Quest

Hyper-V Monitoring in Foglight® Evolve Cloud 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.

Hyper-V Monitoring in Foglight Evolve Cloud User and Reference Guide
Foglight Version- 7.1.0
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1

About Hyper-V Monitoring in Foglight Evolve Cloud

Hyper-V Monitoring in Foglight® Evolve Cloud monitors a Microsoft® Hyper-V® virtual infrastructure. Better management of services can be achieved when you are alerted of infrastructure problems before end users are affected. This ensures consistent application performance at established service levels. Hyper-V Monitoring in Foglight Evolve Cloud 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.

- About your monitored environment
- Prerequisites: Hyper-V Monitoring in Foglight Evolve Cloud configuration
- Hyper-V Monitoring in Foglight Evolve Cloud WinRM GPO script

About your monitored environment

Microsoft® Hyper-V® provides an innovative mechanism for organizing a virtual infrastructure using a unique combination of physical and logical components. Hyper-V Monitoring in Foglight® Evolve Cloud accommodates environments of all sizes that leverage the Hyper-V virtualization platform by examining and enhancing the Hyper-V eminently knowledgeable view of the virtual world.

Microsoft Hyper-V allows for the configuration of a hierarchical organizational structure that resides primarily within the virtual domain. This enables organizations to easily configure physical Hyper-V servers and virtual machines to reside in logical groups that dictate various aspects of the virtual infrastructure, like physical object location, resource allocations and limitations for virtual machines, and high availability settings for physical and virtual components.

A Hyper-V infrastructure contains a collection of physical and virtual objects. The physical objects within the virtual infrastructure are those with which you can physically interact. The virtual components or objects that make up the virtual environment cannot exist without the presence of underlying physical components, such as Hyper-V servers. In addition, virtual objects, such as clusters and virtual machines, allow for the advanced configuration of resource management and of high availability settings. Each Hyper-V infrastructure contains a collection of the following object types:

- *Clusters*. A cluster object is a group of Hyper-V servers that share common storage resources and network configurations.
- *Servers*. A Hyper-V server is a physical component required to begin building a virtual infrastructure. Hyper-V servers provide hypervisor-based architecture for controlling and managing resources for the virtual machines that run on it. Virtual machines running on a Hyper-V server share the server's resources.
- *SCVMM Servers*. A System Center Virtual Machine Manager (SCVMM) allows you to manage host, networking, and storage resources when creating and deploying virtual machines to virtual clouds.
- *Virtual Machines*. A virtual machine resides on a Hyper-V server. 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, that includes the number of processors and the amount of memory it can leverage.

- *Storage*. A Microsoft Windows Cluster Shared Volume (CSV) is a shared disk available for read and write operations by all nodes within a Windows Server Failover Cluster. A Windows Server Failover Cluster is a group of computers that provides continued service when system components fail.
- *Virtual Switches*. A Hyper-V virtual switch is a software-based layer-2 Ethernet network switch. The switch connects virtual machines to virtual and physical networks.
- SOFS Servers. A Scale-Out File Server (SOFS) allows the same folder or file to be shared from multiple cluster nodes.

Prerequisites: Hyper-V Monitoring in Foglight Evolve Cloud configuration

User privileges required for monitoring agents

Hyper-V Monitoring in Foglight Evolve Cloud requires the following configuration prerequisites:

- Privileges of Monitor Account for Hyper-V® Agent:
  - The user is a member of a local group administrators.
- Privileges of Monitor Account for SCVMM Agent (Hyper-V® environments):
  - The user is SCVMM (Not Windows) administrator.
  - The user is a member of a local group administrators.

  NOTE: SCVMM 2012 and SCVMM 2012R2 are currently supported.

  NOTE: Follow the Microsoft documentation to add a user to the SCVMM administrator role https://technet.microsoft.com/en-us/library/hh341475(v=sc.12).aspx

  NOTE: Follow the Microsoft documentation to add a member to a local group https://technet.microsoft.com/en-us/library/cc772524(v=ws.11).aspx
- Privileges of Hyper-V Optimizer (Hyper-V® environments):
  - Hyper-V Optimizer is using the Hyper-V agent credentials (which is the local administrator).
- Privileges of Monitor Account for Scale-Out File Server (SOFS) Agent:
  - The user is a member of a local group administrators.

Configurations required for collecting data from VMs resided on SMB server

To collect the complete data of virtual machines that are resided on the SMB server, make sure to do the following:

1. Open *krb5.config* under the *FGLAM_HOM\state\default\config* directory, set *"forwardable=true"* in *libdefaults*.
2. Enable SMB delegation on Active Directory using either of the following approaches:
   - Run the following command on Active Directory. Visit Enable-SmbDelegation for details.

Enable-SmbDelegation [-SmbClient] <Hyper-V server name> [-SmbServer] <SMB server name>

NOTE: The Active Directory forest must be at the Windows Server 2012 functional level. This cmdlet relies on Active Directory Windows PowerShell cmdlets to perform its actions. To install the Active Directory cmdlets, run the following command: *Install-WindowsFeature RSAT-AD-PowerShell*

- Enable the SMB delegation through the Active Directory Users and Computers console.
  a Browse to select the default container named *Computers*.
  b Select the computer on which you want to configure constrained delegation (your Hyper-V host server), right click on it and select *Properties*.
  c Click *Delegation*, and then select the *Trust this computer for delegation to specified services only* option and ensure you select the *Use Kerberos Only* option.
  d In the *Service* box, click *Add* and select the Hyper-V target host computer, and then select ***cifs*** from the list of services that show up.

Hyper-V Monitoring in Foglight Evolve Cloud WinRM GPO script

The GPO script is provided to allow for a streamlined deployment, including how to configure Windows Remote Management (WinRM). Users must run the script as the Administrator on the AD controller which is enabled on Windows Server 2008 R2, Windows Server 2012 or Windows Server 2012 R2. They must enable WinRM for all the Hyper-V® servers through one time setup at Domain Controller, login to just one Domain Controller, and change the group policy by running an automation script.

The script creates a group policy object and links it to the specific OU (specified by running the script). The policy has the following settings:

- Create a firewall rule “Allow WinRM for FglAM Requests” which allows port 5985 on all network.
- Allow WinRM basic authentication.
- Allow WinRM unencrypted traffic.
- Set WinRM IPv4 and IPv6 filter to “*”.
- At the end of the script, users can chose to force the policy update. It runs an “Invoke-GPUpdate” method on all members in the specific OU.

These settings can be observed in the Group Policy Management console by selecting the policy object.

To undo the changes made by the script:

- Delete the group policy object.

  OR

- Remove the linked OU from the GPO scope.

2

Agent administration

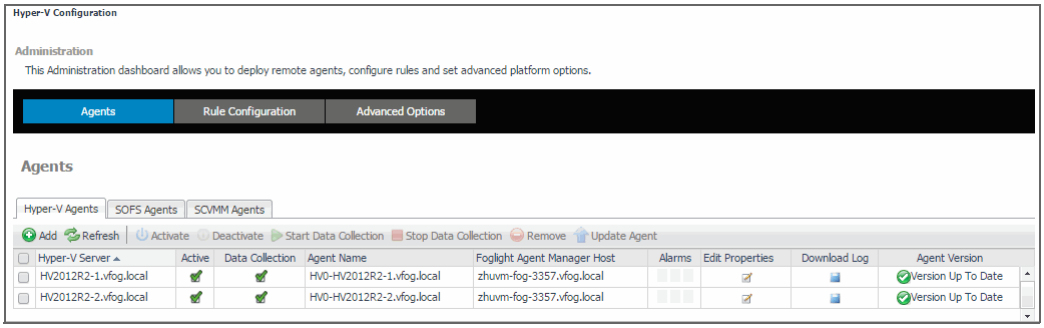
The Hyper-V Agent Administration dashboard contains links to agent administration tasks that you can use to manage Hyper-V agent instances, set the alarm sensitivity, and review and remove Hyper-V objects.

- Accessing the Hyper-V Agent Administration dashboard
- Configuring monitoring agents
- Reviewing object instances and deleting expired data

Accessing the Hyper-V Agent Administration dashboard

This tab consists of the Administration area and the Agents view commands.

Figure 1. Hyper-V Agent Administration dashboard



To access the Hyper-V Administration dashboard:

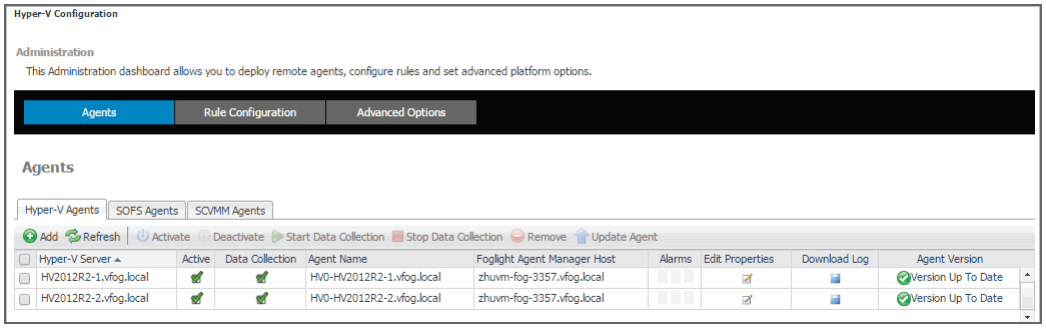
1 Log in to the Foglight Evolve Cloud browser interface.

2 Ensure that the navigation panel is open.

To open the navigation panel, click the right-facing arrow ▶ on the left.

3 On the navigation panel, under **Dashboards**, choose **Hyper-V > Hyper-V Agent Administration**.

Figure 2. Hyper-V Agent Administration dashboard



Administration area

The **Administration** area contains links to administrative tasks that you can initiate from this tab:

- **Rule Configurations:** Sets the level of alarms that the system generates, stores, and displays.
- **Agents:** Review existing Hyper-V/SOFS/SCVMM object instances. For more information, see Agents view commands on page 9.
- **Advanced Options:** Review and delete Hyper-V object instances that are no longer needed. For more information, see Reviewing object instances and deleting expired data on page 30.

Agents view commands

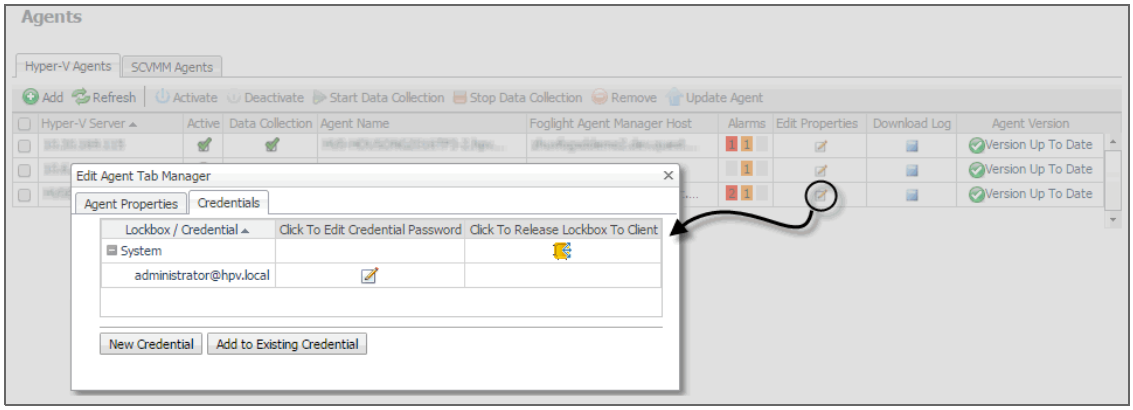
The **Agents** view shows a list of existing agent instances and a set of agent management commands at the top of the list. Use it to verify that your agents are collecting data from the monitored environment.

The following commands are available:

- **Add:** Starts a workflow for creating new agent instances. For more information, see Configuring monitoring agents on page 11.
- **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 Hyper-V 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 Hyper-V server.
- **Edit Properties:** Starts a workflow for editing the properties of one or more selected agent instances. Each agent comes with a set of properties that it uses to configure its correct running state. For more information, see Configuring agent properties on page 21.
- **Remove:** Deletes the selected agent instance.
- **Update Agent:** Updates the agent package to the latest version. For more information, see the *Installing and Configuring Foglight for Storage Management* Guide.

IMPORTANT: Updating the agent package using this command generates the previously existing credentials. However, if you update the agent package by re-deploying its .gar file through the Agent Status page, the credentials need to be re-created. To do that, select an agent instance, click **Edit Properties**, and configure the required credentials on the **Credentials** tab of the **Edit Tab Manager** dialog box.

Figure 3. Edit Tab Manager dialog box



To perform any of the available commands, select one or more check boxes in the left-most column and click the appropriate button. For example, to start an agent's data collection, select the check box in the agent row and click **Start Data Collection**.

Agent tabs

The Agents area contains three tabs: **Hyper-V Agents**, **SCVMM Agents**, and **SOFS Agents**. Each tab displays a list of the existing Hyper-V, SCVMM, or SOFS Agent instances and shows their status. Use it to verify if your agents are collecting data from the monitored environment.

Figure 4. Agents view

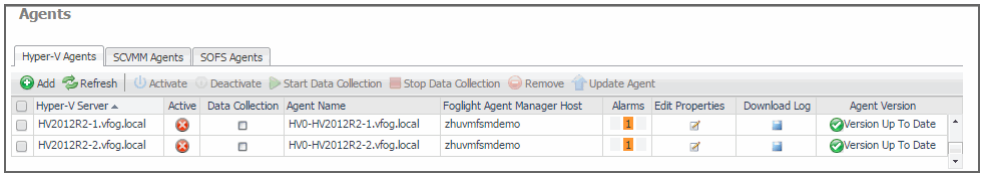


Table 1. Description of the View

Data displayed	• **Active**. Indicates if the Hyper-V Agent process is running. • **Agent Name**. The name of the Hyper-V Agent instance. • **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). • **Alarms**. The total numbers of Warning, Critical, and Fatal alarms. • **Data Collection**. Indicates if the Hyper-V Agent is collecting data from the monitored environment. • **Download Log**. Allows you to download the agent log file. • **Edit Properties**. Allows you to edit the agent's properties. • **Foglight Agent Manager Host**. The name of the machine on which the Foglight Evolve Cloud™ Agent Manager and the Hyper-V Agent process are running.

Table 1. Description of the View

- **Hyper-V Server** (**Hyper-V Agents** tab only). The name of the monitored Hyper-V® server.
- **SCVMM Server** (**SCVMM Agents** tab only). The name of the monitored Hyper-V Virtual Machine Manager.
- **SOFS Server** (**SOFS Agents** tab only). The name of the monitored SOFS server.

Configuring monitoring agents

Hyper-V Monitoring in Foglight® Evolve Cloud uses the Hyper-V, SCVMM, and SOFS agents to collect information about your virtual environment:

- *Hyper-V Agents* collect information from monitored Hyper-V servers. A Hyper-V server is a physical component required to begin building a virtual infrastructure. Hyper-V servers provide hypervisor-based architecture for controlling and managing resources for the virtual machines that run on it.
- *SCVMM Agents* collect information from Virtual Machine Managers (VMM). A VMM allows you to manage host, networking, and storage resources when creating and deploying virtual machines to virtual clouds.
- *SOFS Agents* collect information from monitored SOFS servers. A SOFS server is a Windows Server cluster with some form of shared storage. SOFS servers provide highly available file-based storage for applications and general use.

When Hyper-V, SCVMM, and SOFS agent packages are successfully deployed, you can create 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 **Agents** area on the Hyper-V Configuration dashboard.

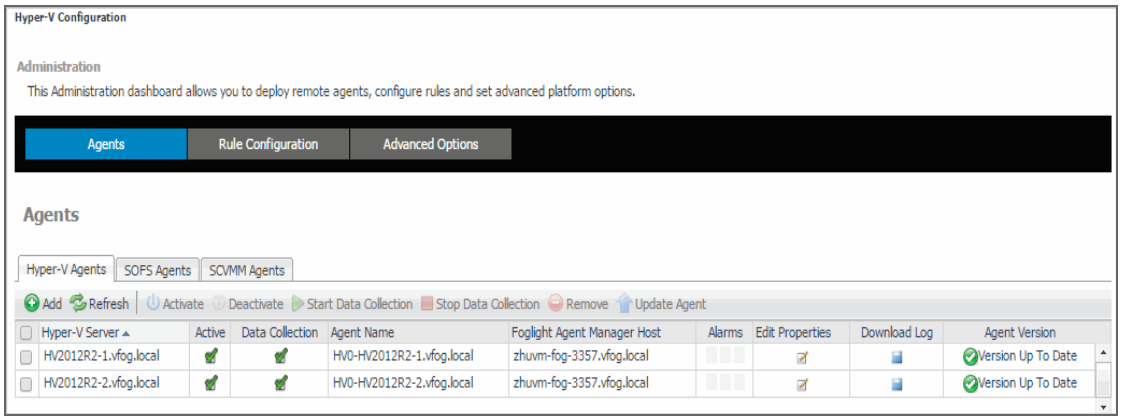
When you add an agent instance, the agent process is created on the Agent Manager host. Activating the agent instance starts that agent process. When you start an agent's data collection, the agent process starts collecting data from the monitored host and to sends it to Hyper-V Monitoring in Foglight Evolve Cloud.

To create, activate agent instances, and start their data collection:

1 Log in to the Foglight Evolve Cloud browser interface.

2 On the navigation panel, under **Dashboards**, choose **Hyper-V > Hyper-V Agent Administration**.

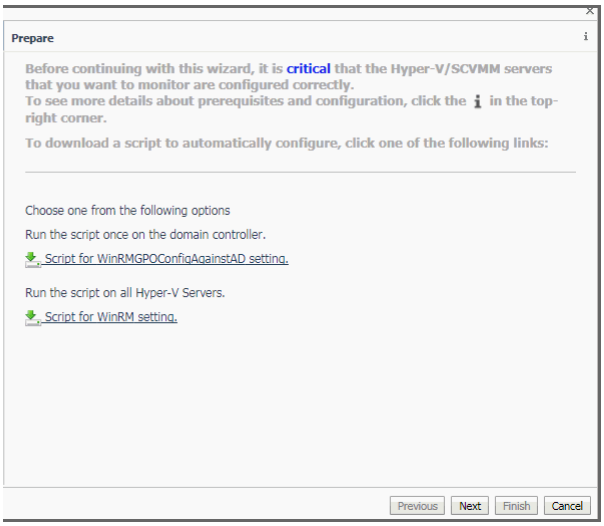
Figure 5. Hyper-V Agent Administration dashboard



3 On the **Administration** tab, under **Agents**, open the **Hyper-V Agents**, the **SCVMM Agents** tab, or the **SOFS Agents** tab, as required.

4 Click **Add** to launch the **Agent Setup** wizard.

The **Agent Setup** wizard appears, showing the **Prepare** page.

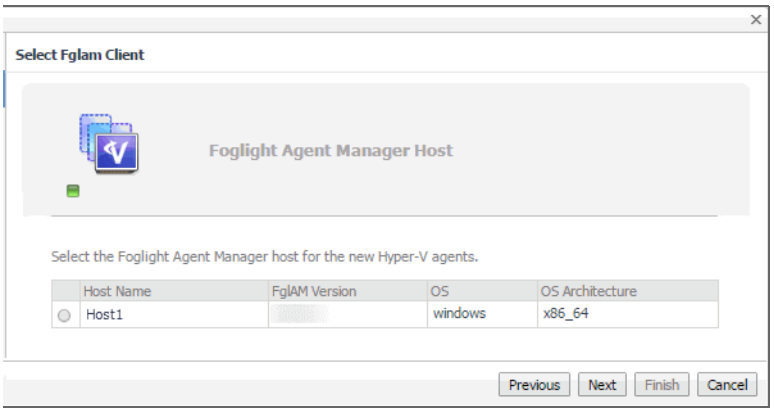


5 Review the information on this page.

- If you want to configure WinRM settings automatically, download the appropriate script, and follow the instructions provided with the scripts.
- To configure these settings manually, see the *Agent Manager Guide*.

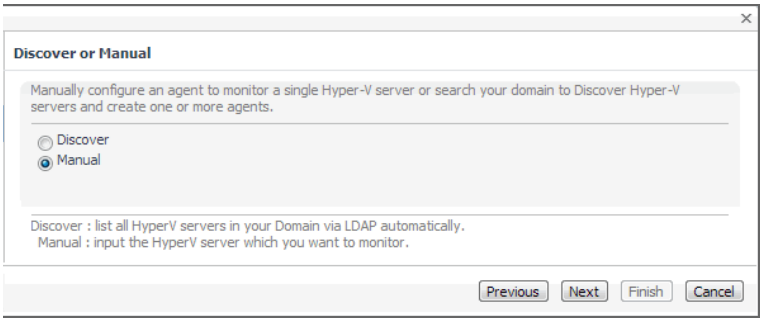
When done, click **Next**.

The **Agent Setup** wizard refreshes, showing the **Select FglAM Client** page. The page shows a list of all hosts that already have the Agent Manager installed and running, and to which you can deploy the Hyper-V Agent package.



6 Select the Agent Manager on which you want to create the Hyper-V Agent instance, and click **Next**.

7 **Hyper-V Agents only**. On the **Discover or Manual** page that appears, you can indicate if you want to manually specify the Hyper-V Server that you want to monitor, or to choose between the servers running in a given domain.

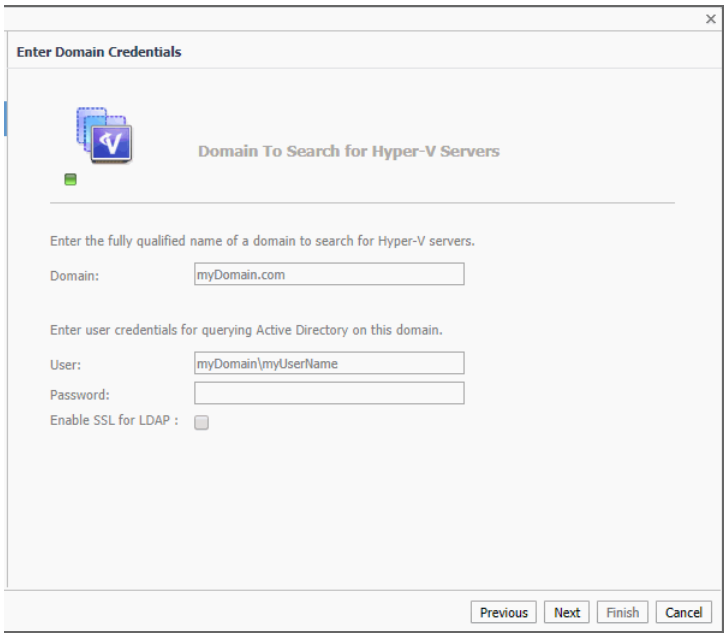


Select one of the following options:

Discover. Select this option if you want to choose from the available Hyper-V Servers running in the desired domain. Click **Next** and proceed to Step a.

Manual. Select this option if you want to manually specify the name of the Hyper-V Server. Click **Next** and proceed to Step b.

a **Discovering Hyper-V Servers only**. On the **Enter Domain Credentials** page that appears, specify the information needed to search for the running Hyper-V Servers.

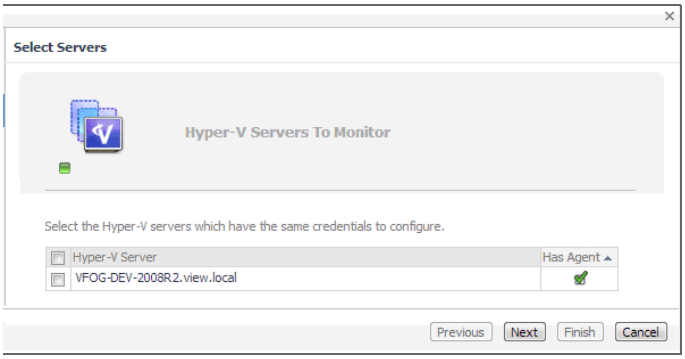


a Provide the following information, and then click **Next**.

- **Domain**: Type the fully qualified name of a domain to search for the Hyper-V Server. For example, `myDomain.com`.
- **User**: Type the user name to be used by the agent to be used to query Active Directory on the selected domain using the syntax *Domain**UserName*. For example, `myDomain\jsmith`.
- **Password**: Type the password associated with the above user name.
- **Enable SSL for LDAP**. Select this option to enable SSL for LDAP connection.

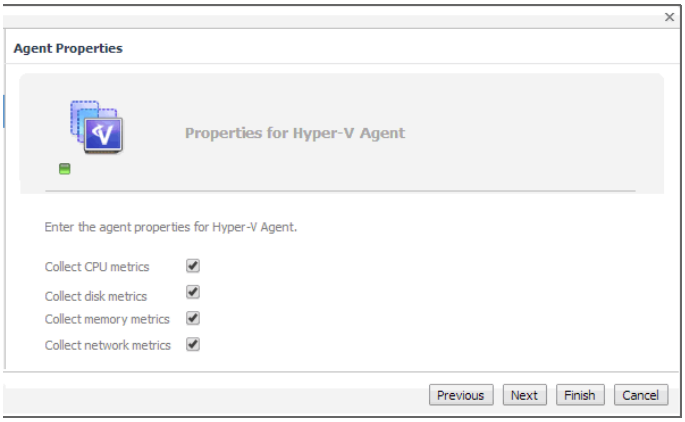
NOTE: In FIPS-compliant mode, you need to import the CA certificate or the self-signed certificate to the KeyStore of FMS to use this option. For more information, see Managing certificates for FMS on page 27.

The **Agent Setup** wizard refreshes, showing the **Select Servers** page. The page shows a list of all Hyper-V servers that you have access to, based on the domain name and user credentials you provided in this step.



b Select one or more Hyper-V Servers that you want to monitor and click **Next**.

The **Agent Setup** wizard refreshes, showing the **Agent Properties** page.



c By default, the options for collecting CPU, disk, memory, and network metrics are selected. Review these settings, and make any changes, if required. When done, click **Next**.

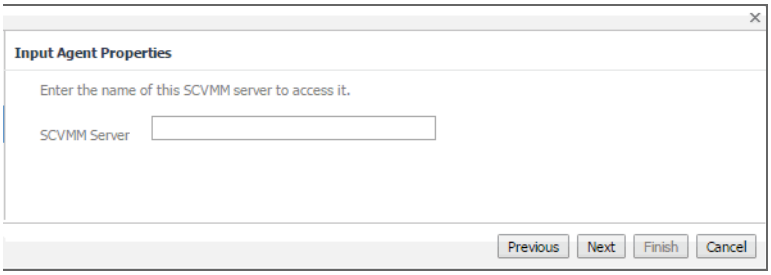
d Proceed to Step c.

b **Manually specifying a Hyper-V Server only**. On the **Manual Agent Properties** page that appears, specify the information needed to search for the running Hyper-V servers.

Click **Next**.

c On the **Credential Verification** page that appears, review the existing set of credentials. If the wizard determines that the selected Agent Manager has any credentials configured for the host on which the Hyper-V Server is running, they appear listed on this page.

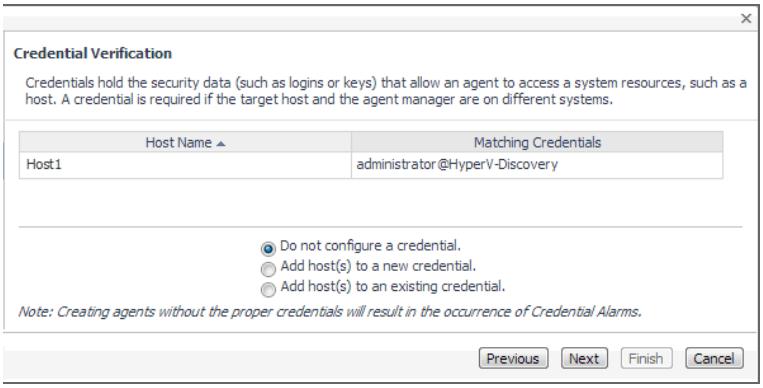
8 **SCVMM Agents only**. On the Input Agent Properties page that appears, type the name of the SCVMM server, and click **Next**.



9 On the **Credentials Verification** page that appears, select one of the following options:

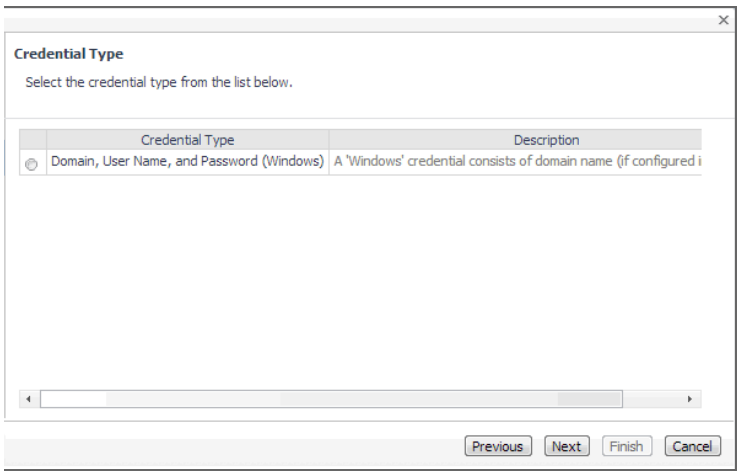
- **Do not configure a credential**: Select this option if you want to configure the credential for this resource at a later time. Click **Next** and continue with Step 12.
- **Add host(s) to a new credential**: Select this option if you want to add the host to a new credential. This option is suitable if none of the existing credentials have the connection details needed to access the new host. Click **Next** and continue with Step 10.
- **Add host(s) to an existing credential**: Select this option if you want to add the host to an existing credential. This option is suitable if an existing credential has the security data needed to access the new host, but you need to edit its resource mappings to include this host. Click **Next** and continue with Step 11.

IMPORTANT: Credentials are security data that provide the Infrastructure agent with the permission to monitor system resources, such as a host or a range of hosts.



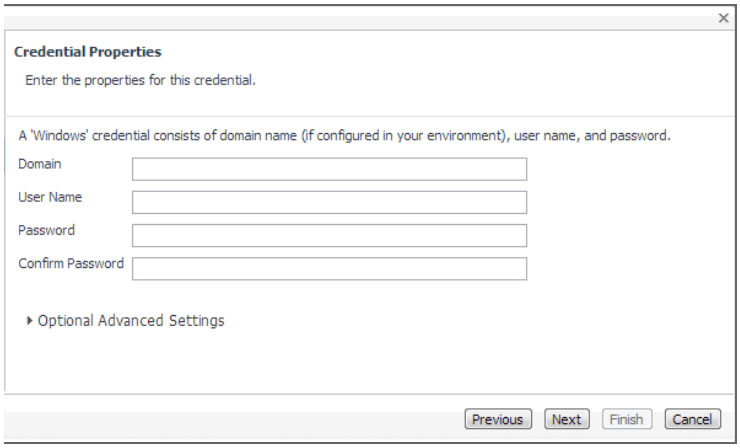
10 Create a new credential.

a On the **Credential Type** page that appears, select the credential type from the available options.



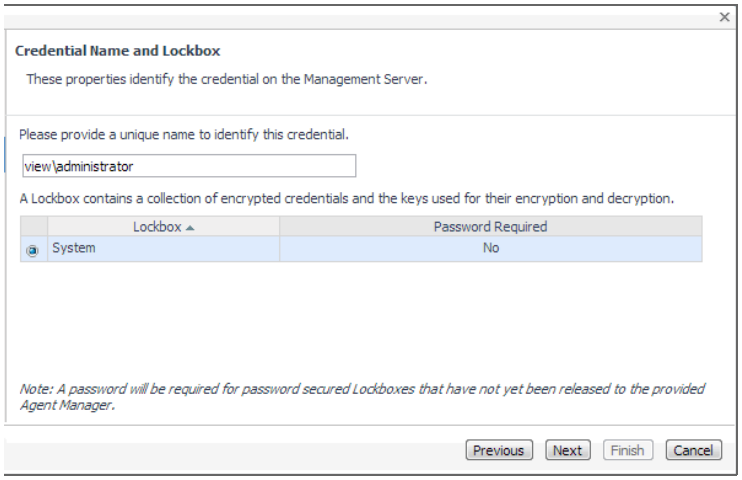
b Click **Next**.

The **Credential Properties** page appears.



c On the **Credential Properties** page, type the required properties, and click **Next**.

The **Credential Name and Lockbox** page appears.

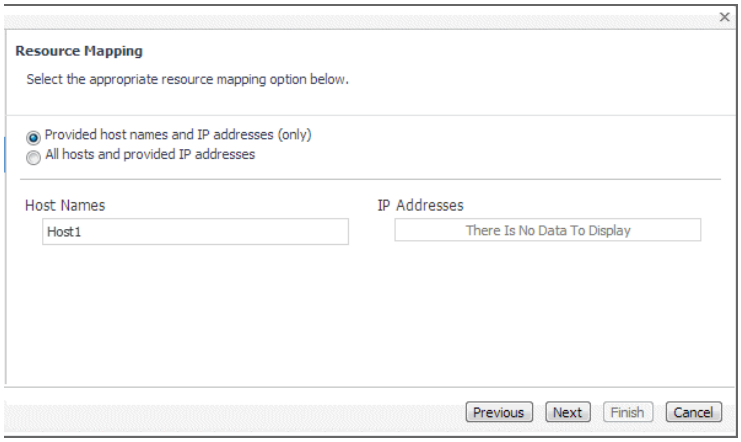


d On the **Credential Name and Lockbox** page, provide a name to uniquely identify the credential, and select a lockbox in which you want to keep the credential. A lockbox can be used to group credentials for access and/or security. In smaller Foglight Evolve Cloud installations, using the default **System** lockbox should be sufficient.

> **NOTE:** If a lockbox is password protected and is not released to the target Foglight Agent Manager, you can provide the lockbox password on the last page of the wizard.

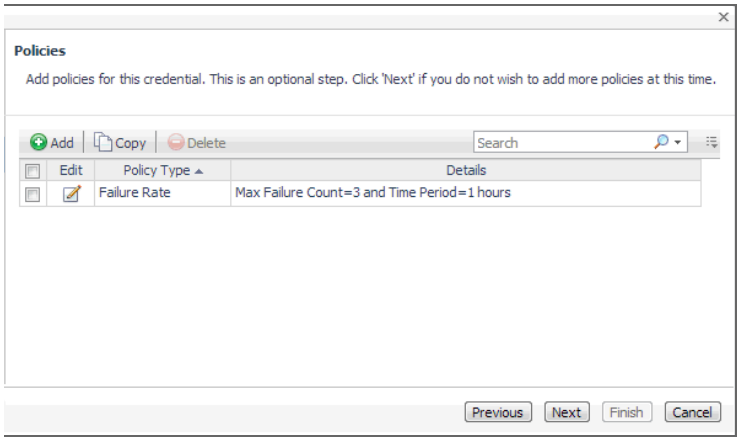
Click **Next**.

The **Resource Mapping** page appears.



e On the **Resource Mapping** page, indicate which hosts you want to associate with this credential. Click **Next**.

The **Policies** page appears.

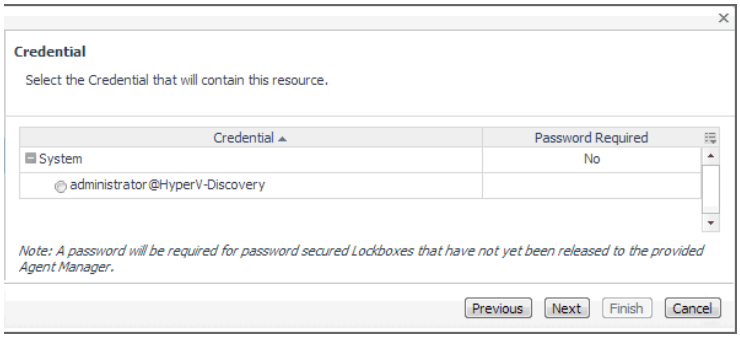


f Optional—On the **Policies** page, define one or more policies for this credential. A policy defines the number of times a credential can be used, the number of allowed authentication failures, the time range during which the credential is valid, or the length of time the credential data can be cached on the client. For example, you can specify the number of times the credential can be used, or the time period during which it can be used. For complete information about the available credential policies, see the *Administration and Configuration Help*.

g Click **Next** and proceed to Step 12.

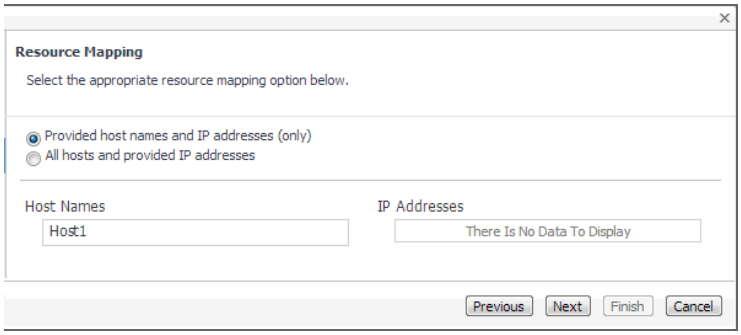
11 Use an existing credential.

a On the **Credential** page that appears, select an existing credential to contain this host.



b Click **Next**.

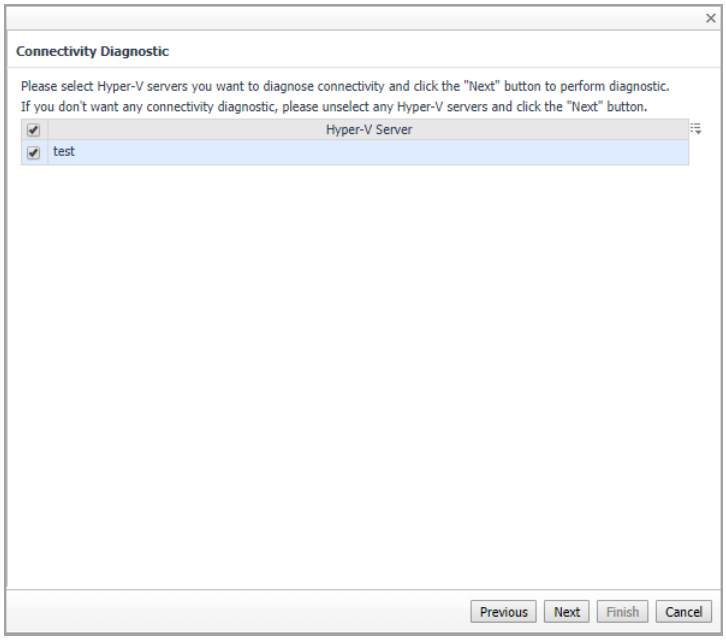
The **Resource Mapping** page appears.



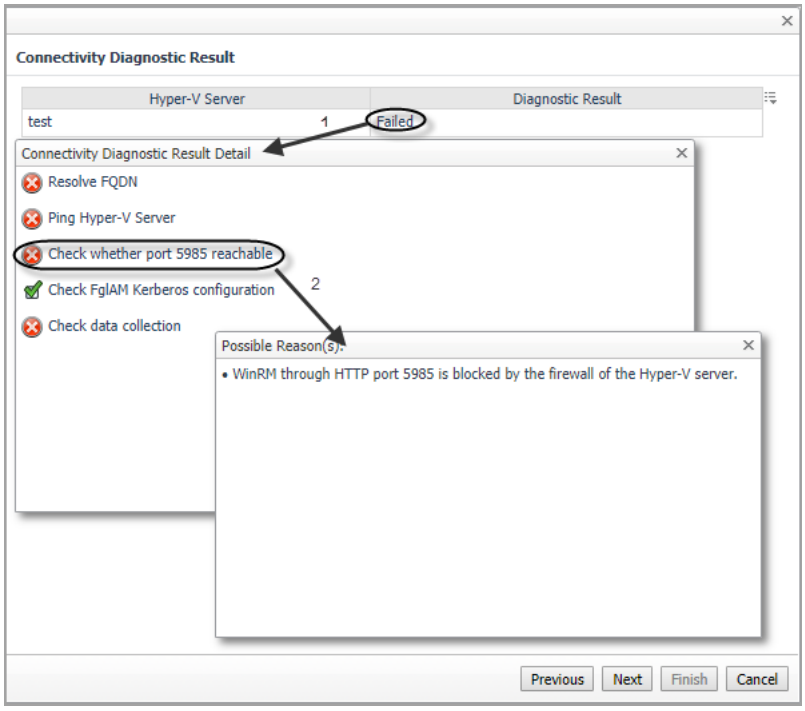
c On the **Resource Mapping** page, indicate which hosts you want to associate with this credential. You can either select the host that you are about to start monitoring, all monitored hosts, or hosts whose name contains a specific text string.

d Click **Next** and proceed to Step 12.

12 On the **Connectivity Diagnostic** page that appears, select the Hyper-V servers you want to diagnose connectivity and click **Next** to perform diagnostic. If no connectivity diagnostic is required, unselect any Hyper-V servers and click **Next**.

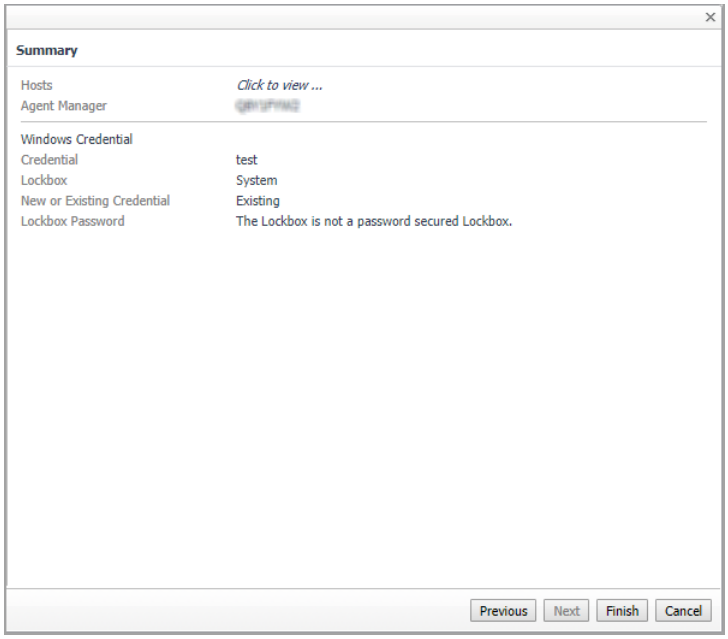


Wait for a few seconds until the **Connectivity Diagnostic Result** page appears. Click the Diagnostic Result and the **Connectivity Diagnostic Result Detail** page appears. Click on the failed items to see the possible reasons.



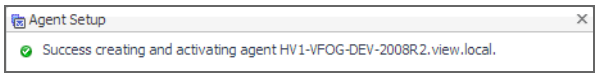
Click **Next** after connectivity diagnostic completes.

13 On the **Summary** page that appears, review the information provided about the host and the monitoring agent.



14 Click **Finish**.

The new host is added to the Hosts dashboard after a short delay. The monitoring agent is created. If the operation is successful, the **Agent Setup** message box appears. Review the information and close the message box.



The agent instances created to monitor the new host appear on the **Administration** tab, in the **Agents** area.

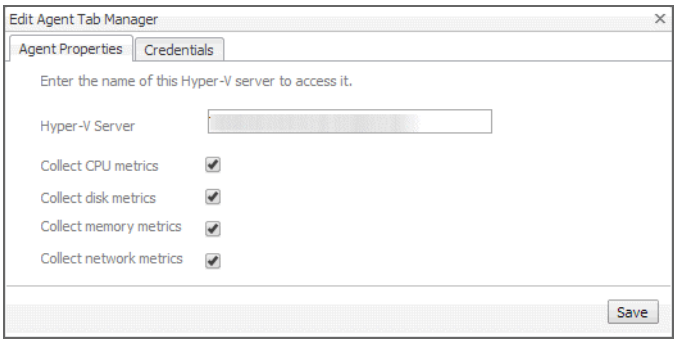
Close the dialog box. The Agent Management dashboard refreshes, showing the newly created Hyper-V Agent in the list.

15 If required, reconfigure the agent properties or credentials. For example, you can specify the name of the monitored Hyper-V server or the authentication schema.

When an agent connects to the Management Server, it is provided with sets of properties that it uses to configure its correct running state. Hyper-V Monitoring in Foglight Evolve Cloud stores agent properties on the Management Server.

a Select an agent and click **Edit Properties**.

The **Edit Agent Tab Manager** dialog box appears, showing the Hyper-V Agent properties on the **Agent Properties** tab.

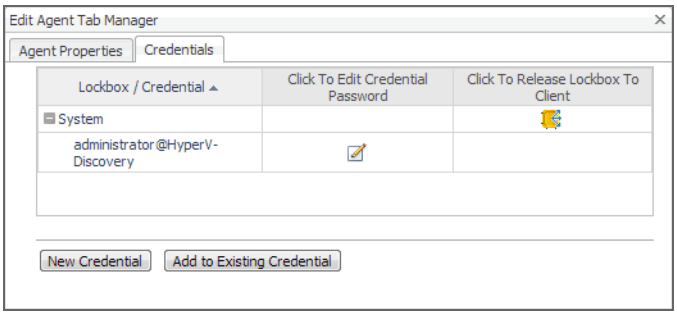


NOTE: When multiple agents are selected, you can only edit the properties that are common to all selected agents.

b Review and edit the agent properties, as required.

For additional information about these properties, see Setting the Hyper-V Agent Configuration properties on page 22.

c Open the **Credentials** tab, and review the available credentials.



d If required, you can create a new credential for this agent, or associate it with an existing credential.

- **New credentials**. Click **New Credential** and use the **Create Credential Wizard** that appears to provide the required information. For more details, see Step 10.
- **Existing credentials**. Click **Add to Existing Credential** and use the **Create Credential Wizard** that appears to provide the required information. For more details, see Step 11.

16 Activate one or more agents.

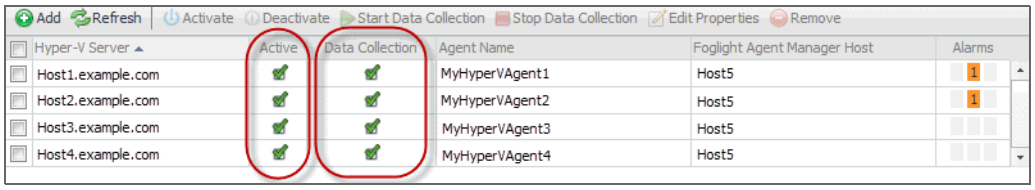
On the Agent Management dashboard, select the agents that you want to activate and click **Activate**.

17 Start the data collection for one or more agents.

On the Agent Management dashboard, select the agents whose data collection you want to start and click **Start Data Collection**.

18 Click **Refresh.**

The **Active** and **Data Collection** columns show green check marks indicating that the agents are active and collecting data.



If the agent unexpectedly fails or stops, this is an indicator of an incorrect configuration. Unknown host names or invalid WinRM configuration can cause the agent to fail. Incorrect configuration causes the agent to stop. If this happens, the agent generates an observation containing a message with more information about the failure.You can view the message contents in the Data Browser. For example, to find out any massages related to the Hyper-V Agent, in the Data Browser, navigate to **Hyper-V > Hyper-V Agents > <***Hyper-V Agent instance***> > Messages > History > <***message***>**. For more information about the Data Browser, see the *Data Model Guide*.

Configuring agent properties

NOTE: To use HTTPs connection, you need to import the CA certificate or the self-signed certificate to the KeyStore of FglAM. For more information, see Managing certificates for FglAM on page 26.

The Hyper-V, SCVMM, and SOFS Agents collect data from your virtual infrastructure and sends it to the Management Server. The agents keep track of resource utilization metrics and alerts you when certain pre-defined thresholds are reached.

When an agent connects to Foglight Management Server, 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 Hyper-V Monitoring in Foglight® Evolve Cloud. 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.

There are two ways to access the Hyper-V, SCVMM, and SOFS Agent properties:

- On the Hyper-V Environment dashboard, on the **Administration** tab, select an agent instance and click **Edit Properties** (see Configuring monitoring agents on page 11).

  NOTE: This method only allows you to edit the **Configuration** properties, but not the **Data Collection Scheduler** properties.

- On the Agent Status dashboard, select an agent instance and click **Edit Properties**. This method provides access to the full set of Hyper-V Agent properties, and is described in this topic.

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

To modify the Hyper-V/SCVMM/SOFS Agent agent properties using the Agent Status dashboard:

1 Log in to the Foglight Evolve Cloud browser interface.

2 Ensure that the navigation panel is open.

To open the navigation panel, click the right-facing arrow on the left.

3 Open the Agent Status dashboard and navigate to the agent properties.

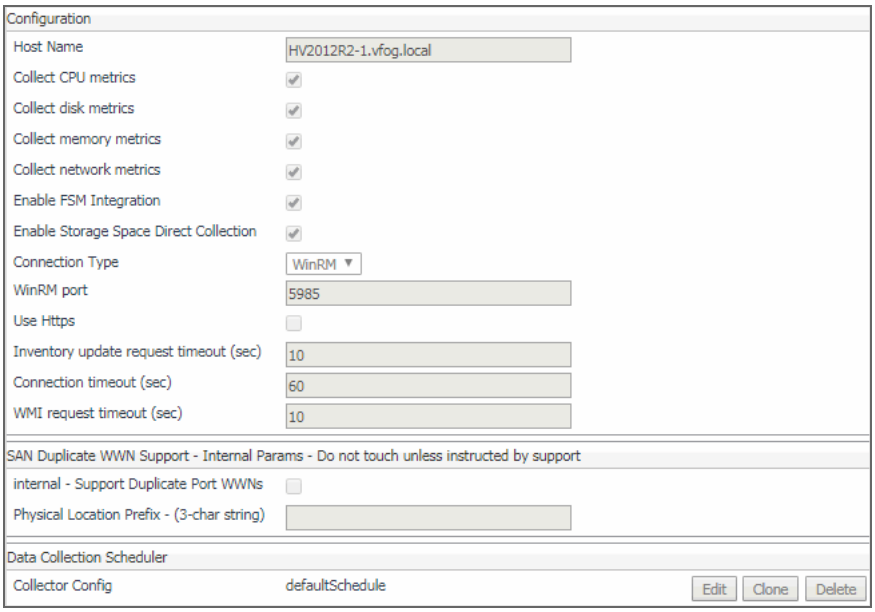
a On the navigation panel, under **Dashboards**, select **Administration > Agents > Agent Status**.

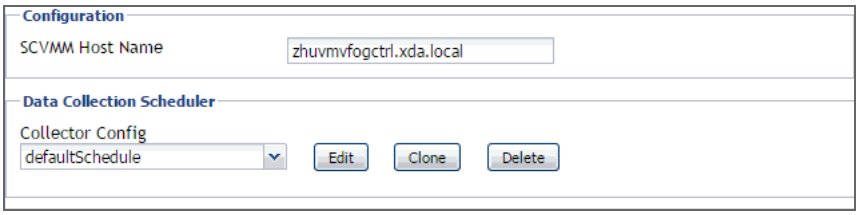
> **IMPORTANT:** Another way of editing agent properties is through the Agent Properties dashboard. The properties you specify on this dashboard apply to all instances of the selected type. To be certain that you are editing properties for a particular agent instance, without overwriting any properties of other agent instances of the same type, use the Agent Status dashboard instead of the Agent Properties dashboard.

b On the Agent Status dashboard, select the instance of the Hyper-V, SCVMM, or SOFS Agent whose properties you want to modify, and click **Edit Properties**.

c Indicate that you want to edit the properties of the agent instance.

A list of agent properties appears in the display area.



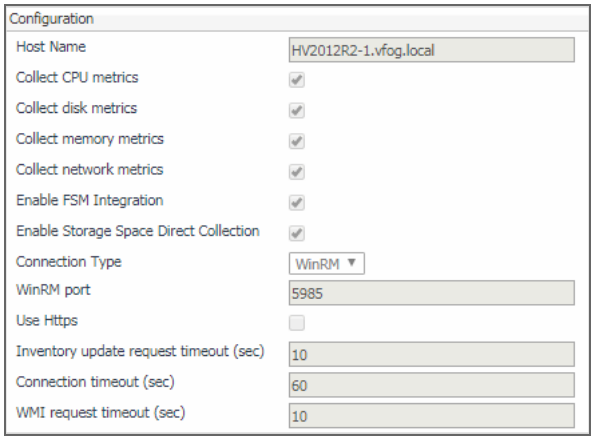


The position of the **Properties** pane depends on the dashboard you used to access agent properties. If you used the Agent Properties dashboard, the Properties pane appears to the right of the **Namespace > Type** pane in the display area. If you used the Agent Status dashboard, the **Properties** pane appears across the display area.

Setting the Hyper-V Agent Configuration properties

To monitor a desired Hyper-V® server, ensure the Hyper-V Agent's **Configuration** properties are set up as required.

Figure 6. Hyper-V Agent Configuration properties



To set the Hyper-V Agent Configuration properties:

1. Locate the Hyper-V Agent's **Configuration** properties.
2. Set the **Configuration** properties as follows:
   - **Host Name**: Type the fully qualified host name of the machine on which the monitored Hyper-V Server is running.
   - **Collect CPU metrics**: Select this option if you want to collect CPU metrics from the monitored Hyper-V environment.
   - **Collect disk metrics**: Select this option if you want to collect disk metrics from the monitored Hyper-V environment.
   - **Collect memory metrics**: Select this option if you want to collect memory metrics from the monitored Hyper-V environment.
   - **Collect network metrics**: Select this option if you want to collect network metrics from the monitored Hyper-V environment.
   - **Enable FSM Integration**: Select this option if you want to enable the integration with Foglight for Storage Management.
   - **Enable Storage Space Direct Collection**. Select this option if you want to collect Storage Space Direct (S2D) metrics from the monitored Hyper-V environment.
   - **Connection Type**. Specify the connection type. Quest recommends using *WinRM* as the connection type, as *DCOM* will be removed in future release.
   - **WinRM port**. Type the port number of WinRM.
   - **Use HTTPs**. Select this option if you want to use the HTTPS protocol.
   - **Inventory update request timeout (sec)**: Type the number of seconds after an inventory collection times out.
   - **Connection timeout (sec)**: Type the number of seconds after a connection times out.
   - **WMI request timeout (sec)**: Type the number of seconds after a WMI request times out.

Setting the SCVMM Agent Configuration properties

To monitor a desired System Center Virtual Machine Manager (SCVMM), ensure the SCVMM Agent's **Configuration** properties are set up as required.

Figure 7. SCVMM Agent Configuration properties

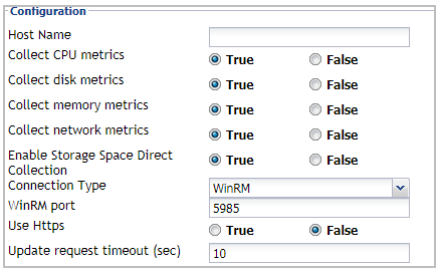
To set the SCVMM Agent Configuration properties:

1. Locate the SCVMM Agent's **Configuration** properties.
2. In the **Configuration** area, in the **SCVMM Host Name** box, type the name of the machine on which the Virtual Machine Manager is running.

Setting the SOFS Agent Configuration properties

To monitor a desired SOFS server, ensure the SOFS Agent's **Configuration** properties are set up as required.

Figure 8. SOFS Agent Configuration properties



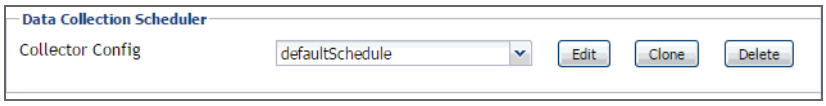
To set the SOFS Agent Configuration properties:

1. Locate the SOFS Agent's **Configuration** properties.
2. Set the **Configuration** properties as follows:
   - **Host Name**: Type the fully qualified host name of the machine on which the monitored Hyper-V Server is running.
   - **Collect CPU metrics**: Select this option if you want to collect CPU metrics from the monitored SOFS environment.
   - **Collect disk metrics**: Select this option if you want to collect disk metrics from the monitored SOFS environment.
   - **Collect memory metrics**: Select this option if you want to collect memory metrics from the monitored SOFS environment.
   - **Collect network metrics**: Select this option if you want to collect network metrics from the monitored SOFS environment.
   - **Enable Storage Space Direct Collection**. Select this option if you want to collect Storage Space Direct (S2D) metrics from the monitored Hyper-V environment.
   - **Connection Type**. Specify the connection type. Quest recommends using *WinRM* as the connection type, as *DCOM* will be removed in future release.
   - **WinRM port**. Type the port number of WinRM.
   - **Use HTTPs**. Select this option if you want to use the HTTPS protocol.
   - **Update request timeout (sec)**: Type the number of seconds after a collection times out.

Setting the Hyper-V/SCVMM/SOFSAgent Data Collection Scheduler properties

Use the **Data Collection Scheduler** properties to adjust how frequently the Hyper-V, SCVMM, or SOFS Agent collects data from the monitored server.

Figure 9. Data Collection Scheduler properties



To set the Data Collection Scheduler properties:

1 Locate the Hyper-V, SCVMM, or SoFS Agent **Data Collection Scheduler** properties.

2 Select the collection configuration list that you want to use.

Click **Collection Config**, and from the list that appears, select a collection list.

> **TIP:** The Inventory Collection process does not submit data back to the Management Server, it is used entirely to support the Essential and Resource metric collections.
>
> If you want to clone a list and associate it with the agent instance whose properties you are editing, select it and click **Clone**. When prompted, enter a name for the cloned list. For more information on cloning, see the *Administration and Configuration Help*.

The default **Data Collection** entry appears in the list. This collector is responsible for obtaining Hyper-V metrics from the monitored system.

3 Update the selected collection configuration list.

a Click the **Edit** button on the right of **Collector Config**.

A dialog box appears.

b Edit the entries in the list, as required.

c To edit a value in the table, double-click the table cell, and enter the required value. Each list has the following values:

- **Collector Name**: Contains the name of the default collector, **Data Collection**.
- **Default Collection Interval**: Contains the length of the default collection interval.
- **Time Unit**: Contains the time unit for measuring the default collection interval: `milliseconds`, `seconds`, `minutes`, `hours`, or `days`.
- **Fast-Mode Collection Interval**: Contains the length of the collection interval when the agent is running in fast mode.
- **Fast-Mode Time Unit**: Contains the length of the collection interval when the agent is running in fast mode.
- **Fast-Mode Max Count**: Contains the maximum count of entries when the agent is running in fast mode.

d Save your changes to the list by clicking **Save Changes** in the dialog box.

The dialog box closes.

4 In the display area, click **Save**.

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-----
    XXXXXXXX=
    -----END CERTIFICATE-----
    ```

    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:
                                  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
  ```

Managing certificates for FMS

Use the keytool utility shipped with Foglight to create, import, or export certificates. This utility can be found at: *<foglight_home>\jre\bin\keytool*.

There are two FMS running modes:

- None-FIPS (Federal Information Processing Standards) mode
- FIPS-compliant mode

Managing certificates for FMS in non-FIPS mode

The KeyStore Foglight used under non-FIPS mode is located at: *<foglight_home>/jre/lib/security/cacerts* (default password: `changeit`)

Add a certificate

Use the keytool command in FMS JRE located in *<foglight>/jre/bin*

```
keytool -import -trustcacerts -alias "<alias>" -file "<certificate path>" -keystore
<foglight_home>/jre/lib/security/cacerts -storepass changeit
```

- Validate the certificate and ensure the following:
  - It is not expired.
  - It is an X.509 format.
- Change the following before executing the command:
  - `<alias>`: The alias is required and is used in the list and delete operations to refer to the certificate. It can be anything.
  - `<foglight_home>`: The folder path where the Foglight is installed.
  - `<certificate path>`: Your custom certificate path.

List installed certificates

```
keytool -list -keystore <foglight_home>/jre/lib/security/cacerts -storepass changeit
```

Delete a certificate

Remove a certificate referred to by an `alias`.

```
keytool -delete -alias <alias> -keystore <foglight_home>/jre/lib/security/cacerts -
storepass changeit
```

A full example for managing certificate for FMS in non-FIPS mode

Add example certificate into FMS Certificate Store in non-FIPS mode

```
C:\Quest\Foglight\jre\bin> .\keytool.exe -import -trustcacerts -alias fveqaca -
file "C:\caca.cer" -keystore C:\Quest\Foglight\jre\lib\security\cacerts -
storepass changeit

Owner: CN=CA, DC=ca, DC=local

Issuer: CN=CA, DC=ca, DC=local

Serial number: xxxxxxxxxxx

Valid from: Mon Jun 15 10:56:05 CST 2015 until: Mon Sep 23 14:58:03 CST 2047

Certificate fingerprints:

         MD5:  xxxx

         SHA1: xxxx

         SHA256: xxxx

.....

Trust this certificate? [no]:  yes

Certificate was added to keystore
```

Managing certificates for FMS in FIPS-compliant mode

The KeyStore Foglight used in FIPS-compliant mode is located at:
<foglight_home>/config/security/trust.fips.keystore (default password: `nitrogen`)

Add a certificate in FIPS-compliant mode

Use the keytool command in FMS JRE located in *<foglight>/jre/bin.*

```
keytool -import -trustcacerts -alias "<alias>" -file "<certificate path>" -keystore
"<Foglight_home>/config/security/trust.fips.keystore" -deststoretype BCFKS -
provider org.bouncycastle.jcajce.provider.BouncyCastleFipsProvider -providerpath
"<Foglight_home>/server/core/bc-fips.jar" -storepass nitrogen
```

- Validate the certificate and ensure the following:
  - It is not expired.
  - It is an X.509 format.
- Change the following before executing the command
  - `<alias>`: The alias is required and is used in the list and delete operations to refer to the certificate. It can be anything.
  - `<Foglight_home>`: The folder path where Foglight is installed.
  - `<certificate path>`: Your custom certificate path.

List installed certificates

```
keytool -list -keystore "<Foglight_home>/config/security/trust.fips.keystore" -
deststoretype BCFKS -provider
org.bouncycastle.jcajce.provider.BouncyCastleFipsProvider -providerpath
"<Foglight_home>/server/core/bc-fips.jar" -storepass nitrogen
```

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

Refer to the example output below:

```
Keystore type: BCFKS

Keystore provider: BCFIPS

Your keystore contains 151 entries

camerfirmachambersignca [jdk], Dec 18, 2019, trustedCertEntry,

Certificate fingerprint (SHA1):
4A:BD:EE:EC:95:0D:35:9C:89:AE:C7:52:A1:2C:5B:29:F6:D6:AA:0C

entrust2048ca [jdk], Dec 18, 2019, trustedCertEntry

…
```

Delete a certificate

Remove a certificate referred to by an `alias`.

```
keytool -delete -alias <alias> -keystore
"<Foglight_home>/config/security/trust.fips.keystore" -deststoretype BCFKS -
provider org.bouncycastle.jcajce.provider.BouncyCastleFipsProvider -providerpath
"<Foglight_home>/server/core/bc-fips.jar" -storepass nitrogen
```

A full example for managing certificate for FMS in FIPS-compliant mode

Add example certificate into FMS certificate store in FIPS-compliant mode

```
C:\Quest\Foglight\jre\bin>keytool -import -trustcacerts -alias "Evolve-Test" -file
"D:/Evolve-test.crt" -keystore
```

```
"C:/Quest/Foglight/config/security/trust.fips.keystore" -deststoretype BCFKS -
provider org.bouncycastle.jcajce.provider.BouncyCastleFipsProvider -providerpath
"C:/Quest/Foglight/server/core/bc-fips.jar" -storepass nitrogen

Owner: CN=CA, DC=ca, DC=local

Issuer: CN=CA, DC=ca, DC=local

Serial number: xxxx

Valid from: Sun Jan 06 23:07:06 CST 2019 until: Wed Apr 06 23:07:06 CST 2022

Certificate fingerprints:

...


Extensions:

...

Trust this certificate? [no]:  yes

Certificate was added to keystore
```

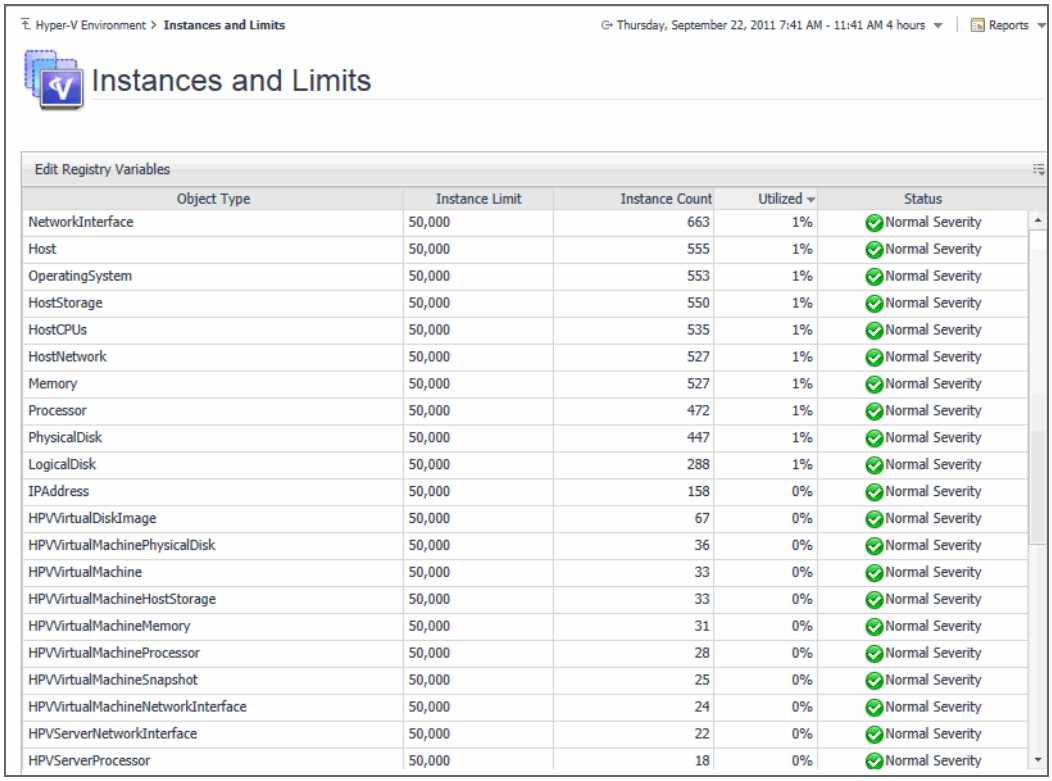
Reviewing object instances and deleting expired data

Foglight Evolve Cloud™ collects data from monitored environments and creates a data model in real-time. The resulting topology model consists of nodes where each node is an object instance of a particular object type. Each type of monitoring environment can have a unique set of object types. Hyper-V Monitoring in Foglight Evolve Cloud includes a set of topology object types and their definitions. When Foglight Evolve Cloud collects data from your Hyper-V environment, it builds the topology model that consists of the instances of the object types defined by Hyper-V Monitoring in Foglight Evolve Cloud. By default, a monitored environment can result in up to 50,000 object instances being created by a single object type. This value is controlled by the `foglight.limit.instances` registry variable.

Registry variables have a global default value and type-specific scoped values. This means that different object types can have different instance limits.

Explore the **Instances and Limits** view to see the existing Hyper-V object types. To access this view, on the Hyper-V Agent Administration dashboard, click **Review Instances and Limits**.

Figure 10. Instances and Limits view



Object Type	Instance Limit	Instance Count	Utilized	Status
NetworkInterface	50,000	663	1%	Normal Severity
Host	50,000	555	1%	Normal Severity
OperatingSystem	50,000	553	1%	Normal Severity
HostStorage	50,000	550	1%	Normal Severity
HostCPUs	50,000	535	1%	Normal Severity
HostNetwork	50,000	527	1%	Normal Severity
Memory	50,000	527	1%	Normal Severity
Processor	50,000	472	1%	Normal Severity
PhysicalDisk	50,000	447	1%	Normal Severity
LogicalDisk	50,000	288	1%	Normal Severity
IPAddress	50,000	158	0%	Normal Severity
HPVVirtualDiskImage	50,000	67	0%	Normal Severity
HPVVirtualMachinePhysicalDisk	50,000	36	0%	Normal Severity
HPVVirtualMachine	50,000	33	0%	Normal Severity
HPVVirtualMachineHostStorage	50,000	33	0%	Normal Severity
HPVVirtualMachineMemory	50,000	31	0%	Normal Severity
HPVVirtualMachineProcessor	50,000	28	0%	Normal Severity
HPVVirtualMachineSnapshot	50,000	25	0%	Normal Severity
HPVVirtualMachineNetworkInterface	50,000	24	0%	Normal Severity
HPVServerNetworkInterface	50,000	22	0%	Normal Severity
HPVServerProcessor	50,000	18	0%	Normal Severity

The **Instances and Limits** view displays the list of the existing Hyper-V object types, and for each type it shows the type name, instance limit, instance count, instance limit utilization, and the type status given as the highest severity level associated with an instance of that type. This information can give you insight into the size of your database and whether additional adjustments are required to improve your system performance. For example, if an object type results in a high number of object instances, this may result in performance bottlenecks. To prevent them, check if any of these are updated recently and, if not, delete them from the database, as described below.

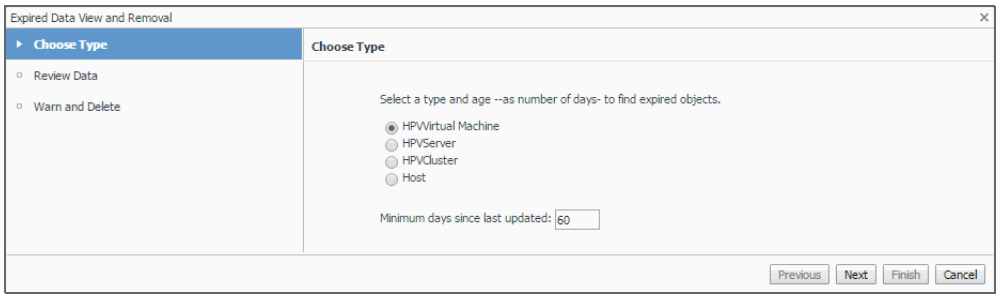
To view the list of existing registry variables or to edit them, click **Edit Registry Variable** in the top-left corner. For complete information about registry variables in Foglight Evolve Cloud, see the *Administration and Configuration Help*.

For reference information about this view, see Instances and Limits view on page 32.

To review and delete expired data:

1 On the Hyper-V Agent Administration dashboard, click **Review Expired Data**.

The **Expired Data View and Removal** dialog box appears.

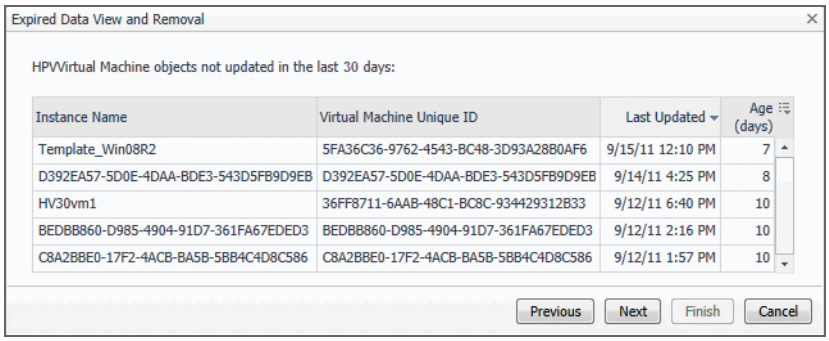


2 In the **Expired Data View and Removal** dialog box, select a category of object type that you want to review, and type the number of days during which the object instances were not updated.

For example, to view the object instances that are not updated in 30 days and are created when monitoring virtual machines, select **HPVVirtual Machine**, and in the **Minimum days since last updated** box, type 30.

3 Click **Next**.

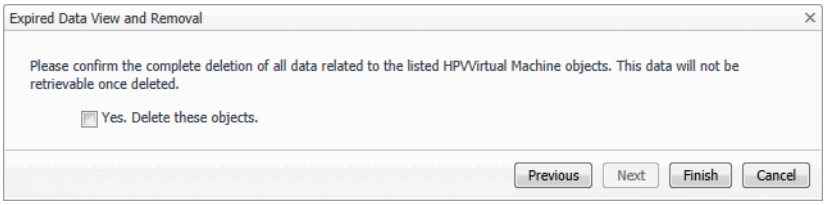
The **Expired Data View and Removal** dialog box refreshes, showing the object instances that meet the specified requirements.



4 Observe the results.

- If you want to delete all of the object instances, click **Next**.
- If you want to modify your search, click **Previous**, make your changes, and observe your results again. For example, to show fewer instances, click **Previous**, and increase the time period. When satisfied, click **Next**.
- If you do not want to delete any objects, click **Next**.

The **Expired Data View and Removal** dialog box refreshes.



5 To delete the selected object instances, select the check box.

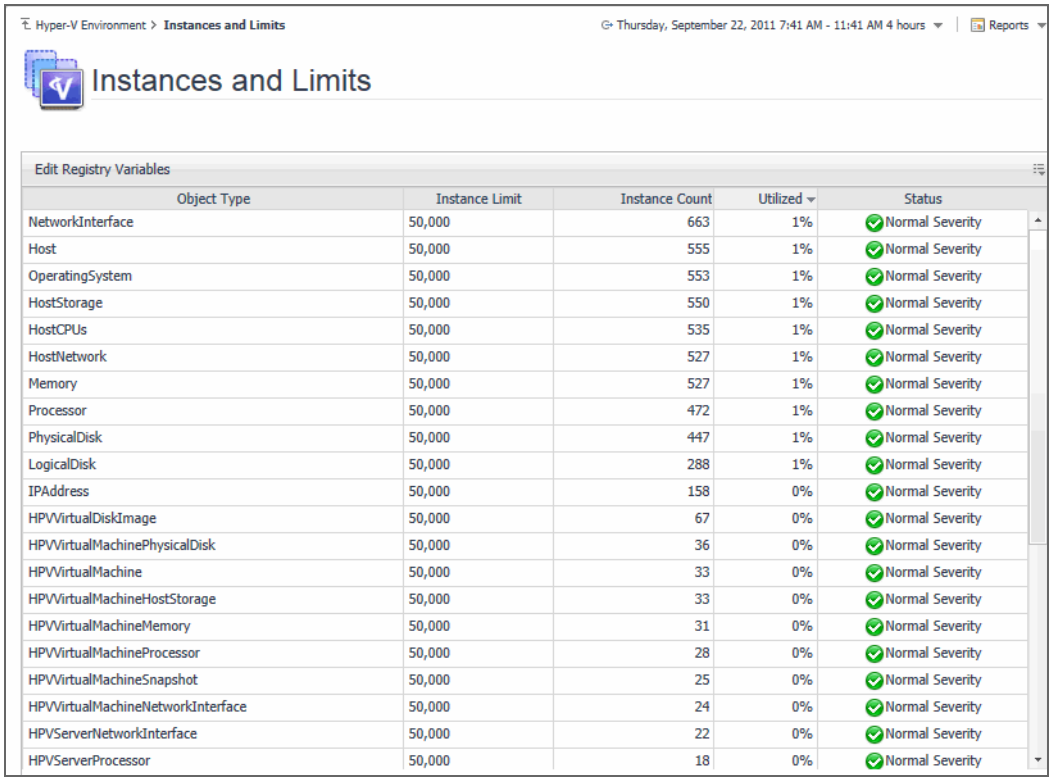
To keep the selected object instances, ensure the check box is clear.

6 Click **Finish**.

Instances and Limits view

This view displays the list of the existing Hyper-V object types. This information can give you insight into the size of your database and whether additional adjustments are required to improve your system performance.

Figure 11. Instances and Limits view



Object Type	Instance Limit	Instance Count	Utilized	Status
NetworkInterface	50,000	663	1%	Normal Severity
Host	50,000	555	1%	Normal Severity
OperatingSystem	50,000	553	1%	Normal Severity
HostStorage	50,000	550	1%	Normal Severity
HostCPUs	50,000	535	1%	Normal Severity
HostNetwork	50,000	527	1%	Normal Severity
Memory	50,000	527	1%	Normal Severity
Processor	50,000	472	1%	Normal Severity
PhysicalDisk	50,000	447	1%	Normal Severity
LogicalDisk	50,000	288	1%	Normal Severity
IPAddress	50,000	158	0%	Normal Severity
HPVVirtualDiskImage	50,000	67	0%	Normal Severity
HPVVirtualMachinePhysicalDisk	50,000	36	0%	Normal Severity
HPVVirtualMachine	50,000	33	0%	Normal Severity
HPVVirtualMachineHostStorage	50,000	33	0%	Normal Severity
HPVVirtualMachineMemory	50,000	31	0%	Normal Severity
HPVVirtualMachineProcessor	50,000	28	0%	Normal Severity
HPVVirtualMachineSnapshot	50,000	25	0%	Normal Severity
HPVVirtualMachineNetworkInterface	50,000	24	0%	Normal Severity
HPVServerNetworkInterface	50,000	22	0%	Normal Severity
HPVServerProcessor	50,000	18	0%	Normal Severity

Table 2. Description of the View

Data displayed	• **Instance Count**. The current number of object instances of this type. • **Instance Limit**. The maximum number of object instances of this type that can be instantiated. • **Object Type**. The type of the topology object. • **Status**. The current status representing the highest severity level associated with an instance of that type. • **Utilized**. The percentage of the object limit instance that is currently utilized.

3

Performance investigation with the Hyper-V Explorer

The Hyper-V Explorer provides a great deal of value to administrators who leverage Hyper-V Monitoring in Foglight® Evolve Cloud to monitor their virtual infrastructure. It has a hierarchical interface that displays various performance metrics and alarms within the virtual infrastructure. It provides several informative views through which you can quickly and easily access detailed information about any of the available components (physical or virtual) within the monitored environment.

- About the Hyper-V Explorer
- Accessing the Hyper-V Explorer
- About the Hyper-V Explorer topology
- Hyper-V Explorer Summary
- Hyper-V Explorer Storage

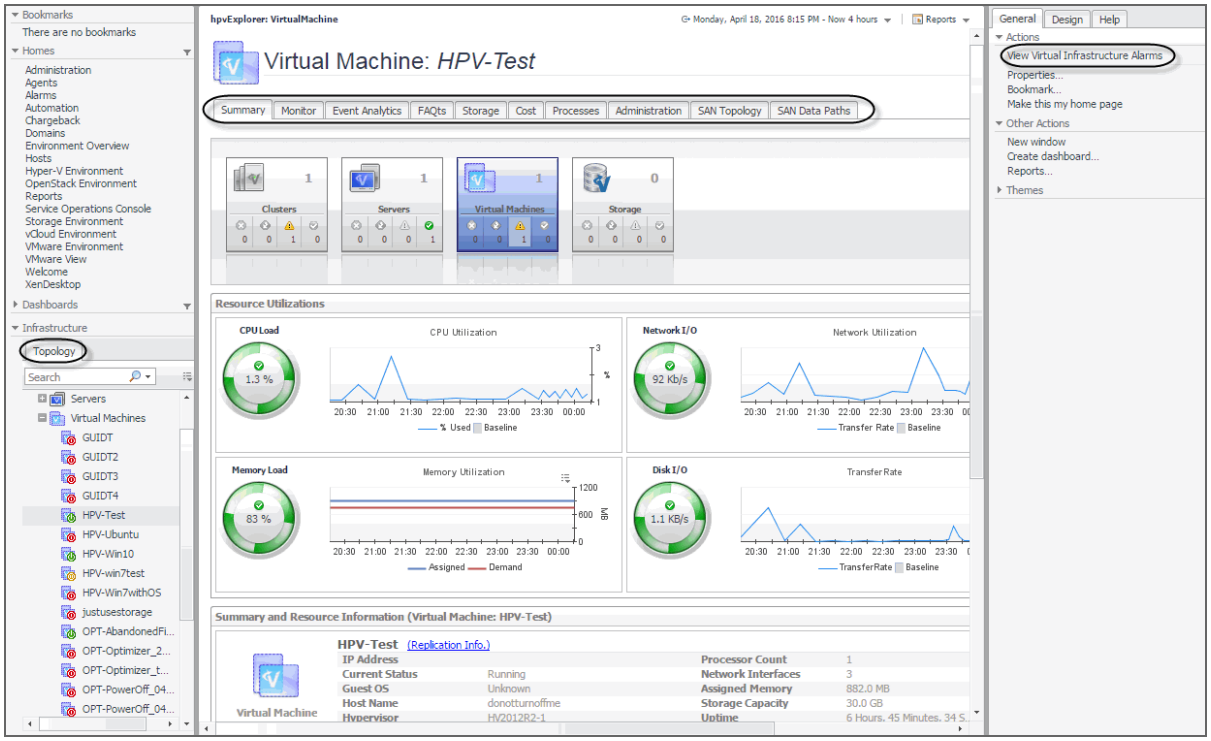
About the Hyper-V Explorer

The Hyper-V Explorer provides detailed performance metrics about an object or a group of objects selected on the **Hyper-V Explorer Topology tab**.The upper part of the Hyper-V Explorer consists of three main components: a selected tile, an alarm summary for the selected object, and navigation tabs.

The alarm summary in the top right shows the number of alarms at each severity level that are outstanding for the selected object type: clusters, servers, and virtual machines. Clicking an alarm count shows a list of the active alarms for the selected object or group of objects.

The range of navigation tabs varies from object to object, but generally includes a tab that displays the selected object's summary (typically the default view), a tab displaying the selected object's performance monitoring details, and one or more tabs with other relevant information. There are tabs that appear in the display area and a tab displaying a topology tree on the navigation panel. In addition, the action panel also provides instant access to a number of useful actions and tasks.

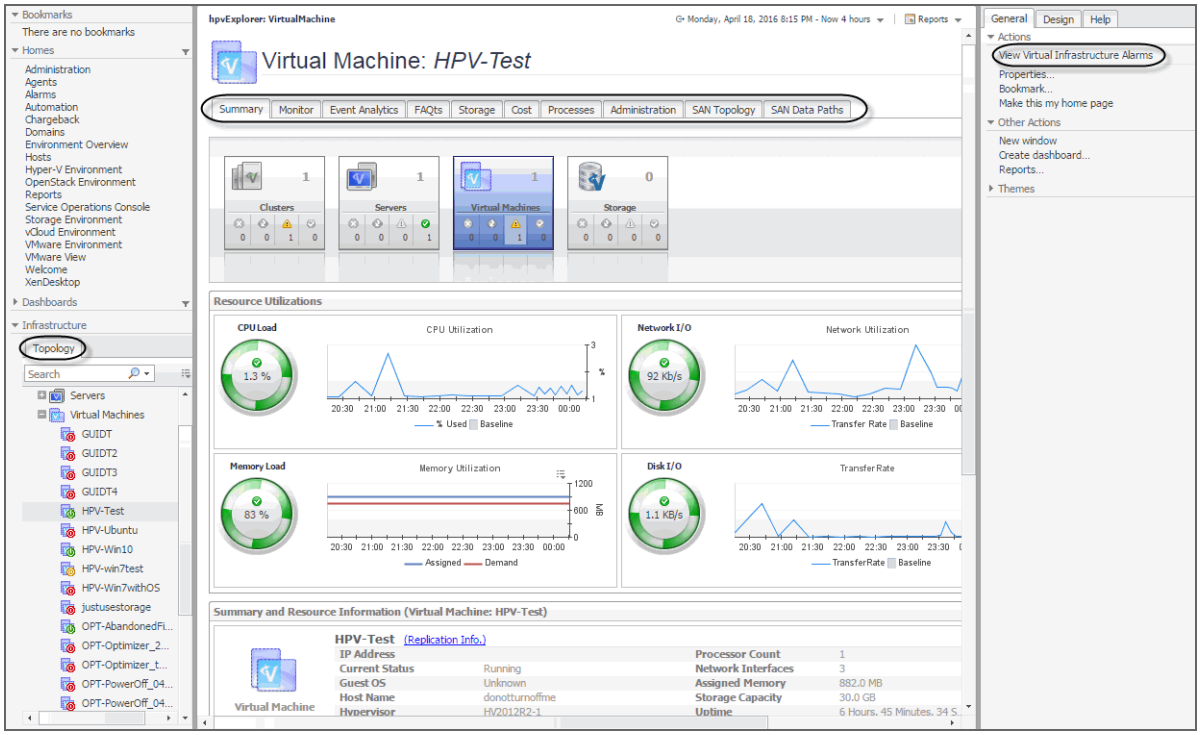
Figure 12. Hyper-V Explorer



Accessing the Hyper-V Explorer

The Hyper-V Explorer provides detailed performance metrics about an object or a group of objects selected on the Hyper-V Explorer Topology tab.

Figure 13. Hyper-V Explorer



To access the Hyper-V Explorer

1 Log in to the Foglight Evolve Cloud browser interface.

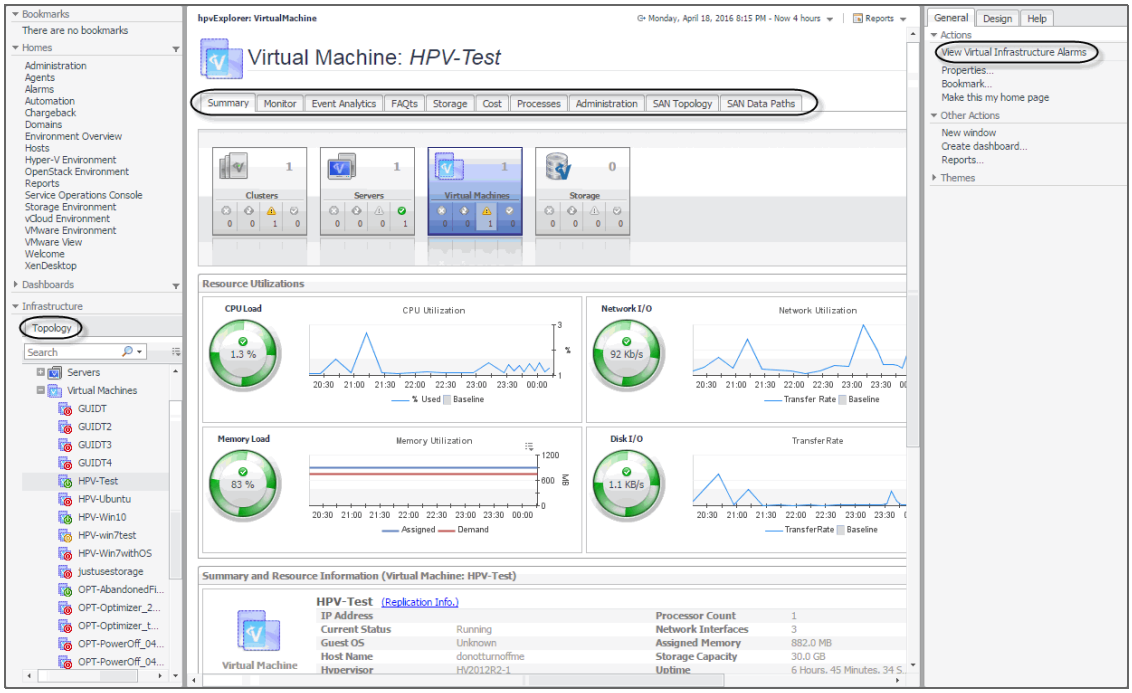
2 Ensure that the navigation panel is open.

To open the navigation panel, click the right-facing arrow ▶ on the left.

3 On the navigation panel, under **Dashboards**, click **Hyper-V > Hyper-V Explorer**.

The Hyper-V Explorer appears in the display area.

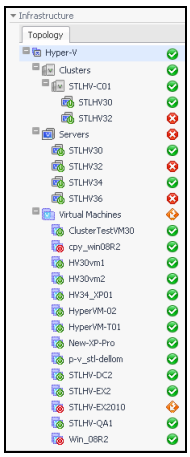
Figure 14. Hyper-V Explorer



About the Hyper-V Explorer topology

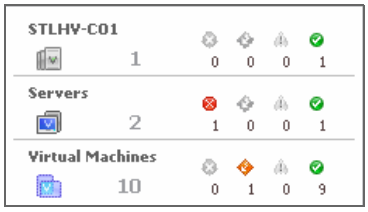
The **Topology** tab appears on the navigation panel when you access the Hyper-V Explorer. It displays a tree showing a hierarchical structure of the elements in your virtual infrastructure.

Figure 15. Topology tab



Use it to quickly select an object or object container and view the related information in the display area. Hovering over a specific node in this tree shows a dwell that gives you more information about that component, the related elements, and their alarm status. For example, hovering over a cluster node shows the name, the number of servers in that cluster, and the number of virtual machines running on the servers that belong to that cluster. It also shows the alarm counts for each component type and alarm severity.

Figure 16. Related information dwell

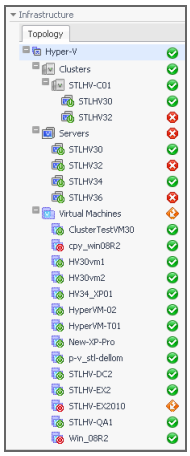


Hyper-V Explorer Topology tab

The Hyper-V Explorer **Topology** tab contains an organized view of the virtual infrastructure objects that are monitored by Hyper-V Monitoring in Foglight Evolve Cloud: clusters, servers, and virtual machines.

This tab appears on the navigation panel, under **Infrastructure**.

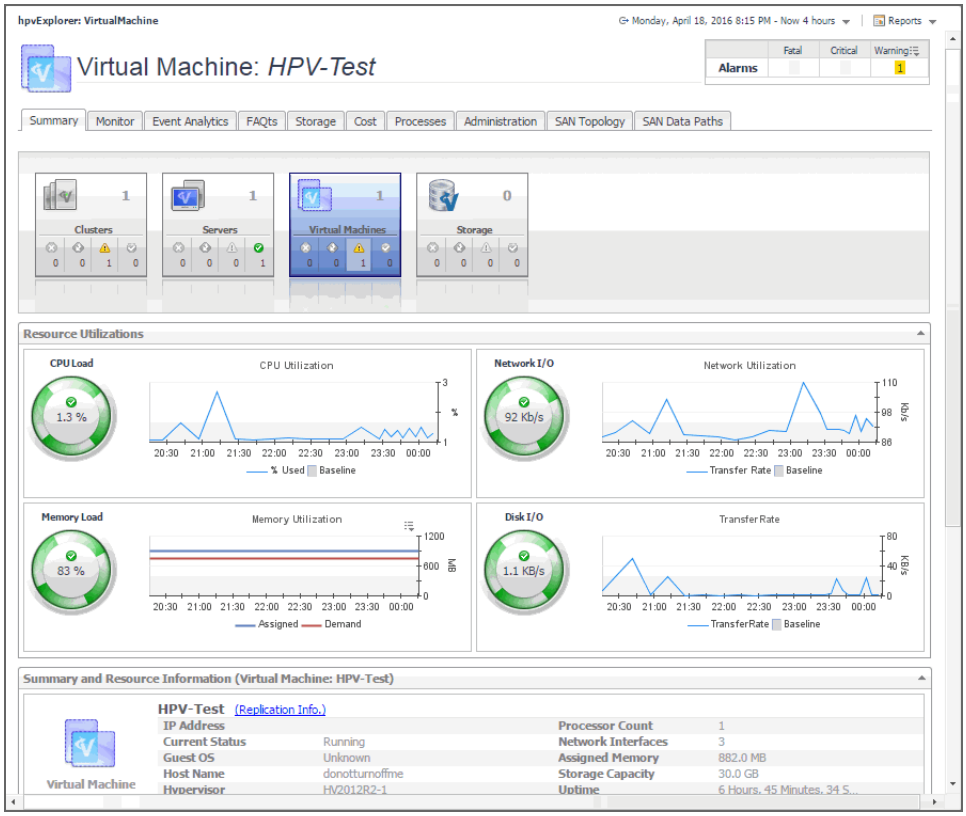
Figure 17. Topology tab



Hyper-V Explorer Summary

This is the first tab that appears open by default when you access the Hyper-V Explorer. It displays high-level information about the resource utilization and the selected component's resources, such as its operating system, physical host, storage capacity, and others. The appearance of this tab depends on the object or group of object selected. For example, exploring a group of clusters shows a combined CPU consumption chart followed by a list of clusters, while exploring a virtual machine displays detailed resource consumption for the selected virtual machine.

Figure 18. Hyper-V Explorer Summary tab

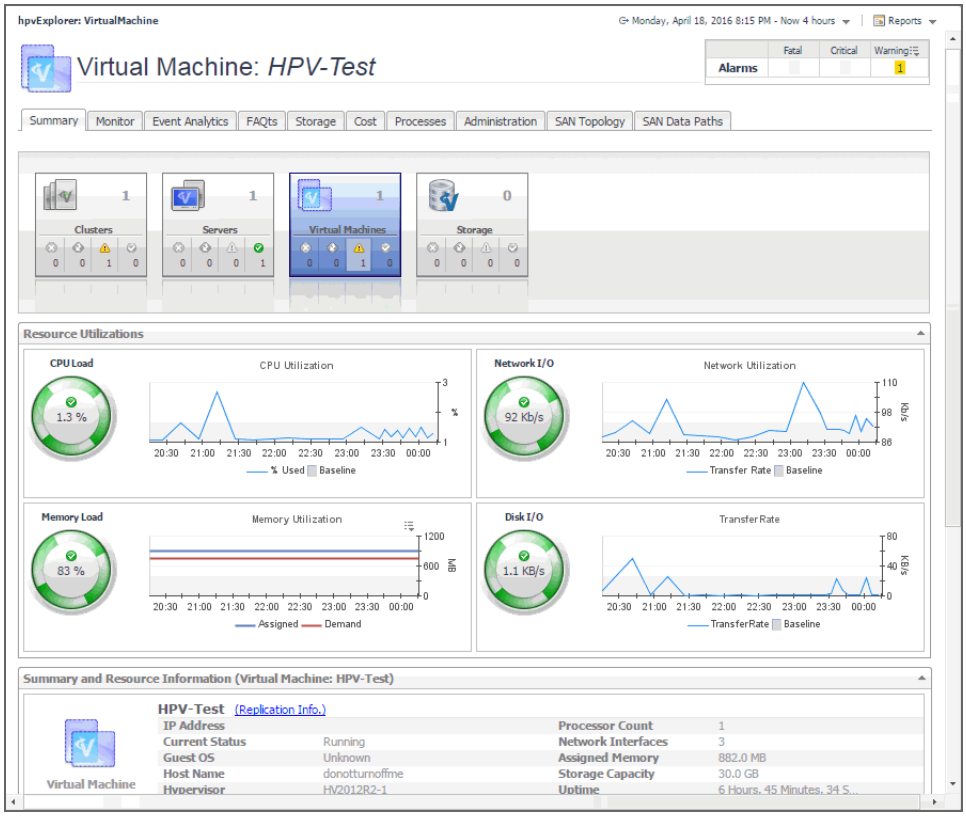


Hyper-V Explorer Summary tab

The Hyper-V Explorer **Summary** tab shows a summary of system resources for a selected cluster, server, or virtual machine.

This tab appears in the Hyper-V Explorer when you select a cluster, server, or virtual machine instance on the Hyper-V Explorer Topology tab.

Figure 19. Summary tab



This tab is made up of the following embedded views:

- Notes
- Resource Utilizations
- Servers
- Summary and Resource Information
- Virtual Environment
- Virtual Machines

Table 3. Notes

Description	Shows additional notes about the selected virtual machine. **NOTE:** This view only appears when viewing virtual machine details.

Table 4. Resource Utilizations

Description	Shows the resource consumption for the selected cluster, server, or virtual machine broken down into four simple views.
Data displayed	• **CPU Load**. The current percentage of the selected component's (cluster, server, or virtual machine) CPU load, used to execute system code and user programs, based on the total CPU capacity available to that component. • **CPU Utilization, % Used**. The percentage of the selected component's (cluster, server, or virtual machine) CPU utilization spent on executing system code and user programs during the selected time period.

Table 4. Resource Utilizations

- **CPU Utilization, Baseline**. An envelope indicating the expected CPU utilization range based on historical data.

NOTE: This metric only appears when exploring server or virtual machine details.

- **Disk I/O**. The current disk I/O rate for the selected cluster, server or virtual machine.
- **Disk Transfer Rate**. The rate at which data was read from or written to the disks associated with the selected cluster, server, or virtual machine) during the specified time period.
- **Disk Transfer Rate, Baseline**. An envelope indicating the expected disk utilization range based on historical data.

NOTE: This metric only appears when exploring server or virtual machine details.

- **Memory, Static Memory**. The total amount of static memory available to the selected cluster, server, or virtual machine.

NOTE: This metric appears only if the DRAM (dynamic random-access memory) is disabled on the selected cluster, server, or virtual machine.

- **Memory Load**. The current percentage of the average memory usage by the selected cluster, server, or virtual machine.

NOTE: This metric appears only if the DRAM (dynamic random-access memory) is enabled on the selected cluster, server, or virtual machine.

- **Memory Utilization, Assigned**. The amount of memory that is allocated to the selected server or cluster) during the specified time period.

NOTE: This metric appears only if the DRAM (dynamic random-access memory) is enabled on the selected cluster, server, or virtual machine.

- **Memory Utilization, Demand**. The amount of memory that the selected cluster, server or virtual machine requires during the specified time period.

NOTE: This metric appears only if the DRAM (dynamic random-access memory) is enabled on the selected cluster, server, or virtual machine.

- **Network I/O**. The current rate at which the selected component (cluster, server, or virtual machine) transfers data from and to the network.
- **Network Utilization, Baseline**. An envelope indicating the expected CPU utilization range based on historical data.

NOTE: This metric only appears when exploring server or virtual machine details.

- **Network Utilization, Transfer Rate**. The rate at which the selected component (cluster, server, or virtual machine) receives or sends data to the network during the selected time period.

Where to go next

Drill down on:

- **CPU Load** spinner. Displays the **CPU Load** dialog box.

Figure 20. CPU Load dialog box

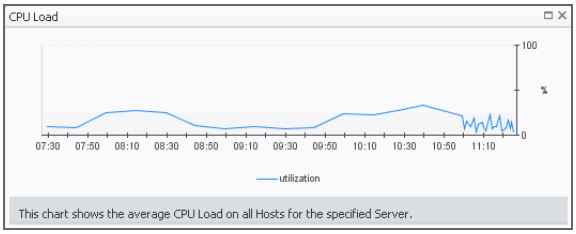
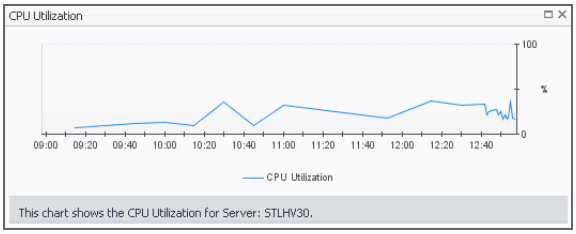


Table 4. Resource Utilizations

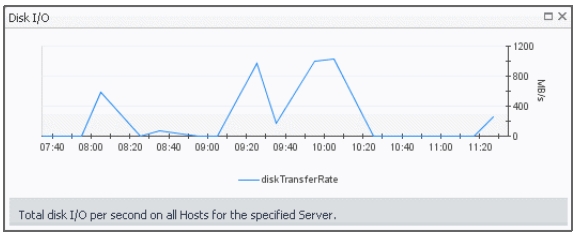
- **CPU Utilization** graph. Displays the **CPU Utilization** dialog box.

Figure 21. CPU Utilization dialog box



- **Disk I/O** spinner. Displays the **Disk I/O** dialog box.

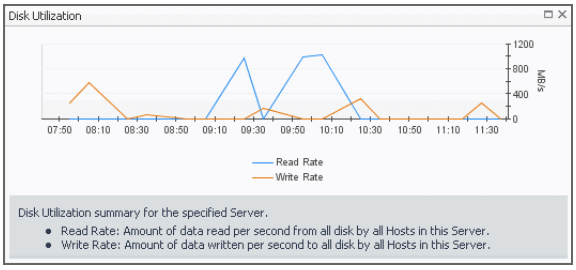
Figure 22. Disk I/O dialog box



NOTE: This drilldown is only available when viewing server or cluster details in the Hyper-V Explorer.

- **Disk Utilization** graph. Displays the **Disk Utilization** dialog box.

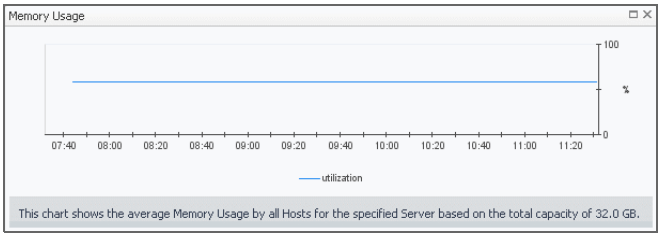
Figure 23. Disk Utilization dialog box



NOTE: This drilldown is only available when viewing server or cluster details in the Hyper-V Explorer.

- **Memory Usage** spinner. Displays the **Memory Usage** dialog box.

Figure 24. Memory Usage dialog box

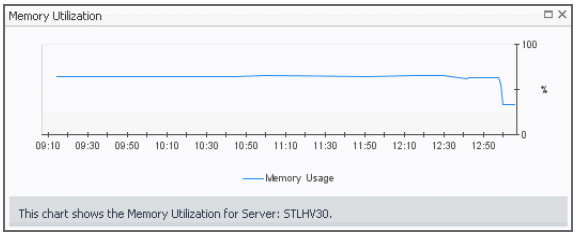


NOTE: This drilldown is only available when viewing server or cluster details in the Hyper-V Explorer.

Table 4. Resource Utilizations

- **Memory Utilization** graph. Displays the **Memory Utilization** dialog box.

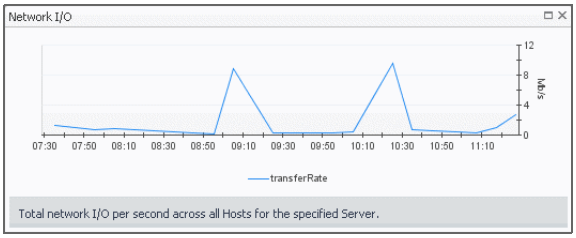
Figure 25. Memory Utilization dialog box



NOTE: This drilldown is only available when viewing server or cluster details in the Hyper-V Explorer.

- **Network I/O** spinner. Displays the **Network I/O** dialog box.

Figure 26. Network I/O dialog box



- **Network Utilization** graph. Displays the **Network Utilization** dialog box.

Figure 27. Network Utilization dialog box

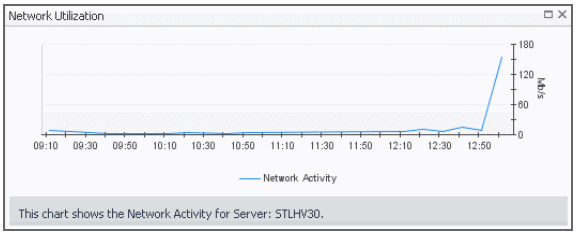


Table 5. Servers

Description	Shows a list of servers that belong to the selected cluster. **NOTE:** This view only appears when viewing cluster details.
Data displayed	• **Server, CPU**. The current percentage of the server's CPU load, used to execute system code and user programs, based on the total CPU capacity. • **Server, Memory**. The current percentage of the server's memory usage by the selected component. • **Server, NICs**. The number of network interface cards that the server uses. • **Server, Server Name**. The server name. • **Server, Status**. The server status, associated with any alarms raised against that server. If no alarms are fired, the status appears as Normal. Otherwise, the status is set to the alarm severity (Warning, Critical, or Fatal). • **Server, Version**. The operating system version. • **Virtual Machines, Configured**. The number of virtual machines that exist on the server.

Table 5. Servers

	• **Virtual Machines, Running**. The number of virtual machines that are currently running on the server.
Where to go next	Drill down on any server entry. The Hyper-V Explorer dashboard appears, showing the server details on the Hyper-V Explorer Summary tab.

Table 6. Summary and Resource Information

Description	Shows physical configuration details for the selected cluster, server or virtual machine.
Data displayed	**Data appearing when viewing cluster details:** • **Hypervisor**. The name of the hypervisor application, **Microsoft Hyper-V**. • **Memory Capacity**. The combined memory capacity of the servers that belong to the selected cluster. • **Network Interfaces**. The number of network interface cards used by the servers that belong to the selected cluster. • **Processing Power**. The CPU speed available to the selected cluster. • **Processor Count**. The number of CPUs used by the servers that belong to the selected cluster. • **Servers**. The number of servers that belong to the selected cluster. • **Virtual Machines Count**. The number of virtual machines running in the selected cluster. **Data appearing when viewing server details:** • **Cluster**. The name of the cluster to which the selected server belongs. • **Current Status**. The current status of the selected server: `Turned off` or `Running`. • **Hypervisor**. The name of the hypervisor application: **Hyper-V**. • **IP Address**. The IP address of the selected server. • **Manufacturer**. The manufacturer of the physical machine. • **Memory Capacity**. The memory capacity of the selected server. • **Model Number**. The model number of the physical machine. • **Network Interfaces**. The number of network interface cards used by the selected server. • **Processor Count**. The number of CPUs used by the selected server. • **Processor Type**. The processor type of the physical machine. • **Uptime**. The length of time the selected server is running. • **Version**. The version of the OS that is running on the selected server. • **Virtual Machines Count**. The number of virtual machines running on the selected server. **Data appearing when viewing virtual machine details:** • **Cluster**. The name of the cluster to which the selected virtual machine belongs. • **Current Status**. The current status of the selected virtual machine: `Turned off` or `Running`. • **Guest OS**. The name of the operating system used by the selected virtual machine. • **Host Name**. The host name of the selected virtual machine. • **Hypervisor**. The name of the hypervisor application: **Hyper-V**. • **IP Address**. The IP address of the selected virtual machine. • **Memory Capacity**. The memory capacity of the selected virtual machine. • **Network Interfaces**. The number of network interface cards used by the selected virtual machine.

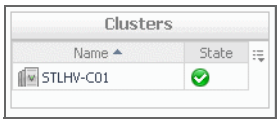
Table 6. Summary and Resource Information

- **Processor Count**. The number of CPUs used by the selected virtual machine.
- **Storage Capacity**. The storage capacity of the selected virtual machine.
- **Uptime**. The length of time the selected virtual machine is running.

Table 7. Virtual Environment

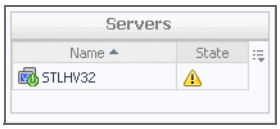
Description	The Hyper-V Explorer's Virtual Environment view displays a high-level overview of your virtual environment. The view has a tile for each object type: **Clusters**, **Servers**, and **Virtual Machines**. Each tile shows how many of the corresponding object instances there are in your virtual infrastructure, as well as the count of objects of that type in each of the alarm states (Normal, Warning, Critical, Fatal).
Data displayed	• **Alarm counts**. The total counts of alarms associated with the clusters, servers, or virtual machines, broken down by alarm types (Normal, Warning, Critical, Fatal). • **Cluster count**. The number of clusters in your virtual environment. • **Server count**. The number of physical servers in your virtual environment. • **Virtual Machine count**. The number of virtual machines in your environment.
Where to go next	Drill down on: • **Clusters**. Displays the **Clusters** dwell, showing the names and states of all clusters in your environment.

Figure 28. Clusters dwell



- **Servers**. Displays the **Servers** dwell, showing the names and states of all servers in your environment.

Figure 29. Clusters dwell



- **Virtual Machines**. Displays the **Virtual Machines** dwell, showing the names and states of all virtual machines in your environment.

Figure 30. Virtual Machines dwell

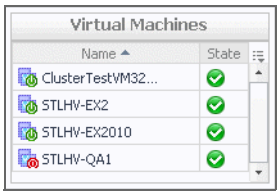


Table 8. Virtual Machines

Description	Shows a list of virtual machines associated with the selected cluster or server. **NOTE:** This view only appears when viewing cluster or server details.
Data displayed	• **Name**. The virtual machine name.

Table 8. Virtual Machines

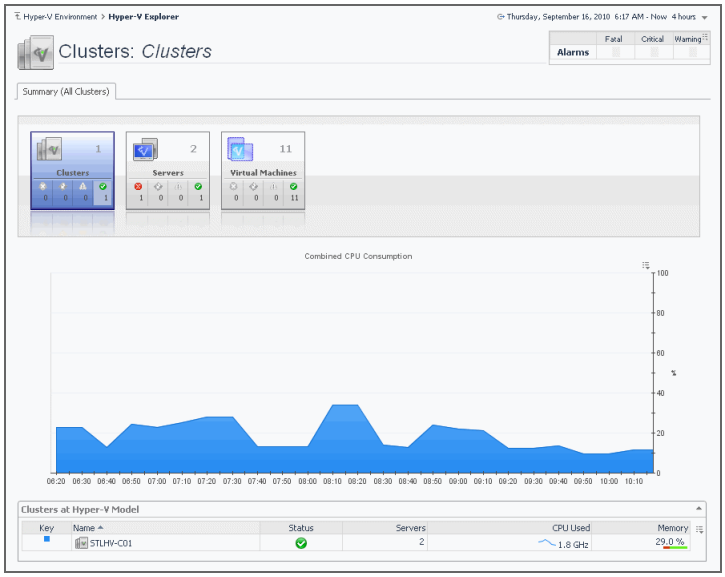
	• **Status**. The status of the virtual machine, associated with any alarms raised against that virtual machine. If no alarms are fired, the status appears as Normal. Otherwise, the status is set to the alarm severity (Warning, Critical, or Fatal).
Where to go next	Drill down on any virtual machine entry. The Hyper-V Explorer dashboard appears, showing the virtual machine details on the Hyper-V Explorer Summary tab.

Hyper-V Explorer Summary (All Clusters) tab

The **Hyper-V Explorer Summary (All Clusters)** tab shows a summary of system resources for all available clusters.

This tab appears in the Hyper-V Explorer when you select the **Clusters** node on the Hyper-V Explorer Topology tab.

Figure 31. Hyper-V Explorer Summary (All Clusters) tab



This tab is made up of the following embedded views:

- Clusters at Hyper-V Model
- Combined CPU Consumption
- Virtual Environment

Table 9. Clusters at Hyper-V Model

Description	This tabular view lists the clusters that exist in your environment.
Data displayed	• **CPU Used**. The current amount of the CPU speed used by the servers in the cluster. • **Key**. The color used in the Combined CPU Consumption chart to represent the cluster. • **Memory**. The current percentage of memory used by all servers in the cluster. • **Name**. Cluster name. • **Servers**. The number of servers in the cluster.

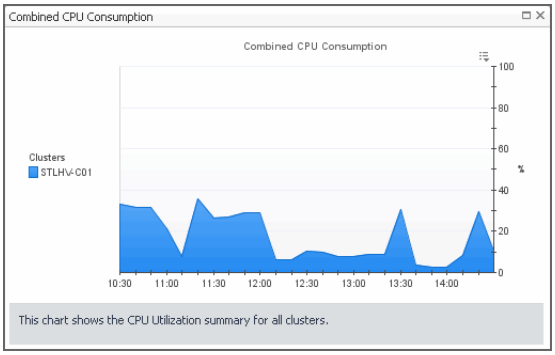
Table 9. Clusters at Hyper-V Model

	• **Status**. The status of the cluster, associated with any alarms raised against that cluster. If no alarms are fired, the status appears as Normal. Otherwise, the status is set to the highest alarm severity (Warning, Critical, or Fatal).
Where to go next	Drill down on any server entry. The Hyper-V Environment dashboard appears, showing the server details on the Hyper-V Explorer Summary tab.

Combined CPU Consumption

Description	Shows the combined percentage of the CPU usage for all clusters in the system.
Data displayed	• **Combined CPU Consumption, %**. The combined percentage of the CPU utilization used by all servers in all clusters to execute system code and user programs during the selected time period.
Where to go next	Drill down on: • **Combined CPU Consumption %**. Displays the **Combined CPU Consumption** dialog box.

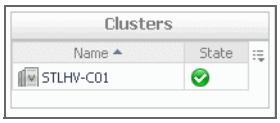
Figure 32. Combined CPU Consumption dialog box



Virtual Environment

Description	Displays a high-level overview of your virtual environment. The view has a tile for each type of object in your virtual infrastructure: **Clusters**, **Servers**, and **Virtual Machines**. Each tile shows how many of the corresponding object instances there are in your virtual infrastructure, as well as the count of objects of that type in each of the alarm states (Normal, Warning, Critical, Fatal).
Data displayed	• **Alarm counts**. The total counts of alarms associated with the clusters, servers, or virtual machines, broken down by alarm types (Normal, Warning, Critical, Fatal). • **Cluster count**. The number of clusters in your virtual environment. • **Server count**. The number of physical servers in your virtual environment. • **Virtual Machine count**. The number of virtual machines that are running on the physical servers that belong to the selected cluster.
Where to go next	Drill down on: • **Clusters**. Displays the **Clusters** dwell, showing the names and states of all clusters in your environment.

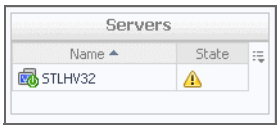
Figure 33. Clusters dwell



Virtual Environment

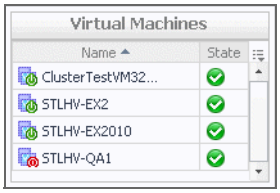
- **Servers**. Displays the **Servers** dwell, showing the name and state of all servers in your environment.

  Figure 34. Servers dwell

- **Virtual Machines**. Displays the **Virtual Machines** dwell, showing the names and states of all virtual machines that are running on the physical servers that belong to the selected cluster.

  Figure 35. Virtual Machines dwell

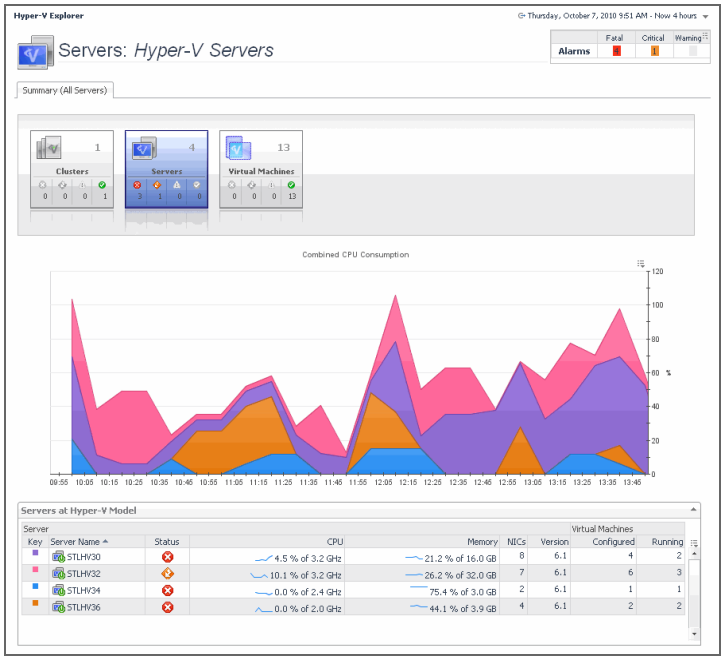
  

Hyper-V Explorer Summary (All Servers) tab

The **Hyper-V Explorer Summary (All Servers)** tab shows a summary of system resources for all physical servers that currently exist in your integrated infrastructure.

This tab appears in the Hyper-V Explorer when you select the **Servers** node on the Hyper-V Explorer Topology tab.

Figure 36. Hyper-V Explorer Summary (All Servers) tab



- Combined CPU Consumption
- Servers at Hyper-V Model

- Virtual Environment

Table 10. Combined CPU Consumption

Description	Shows the combined percentage of the CPU usage for all servers in the system.
Data displayed	• **Combined CPU Consumption %**. The combined percentage of the CPU utilization used by all servers to execute system code and user programs during the selected time period.
Where to go next	Drill down on: • **Combined CPU Consumption %**. Displays the **Combined CPU Consumption** dialog box.

Figure 37. Combined CPU Consumption dialog box

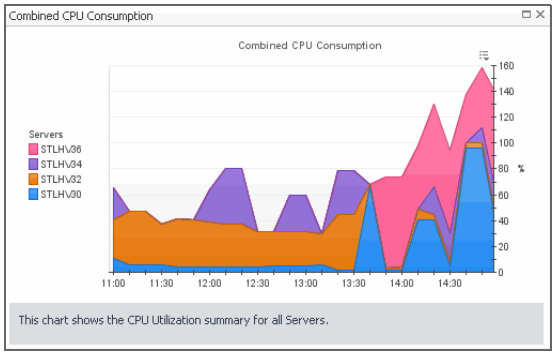
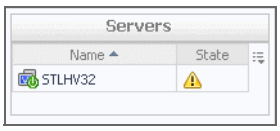
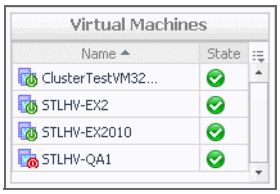


Table 11. Servers at Hyper-V Model

Description	This tabular view lists all servers that exist in your environment.
Data displayed	• **Server, CPU**. The current amount of the CPU speed that is used by the server. • **Server, Key**. The color used in the Combined CPU Consumption chart to represent the server. • **Server, Memory**. The current percentage of memory that is used by the server. • **Server, NICs**. The number of network interface cards used by the server. • **Server, Server Name**. Server name. • **Server, Status**. The server status, associated with any alarms raised against it. If no alarms are fired, the status appears as Normal. Otherwise, the status is set to the highest alarm severity (Warning, Critical, or Fatal). • **Server, Version**. The version number of the Windows OS running on the server. • **Virtual Machines, Configured**. The number of virtual machines that exist on the server. • **Virtual Machines, Running**. The number of virtual machines that are running on the server.
Where to go next	Drill down on any server entry. The Hyper-V Environment dashboard appears, showing the server details on the Hyper-V Explorer Summary tab.

Table 12. Virtual Environment

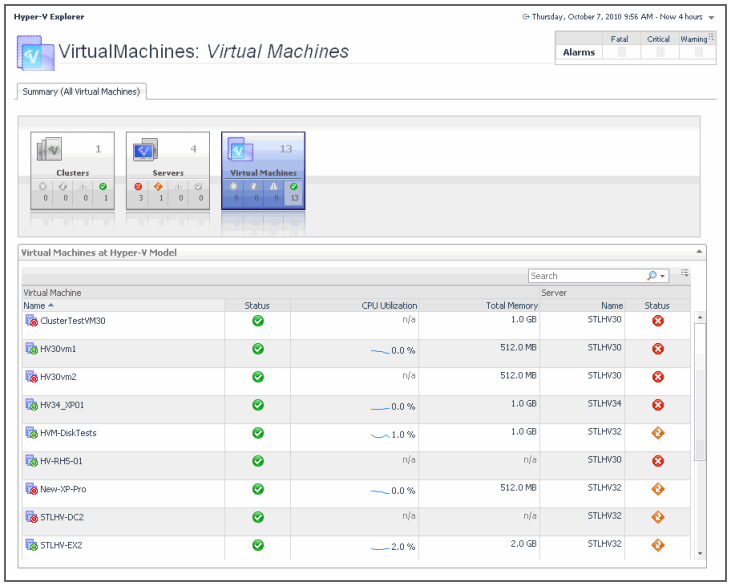
Description	The Hyper-V Explorer's Virtual Environment view displays a high-level overview of your virtual environment. The view has a tile for each type of object in your virtual infrastructure: **Clusters**, **Servers**, and **Virtual Machines**. Each tile shows how many of the corresponding object instances there are in your virtual infrastructure, as well as the count of objects of that type in each of the alarm states (Normal, Warning, Critical, Fatal).
Data displayed	• **Alarm counts**. The total counts of alarms associated with the clusters, servers, or virtual machines, broken down by alarm types (Normal, Warning, Critical, Fatal). • **Cluster count**. The number of physical servers in your virtual environment. • **Server count**. The number of physical servers in your virtual environment. • **Virtual Machine count**. The number of virtual machines in your environment.
Where to go next	Drill down on: • **Clusters**. Displays the **Clusters** dwell, showing the names and states of all clusters in your environment. **Figure 38. Clusters dwell** • **Servers**. Displays the **Servers** dwell, showing the name and state of all servers in your environment. **Figure 39. Servers dwell**  • **Virtual Machines**. Displays the **Virtual Machines** dwell, showing the names and states of all virtual machines in your environment. **Figure 40. Virtual Machines dwell** 

Hyper-V Explorer Summary (All Virtual Machines) tab

The **Hyper-V Explorer Summary (All Virtual Machines)** tab shows a summary of system resources for all virtual machines that currently exist in your integrated infrastructure.

This tab appears in the Hyper-V Explorer when you select the **Virtual Machines** node on the Hyper-V Explorer Topology tab.

Figure 41. Hyper-V Explorer Summary (All Virtual Machines) tab



This tab is made up of the following embedded views:

- Virtual Environment
- Virtual Machines at Hyper-V Model

Table 13. Virtual Environment

Description	The Hyper-V Explorer's Virtual Environment view displays a high-level overview of your virtual environment. The view has a tile for each type of object in your virtual infrastructure: **Clusters**, **Servers**, and **Virtual Machines**. Each tile shows how many of the corresponding object instances there are in your virtual infrastructure, as well as the count of objects of that type in each of the alarm states (Normal, Warning, Critical, Fatal).
Data displayed	• **Alarm counts**. The total counts of alarms associated with the clusters, servers, or virtual machines, broken down by alarm types (Normal, Warning, Critical, Fatal). • **Cluster count**. The number of physical servers in your virtual environment. • **Server count**. The number of physical servers in your virtual environment. • **Virtual Machine count**. The number of virtual machines in your environment.
Where to go next	Drill down on: • **Clusters**. Displays the **Clusters** dwell, showing the name and state of all clusters in your environment.

Figure 42. Clusters dwell

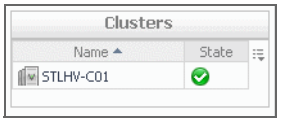
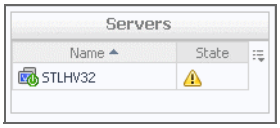


Table 13. Virtual Environment

- **Servers**. Displays the **Servers** dwell, showing the name and state of all servers in your environment.

  Figure 43. Servers dwell

- **Virtual Machines**. Displays the **Virtual Machines** dwell, showing the names and states of all virtual machines in your environment.

  Figure 44. Virtual Machines dwell

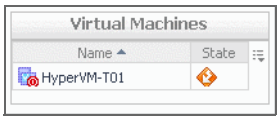
  

Table 14. Virtual Machines at Hyper-V Model

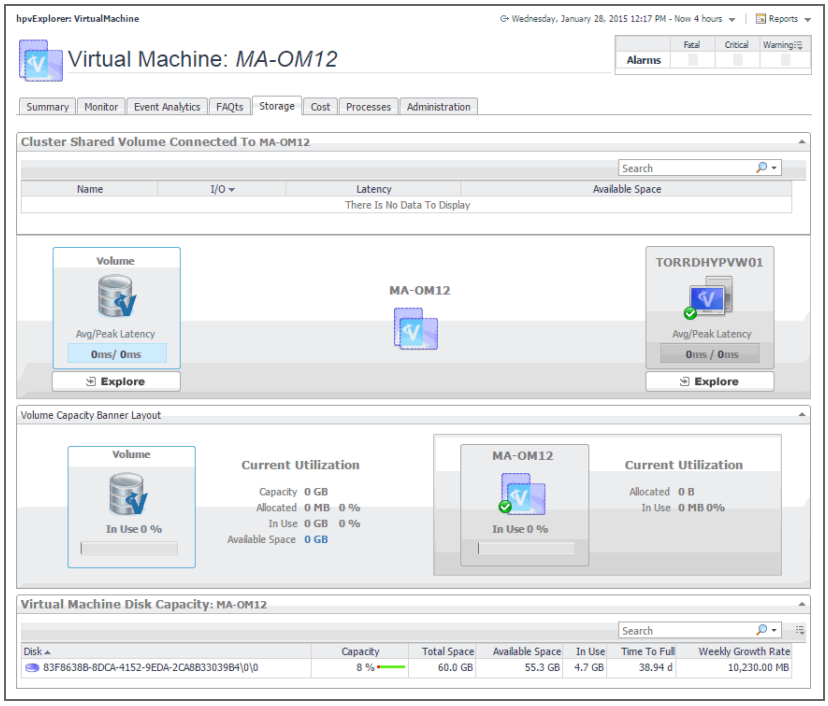
Description	This tabular view lists all virtual machines that exist in your environment.
Data displayed	• **Server, Name**. The name of the server on which the virtual machine is running. • **Server, Status**. The status of the server on which the virtual machine is running, associated with any alarms raised against it. If no alarms are fired, the status appears as Normal. Otherwise, the status is set to the highest alarm severity (Warning, Critical, or Fatal). • **Virtual Machine, CPU Utilization**. The percentage of the virtual machine's CPU utilization spent on executing system code and user programs. • **Virtual Machine, Name**. The virtual machine name. • **Virtual Machine, Status**. The virtual machine status, associated with any alarms raised against it. If no alarms are fired, the status appears as Normal. Otherwise, the status is set to the highest alarm severity (Warning, Critical, or Fatal). • **Virtual Machine, Total Memory**. The total amount of memory allocated to the virtual machine.
Where to go next	Drill down on any virtual machine entry. The Hyper-V Environment dashboard appears, showing the server details on the Hyper-V Explorer Summary tab.

Hyper-V Explorer Storage

This tab only appears when you are exploring individual servers. It displays an organized view of physical drive and logical disk activity. It identifies the physical drives with the highest disk activity, and the logical drives with the lowest capacity. Use this information to fine-tune your configuration, achieve optimal results, and avoid bottlenecks. In addition, this tab lists all physical drives for the selected server, their read and write rates, along with the logical drives, the space used on each drive, data growth patterns, and related estimates.

The appearance of this tab depends on the object or group of object selected. For example, exploring a cluster shows data transfer rates for each disk volume connected to the selected cluster, among other metrics, while exploring a virtual machine reveals the current utilization of disk resources for that virtual machine.

Figure 45. Storage tab

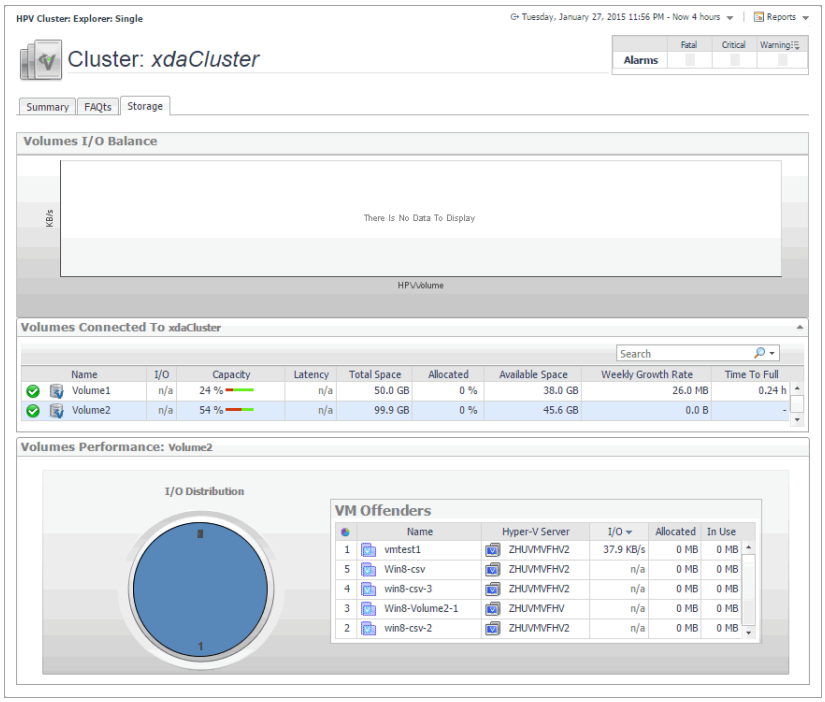


Hyper-V Explorer Storage tab (clusters)

The Hyper-V Explorer **Storage** tab displays combination of embedded views displaying disk volumes associated with the selected cluster. It identifies the virtual machines that spend the highest amounts of disk resources. Use this tab to find out more about the overall consumption of disk resources for a given cluster. The information provided on this tab can help you prevent potential bottlenecks by reallocating disk resources where they are most needed.

This tab appears in the Hyper-V Explorer when you select a cluster on the Hyper-V Explorer Topology tab.

Figure 46. Storage tab (clusters)



This tab is made up of the following embedded views:

- Volumes I/O Balance
- Volumes Connected To Cluster
- Volumes Performance: Volume

Table 15. Volumes I/O Balance

Description	Shows the data transfer rates for each disk volume connected to the selected cluster.

Table 16. Volumes Connected To *Cluster*

Description	Lists the disk volumes connected to the selected cluster and shows performance metrics associated with each volume.
Data displayed	• **Allocated**. The amount of space allocated to the selected cluster. • **Available Space**. The amount of space available on the disk volume. • **Capacity**. The percentage of the disk space that is currently in use. • **I/O**. The disk volume's current data transfer rate. • **Latency**. The current latency of the disk volume. • **Name**. The name of the disk volume. The indicator on the left shows the disk volume's alarm state: Normal, Warning, Critical, or Fatal. • **Time to Full**. The estimated amount of time until which the disk volume will become full. • **Total Space**. The total amount of disk space. • **Weekly Growth Rate**. The average amount of space by which the amount of data stored on the disk volume grows every week.

Table 17. Volumes Performance: *Volume*

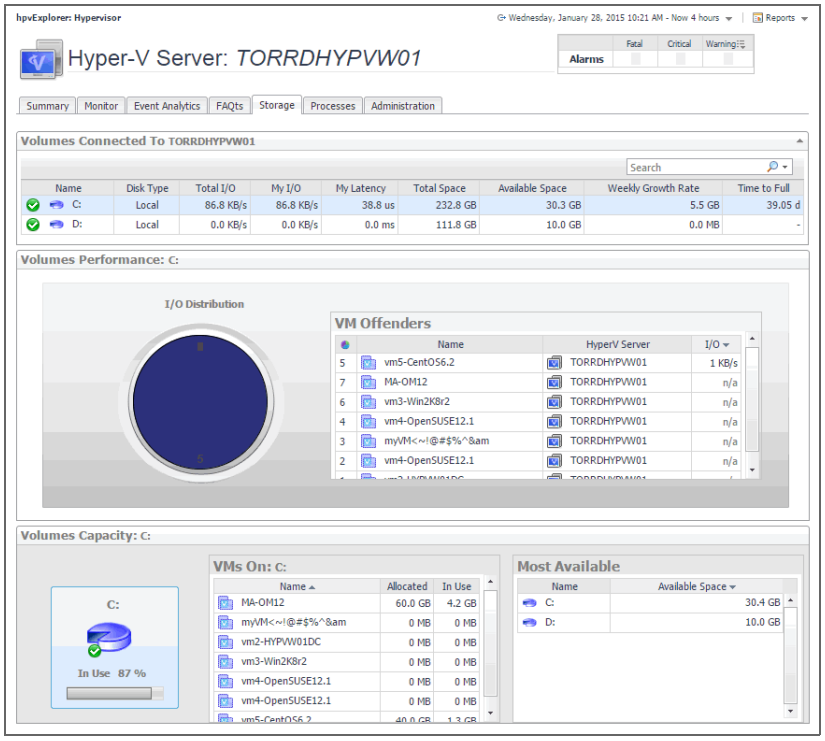
Description	Shows the amount I/O resources used by the virtual machines associated with the disk volume selected in the Volumes Connected To Cluster view.
Data displayed	• **I/O Distribution**. A pie chart indicating how much the individual virtual machines using the selected disk volume contribute to the use of I/O resources. • **VM Offenders, Allocated**. The amount of disk space allocated to the virtual machine. • **VM Offenders, Hyper-V Server**. The name of the Hyper-V server on which the virtual machine is running. • **VM Offenders, I/O**. The data transfer rate utilized by the virtual machine. • **VM Offenders, In Use**. The amount of disk space the virtual machine currently uses. • **VM Offenders, Name**. The name of the virtual machine.

Hyper-V Explorer Storage tab (Hyper-V servers)

The Hyper-V Explorer **Storage** tab displays combination of embedded views displaying disk volumes associated with the selected Hyper-V server. It identifies the virtual machines that spend the highest amounts of disk resources. Use this tab to find out more about the overall consumption of disk resources for a given Hyper-V server. The information provided on this tab can help you prevent potential bottlenecks by reallocating disk resources where they are most needed.

This tab appears in the Hyper-V Explorer when you select a Hyper-V server on the Hyper-V Explorer Topology tab.

Figure 47. Storage tab (Hyper-V servers)



This tab is made up of the following embedded views:

- Volumes Connected To Hyper-V Server
- Volumes Performance: Volume
- Volumes Capacity: Volume

Table 18. Volumes Connected To *Hyper-V Server*

Description	Lists the disk volumes connected to the selected Hyper-V server and shows performance metrics associated with each volume.
Data displayed	• **Available Space**. The amount of space available on the disk volume. • **Disk Type**. Indicates the disk type, for example, **Local**. • **My I/O**. The data transfer rate utilized on the disk volume by the selected Hyper-V server. • **My Latency**. The current latency of requests initiated by the Hyper-V server on the disk volume. • **Name**. The name of the disk volume. The indicator on the left shows the disk volume's alarm state: Normal, Warning, Critical, or Fatal. • **Time to Full**. The estimated amount of time until which the disk volume will become full. • **Total I/O**. The data transfer rate utilized on the disk volume. • **Total Space**. The total amount of disk space. • **Weekly Growth Rate**. The average amount of space by which the amount of data stored on the disk volume grows every week.

Table 19. Volumes Performance: *Volume*

Description	Shows the amount I/O resources used by the virtual machines associated with the disk volume selected in the Volumes Connected To Hyper-V Server view.
Data displayed	• **VM Offenders, Hyper-V Server**. The name of the Hyper-V server on which the virtual machine is running. • **VM Offenders, I/O**. The data transfer rate utilized by the virtual machine. • **VM Offenders, Name**. The name of the virtual machine.

Table 20. Volumes Capacity: *Volume*

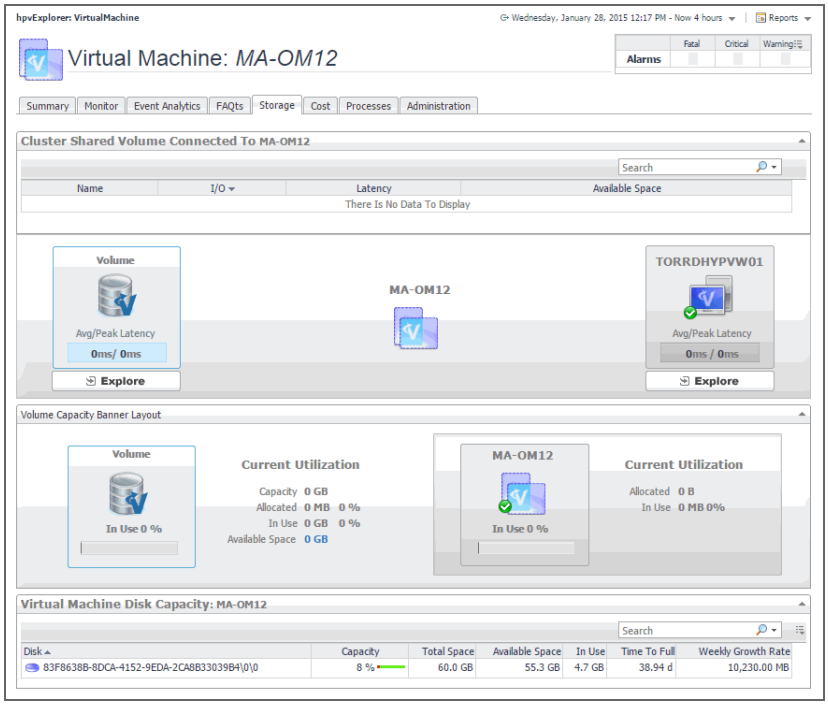
Description	Shows the amount I/O resources used by the virtual machines associated with the selected disk volume.
Data displayed	• ***Disk volume*, In Use**. The percentage of disk space in use. • **Most Available, Available Space**. The amount of space available on the disk volume. • **Most Available, Name**. The disk volume. • **VMs On *disk volume*, Allocated**. The amount of memory allocated to the virtual machine. • **VMs On *disk volume*, In Use**. The amount of memory used by the virtual machine. • **VMs On *disk volume*, Name**. The name of the virtual machine associated with the disk volume.

Hyper-V Explorer Storage tab (virtual machines)

The Hyper-V Explorer **Storage** tab displays combination of embedded views displaying disk volumes associated with a selected virtual machine. It identifies the virtual machines that spend the highest amounts of disk resources. Use this tab to find out more about the overall consumption of disk resources for a given virtual machine. The information provided on this tab can help you prevent potential bottlenecks by reallocating disk resources where they are most needed.

This tab appears in the Hyper-V Explorer when you select a virtual machine on the Hyper-V Explorer Topology tab.

Figure 48. Storage tab (virtual machines)



This tab is made up of the following embedded views:

- Cluster Shared Volume Connected To Virtual Machine
- Volume Capacity Banner Layout
- Virtual Machine Disk Capacity: Virtual Machine

Table 21. Cluster Shared Volume Connected To Virtual Machine

Description	Lists the disk volumes associated with the selected virtual machine and shows performance metrics associated with each disk volumes.
Data displayed	• **Available Space**. The amount of space available on the disk volume. • **I/O**. The data transfer rate of the disk volume. • **Latency**. The disk volume latency. • **Name**. The disk volume. • ***Disk Volume*, Avg/Peak Latency**. The average and peak latency rates for the selected disk. • ***Hyper-V Server*, Avg/Peak Latency**. The average and peak latency rates for the Hyper-V server associated with the selected virtual machine.

Table 22. Volume Capacity Banner Layout

Description	Contains information about the current utilization of disk resources for the selected virtual machine.
Data displayed	• ***Virtual Machine*, Current Utilization, Allocated**. The amount and percentage of disk space allocated to the virtual machine. • ***Virtual Machine*, Current Utilization, In Use**. The amount and percentage of disk space the virtual machine uses. • ***Virtual Machine*, In Use**. The percentage of disk space in use by the virtual machine.

Table 22. Volume Capacity Banner Layout

- **Volume, Current Utilization, Allocated**. The amount and percentage of disk space that is allocated for use.
- **Volume, Current Utilization, Available Space**. The disk space available for allocation.
- **Volume, Current Utilization, Capacity**. The total amount of disk space.
- **Volume, Current Utilization, In Use**. The amount and percentage of disk space that is currently in use.
- **Volume, In Use**. The percentage of disk space that is currently in use.

Table 23. Virtual Machine Disk Capacity: *Virtual Machine*

Description	Lists the disks associated with the selected virtual machine and shows their performance metrics.
Data displayed	• **Available Space**. The space currently available on the disk. • **Capacity**. The disk capacity. • **In Use**. The amount of space used on the disk. • **Disk**. The name of the disk. • **Time To Full**. The estimated time after which the disk will be full. • **Total Space**. The total space allocated to the disk. • **Weekly Growth Rate**. The estimated growth pattern of the used disk space.

About Us

We are more than just a name

We are on a quest to make your information technology work harder for you. That is why we build community-driven software solutions that help you spend less time on IT administration and more time on business innovation. We help you modernize your data center, get you to the cloud quicker and provide the expertise, security and accessibility you need to grow your data-driven business. Combined with Quest's invitation to the global community to be a part of its innovation, and our firm commitment to ensuring customer satisfaction, we continue to deliver solutions that have a real impact on our customers today and leave a legacy we are proud of. We are challenging the status quo by transforming into a new software company. And as your partner, we work tirelessly to make sure your information technology is designed for you and by you. This is our mission, and we are in this together. Welcome to a new Quest. You are invited to Join the Innovation™.

Our brand, our vision. Together.

Our logo reflects our story: innovation, community and support. An important part of this story begins with the letter Q. It is a perfect circle, representing our commitment to technological precision and strength. The space in the Q itself symbolizes our need to add the missing piece—you—to the community, to the new Quest.

Contacting Quest

For sales or other inquiries, visit https://www.quest.com/company/contact-us.aspx or call +1-949-754-8000.

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.

The Support Portal provides self-help tools you can use to solve problems quickly and independently, 24 hours a day, 365 days a year. The Support Portal enables you to:

- Submit and manage a Service Request.
- View Knowledge Base articles.
- Sign up for product notifications.
- Download software and technical documentation.
- View how-to-videos.
- Engage in community discussions.
- Chat with support engineers online.
- View services to assist you with your product.