.  |
| <b>numberOfShadowVMs</b> | count | No              | The number of shadow virtual machines defined in the vApp template.            |
| <b>numberOfVMs</b>       | count | No              | The number of virtual machines defined in the vApp template.                   |
| <b>storageAllocation</b> | MB    | No              | The amount of storage resources in MB that are allocated to the vApp template. |

Table 33. VMVCloudServerGroup

| Metric                   | Unit  | Derived Metric? | Description                                                                                        |
|--------------------------|-------|-----------------|----------------------------------------------------------------------------------------------------|
| <b>cpuAllocated</b>      | count | Yes             | The amount of CPU resources in MHz that are allocated to all provider vDCs in the server group.    |
| <b>cpuUsed</b>           | count | Yes             | The amount of CPU resources in MHz that all provider vDCs in the server group currently use.       |
| <b>cpuUtilization</b>    | %     | Yes             | The percentage of CPU resources that are in use by the all provider vDCs in the server group.      |
| <b>memoryAllocated</b>   | MB    | Yes             | The amount of memory resources in MB that are allocated to all provider vDCs in the server group.  |
| <b>memoryOverhead</b>    | MB    | Yes             | The amount of memory overhead in MB that are incurred by all provider vDCs in the server group.    |
| <b>memoryUsed</b>        | MB    | Yes             | The amount of memory resources in MB that all provider vDCs in the server group currently use.     |
| <b>memoryUtilization</b> | %     | Yes             | The percentage of memory resources that are in use by all provider vDCs in the server group.       |
| <b>storageAllocated</b>  | MB    | Yes             | The amount of storage resources in MB that are allocated to all provider vDCs in the server group. |

Table 33. VMVCloudServerGroup

| Metric                    | Unit | Derived Metric? | Description                                                                                         |
|---------------------------|------|-----------------|-----------------------------------------------------------------------------------------------------|
| <b>storageUsed</b>        | MB   | Yes             | The amount of storage resources in MB that the all provider vDCs in the server group currently use. |
| <b>storageUtilization</b> | %    | Yes             | The percentage of storage resources that are in use by all provider vDCs in the server group.       |

Table 34. VMVCloudOrgVDCStorageProfile

| Metric       | Unit | Derived Metric? | Description                                                                              |
|--------------|------|-----------------|------------------------------------------------------------------------------------------|
| <b>limit</b> | MB   | No              | The limit of storage resources in MB specified in this organization vDC storage profile. |

Table 35. VMVCloudNetworkPool

| Metric                   | Unit  | Derived Metric? | Description                                      |
|--------------------------|-------|-----------------|--------------------------------------------------|
| <b>usedNetworksCount</b> | count | No              | The number of used networks in the network pool. |

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## Technical support resources

Technical support is available to Quest customers with a valid maintenance contract and customers who have trial versions. You can access the Quest Support Portal at <https://support.quest.com>.

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