Monitoring VMware Systems

VMware: vSphere Base Pack PowerPack version 212

Table of Contents

Introduction 3
What is VMware vSphere? 4
What Does the VMware: vSphere Base Pack PowerPack Monitor? 4
Installing the VMware: vSphere Base Pack PowerPack 4
Version Requirements and Limitations 5
Configuring VMware vCenter Server for Monitoring 7
Prerequisites for Monitoring VMware vCenter Servers 7
Creating a Read-Only User Account for Monitoring 8
Configuring a SOAP/XML Credential 10
Testing the VMware Credential 11
Configuring a VMware Device Template 13
Discovering a vCenter Server 15
Discovering a vCenter Server 15
Configuring the VMware Dynamic Applications 17
Configuring the "VMware: Events" Dynamic Application 17
Configuring the Polling Frequency for VMware Performance Dynamic Applications 18
Configuring the "VMware: Remove Session Cookies" Dynamic Application 19
Enable VM GUID Unique Identifier Threshold 20
Collecting Custom Performance Metrics 21
vSphere Performance Collection 21
VSAN Performance Collection 22
Viewing Component Devices 22
Relationships with Other Types of Component Devices 25
Determining Availability for Component Devices 26
VMware Dashboards 32
Installing the VMware: vSphere Dashboards PowerPack 33
VMware Host Performance Dashboard 34
VMware vCenter Overview Dashboard 36
VMware Device Dashboards 38
VMware: Cluster 39
VMware: Datastore 40
VMware: Datastore Cluster 41
VMware: Host 42
VMware: Resource Pool 43
VMware: Virtual App 44
VMware: Virtual Machine 45

Chapter 1

Introduction

Overview

This manual describes how to monitor VMware vCenter Servers in SL1 using the *VMware: vSphere Base Pack* PowerPack.

The following sections provide an overview of VMware and the *VMware: vSphere Base Pack* PowerPack:

What is VMware vSphere? 4

What Does the VMware: vSphere Base Pack PowerPack Monitor? 4

Installing the VMware: vSphere Base Pack PowerPack 4

Version Requirements and Limitations 5

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What is VMware vSphere?

vSphere is VMware's cloud virtualization platform that enables users to deploy and manage VMware cloud-based resources using a suite of components, including the vCenter Server centralized management application and ESX/ESXi host servers.

TIP: To familiarize yourself with VMware terminology, see the VMware Master Glossary: http://www.vmware.com/pdf/master_glossary.pdf.

What Does the VMware: vSphere Base Pack PowerPack Monitor?

To monitor VMware virtual infrastructure using SL1, you must install the *VMware: vSphere Base Pack* PowerPack. This PowerPack enables you to discover, model, and collect data about all aspects of VMware vSphere, including datacenters, clusters, virtual machines, and datastores.

The *VMware: vSphere Base Pack* PowerPack includes:

- Two example credentials you can use as templates to create SOAP/XML credentials to connect to the VMware devices you want to monitor
- Dynamic Applications to discover, model, and monitor performance metrics and/or collect configuration data for VMware devices.
- Device Classes for each of the VMware devices SL1 monitors
- A Device Template that enables you to easily align multiple Dynamic Applications to VMware devices
- Event Policies and corresponding alerts that are triggered when VMware devices meet certain status criteria
- Device dashboards for several of the discoverable VMware component devices

NOTE: The *VMware: vSphere Dashboards* PowerPack contains additional dashboards that display data collected from VMware systems. To view these dashboards, you must install the *VMware: vSphere Dashboards* PowerPack on your SL1 system. (For more information, see the chapter on ***VMware Dashboards***.)

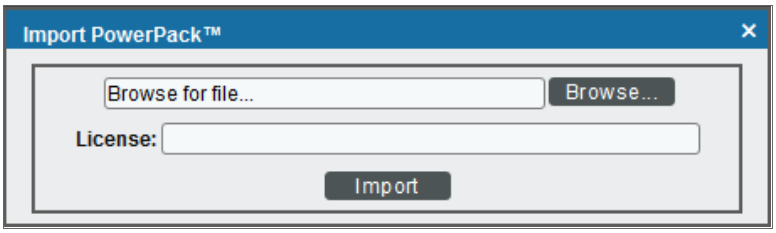
Installing the VMware: vSphere Base Pack PowerPack

Before completing the steps in this manual, you must import and install the latest version of the *VMware: vSphere Base Pack* PowerPack.

TIP: By default, installing a new version of a PowerPack overwrites all content in that PowerPack that has already been installed on the target system. You can use the ***Enable Selective PowerPack Field Protection*** setting in the **Behavior Settings** page (System > Settings > Behavior) to prevent new PowerPacks from overwriting local changes for some commonly customized fields. (For more information, see the ***System Administration*** manual.)

To download and install a PowerPack:

1. Download the PowerPack from the ScienceLogic Customer Portal.
2. Go to the **PowerPack Manager** page (System > Manage > PowerPacks).
3. In the **PowerPack Manager** page, click the **[Actions]** button, then select *Import PowerPack*.
4. The **Import PowerPack** dialog box appears:



5. Click the **[Browse]** button and navigate to the PowerPack file.
6. When the **PowerPack Installer** modal page appears, click the **[Install]** button to install the PowerPack.

NOTE: If you exit the **PowerPack Installer** modal page without installing the imported PowerPack, the imported PowerPack will not appear in the **PowerPack Manager** page. However, the imported PowerPack will appear in the **Imported PowerPacks** modal page. This page appears when you click the **[Actions]** menu and select *Install PowerPack*.

Version Requirements and Limitations

The following limitations and requirements apply to specific functionality in the *VMware: vSphere Base Pack* PowerPack:

- To collect I/O and latency metrics for datastores, you must enable Storage I/O Control. For information about Storage I/O Control, see the VMware knowledge base.
- Datastore Storage Performance Statistics are available only from vCenter systems running vSphere API 4.1.2 or later. SL1 will not collect Datastore Storage Performance Statistics if the Dynamic Applications that use Dynamic Component Mapping are used to monitor ESX or ESXi servers directly.
- Datastore Performance Statistics are unavailable for NFS datastores.

- If VMware Tools is not installed on a guest VM, SL1 cannot collect all performance statistics for that guest VM.
- Because no truly unique identifier is provided by the VMware vSphere API, it is possible that duplicate component devices could be created in SL1 when a virtual machine vMotions between separately monitored ESX/ESXi servers. (This issue does not affect vMotion events that occur within the same component tree, such as between two ESX/ESXi servers that are monitored through the same vCenter server.) Therefore, ScienceLogic recommends monitoring VMware servers through vCenter. In addition to accommodating vMotion events, monitoring through vCenter prevents performance issues on ESX/ESXi servers caused by API use.
- If you want to delete and reinstall version 203 or higher of the *VMware: vSphere Base Pack* PowerPack, you should first delete any existing copies of the Device Template included in the PowerPack and then create new versions of them after reinstalling the PowerPack. Doing so ensures that any copies of the Device Template included in the PowerPack will work properly after reinstallation. You should then assign the new Device Template(s) to any existing Discovery Sessions that were linked to the previous versions of the template(s).

Chapter 2

Configuring VMware vCenter Server for Monitoring

Overview

The following sections describe how to configure VMware vCenter resources for monitoring by SL1 using the *VMware: vSphere Base Pack* PowerPack:

Prerequisites for Monitoring VMware vCenter Servers 7

Creating a Read-Only User Account for Monitoring 8

Configuring a SOAP/XML Credential 10

Testing the VMware Credential 11

Configuring a VMware Device Template 13

Prerequisites for Monitoring VMware vCenter Servers

Before performing the steps for configuring a vCenter server, you must:

- Have access to a VMware vCenter server that monitors your ESXi and ESX servers.
- Have access to the vCenter server using the vSphere web client.

If the Windows Server that hosts the vCenter server is SNMP-enabled, you must also configure your ESXi or ESX servers for communication using SNMP. To do so, you must:

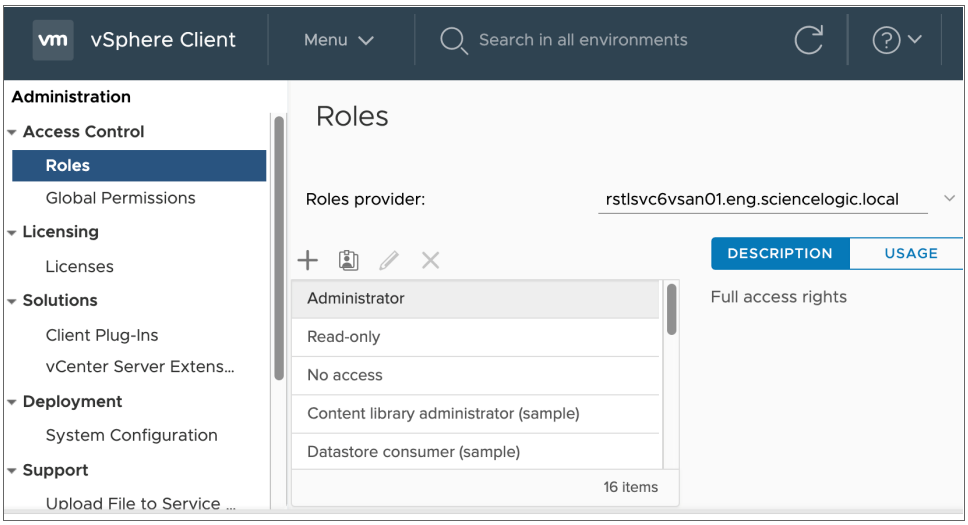
- Configure SNMP community strings, traps, and polling on the ESXi or ESX server. Assign the server at least one SNMP community string. For more information, see VMware's documentation for Configuring SNMP for ESXi 6.5 or Configuring SNMP for ESXi 6.7.

Creating a Read-Only User Account for Monitoring

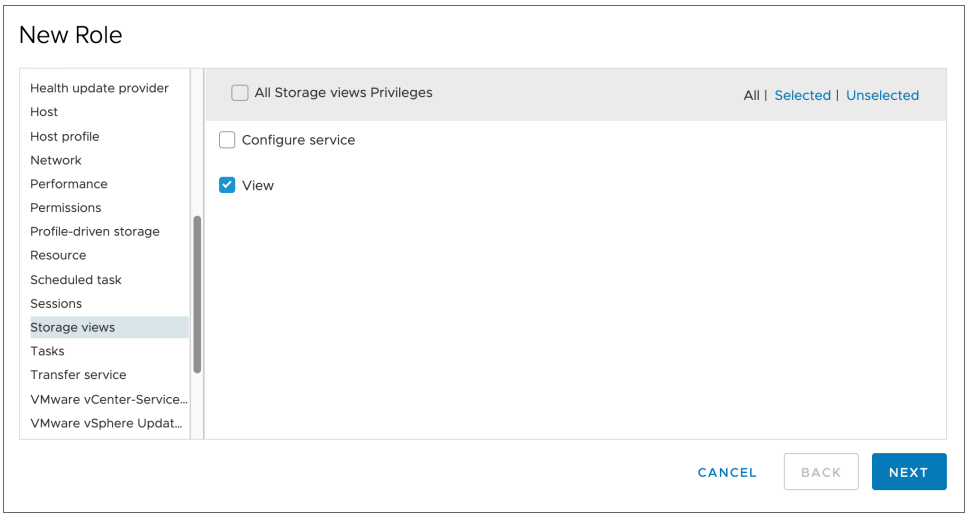
Administrative users are the only default user type that have the level of access SL1 requires to collect data from the VMware vCenter web service. If you do not want to use the username and password of an administrative user in the SOAP/XML credential, you can set up a custom user role with the specific read-only access SL1 requires to the VMware vCenter web service.

To create a custom user role that grants the read-only access SL1 requires, perform the following steps:

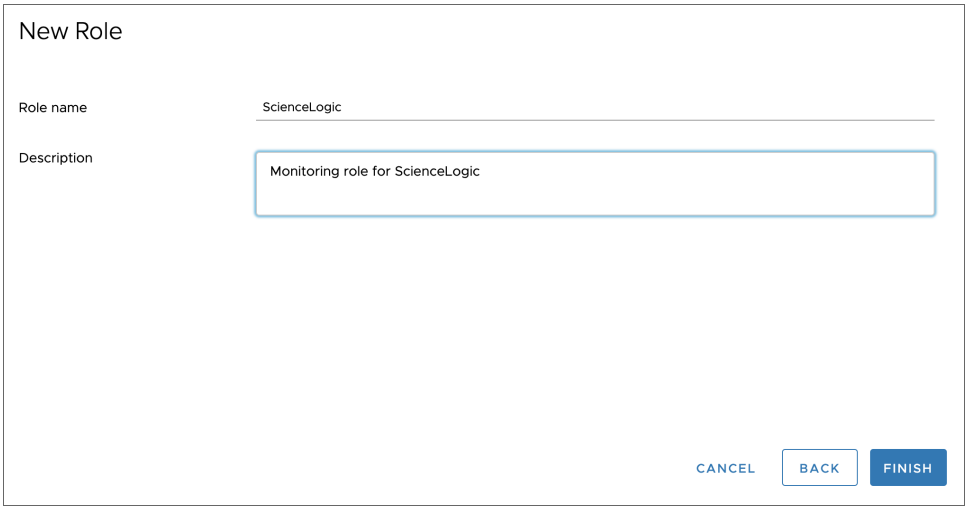
1. Open your vCenter client at `https://<vcenterservername>/ui`
2. Select Menu > Administration from the drop-down.
3. In the menu at the left of the page, click Access Control > Roles. The **Roles** page appears:



4. Click the plus sign (+) to add a new Role. The **New Role** page appears:
5. In the pane on the left, select **Storage views** and select the ***View*** checkbox. Click **[Next]**.



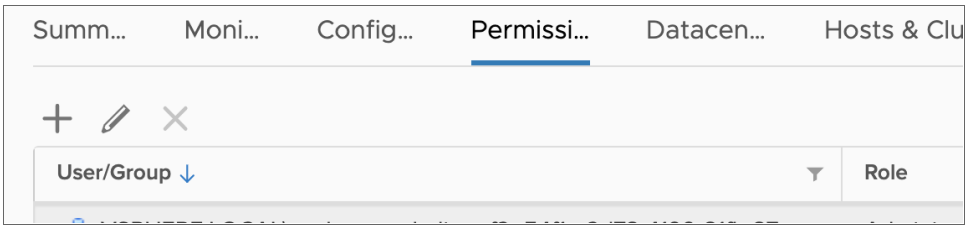
6. In the next screen, enter a name for the role in the ***Role name*** field. Optionally, you can enter a description in the ***Description*** field.



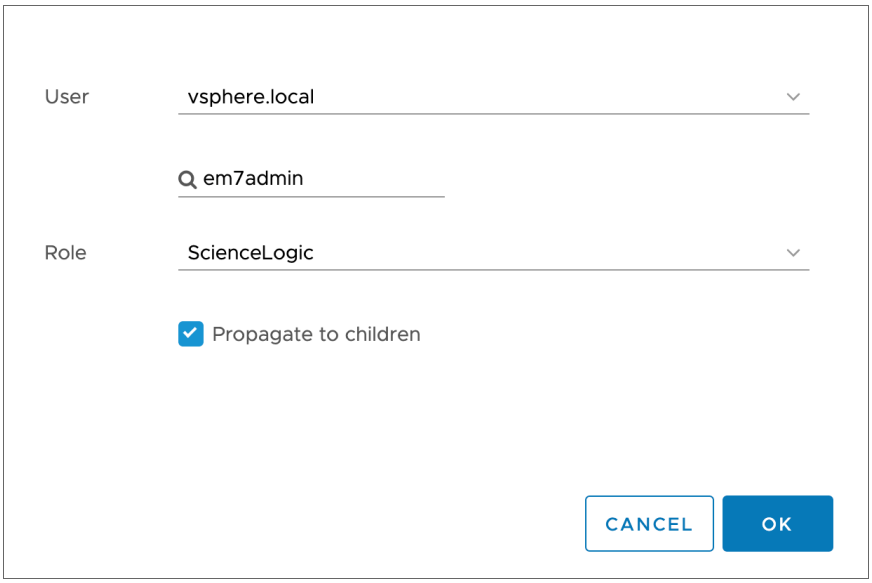
7. Click the **[Finish]** button.

To assign the custom role to a user account, perform the following steps:

1. In the vCenter client, select your vCenter server containing the hosts and clusters you are monitoring and click the **[Permissions]** tab.



2. Click the plus sign ( ) to add permissions.
3. Enter values in the following fields:
   - ***User***. Select your domain and add the user in the field below.
   - ***Role***. Select the role that you just created.
   - ***Propagate to children***. Select this checkbox.



4. Click the **[OK]** button.

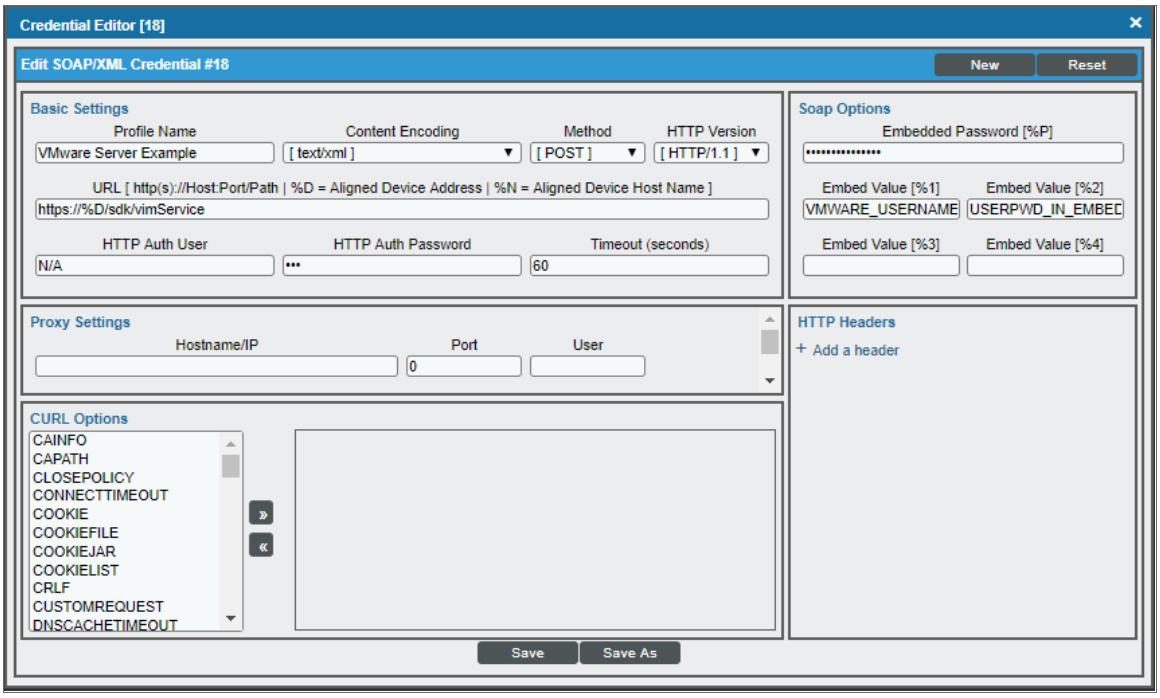
Configuring a SOAP/XML Credential

To use the Dynamic Applications in the *VMware: vSphere Base Pack* PowerPack, you must configure a SOAP/XML credential for the VMware web service. The *VMware: vSphere Base Pack* PowerPack includes the following templates for SOAP/XML credentials that you can edit for use with your vCenter server:

- VMware Server Example (for use with vCenter Server servers not requiring VSAN monitoring)
- VMware Server VSAN Example (for use with VSAN-enabled vCenter servers requiring VSAN monitoring)

To modify either of the templates, perform the following steps:

1. Go to the **Credential Management** page (System > Manage > Credentials).
2. Click the wrench icon ( ) for the "VMware Server Example" credential. The **Credential Editor** modal page appears:



3. Supply values in the following fields:
   - ***Profile Name***. Enter a new name for the credential.
   - ***Embed Value [%1]***. Enter the username SL1 will use to connect to the VMware web service.
   - ***Embedded Password [%P]***. Enter the password SL1 will use to connect to the VMware web service.
4. Click the **[Save As]** button to save your changes as a new credential.

CAUTION: Do not click the **[Save]** button, as it will save over the example credential, which you may need for future use.

Testing the VMware Credential

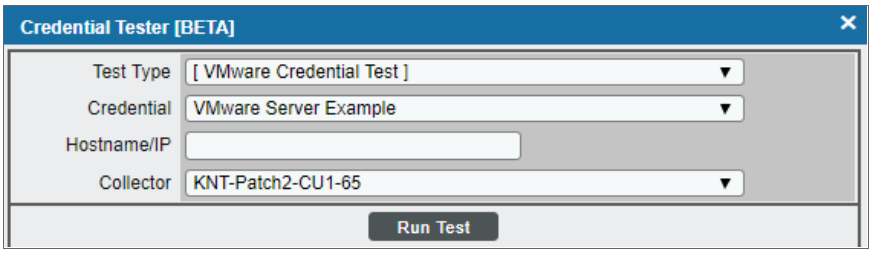
SL1 includes a Credential Test for VMware. Credential Tests define a series of steps that SL1 can execute on demand to validate whether a credential works as expected.

The VMware Credential Test can be used to test a SOAP/XML credential for monitoring VMware using the Dynamic Applications in the *VMware: vSphere Base Pack* PowerPack. The VMware Credential Test performs the following steps:

- ***Test Reachability***. Attempts to reach the vCenter server using ICMP.
- ***Attempt VMware Connection***. Attempts to connect to the VMware service using the account specified in the credential.

To test the VMware credential:

1. Go to the **Credential Test Management** page (System > Customize > Credential Tests).
2. Locate the **VMware Credential Test** and click its lightning bolt icon ( ). The **Credential Tester** modal page appears:



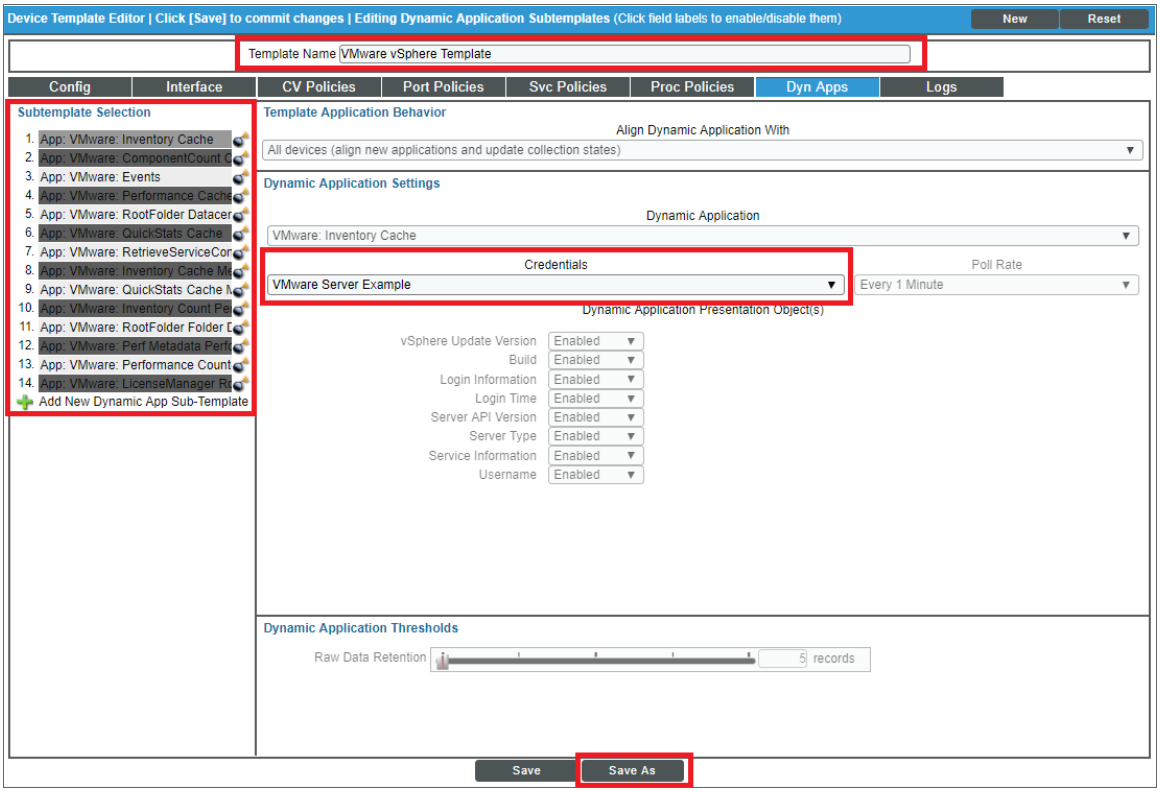
3. Supply values in the following fields:
   - ***Test Type***. This field is pre-populated with the credential test you selected.
   - ***Credential***. Select the credential to test. This drop-down list includes only credentials that you have access to that can be tested using the selected credential test.
   - ***Hostname/IP***. Type the IP address for the vCenter server.
   - ***Collector***. Select the All-In-One Appliance or Data Collector that will run the test.
4. Click the **[Run Test]** button. The **Test Credential** window appears, displaying a log entry for each step in the credential test. The steps performed are different for each credential test. The log entry for each step includes the following information:
   - ***Step***. The name of the step.
   - ***Description***. A description of the action performed during the step.
   - ***Log Message***. The result of the step for this credential test.
   - ***Status***. Whether the result of this step indicates the credential or the network environment is configured correctly (Passed) or incorrectly (Failed).
   - ***Step Tip***. Hover over the question mark icon ( ) with your mouse to display the tip text. The tip text recommends what to do to change the credential or the network environment if the step has a status of "Failed".

Configuring a VMware Device Template

A ***device template*** allows you to save a device configuration and apply it to multiple devices. The *VMware: vSphere Base Pack* PowerPack includes the "VMware vSphere Template." If you configure and apply this device template when you discover your vCenter server, SL1 aligns the appropriate Dynamic Applications to the discovered vCenter server device.

To configure the VMware device template:

1. Go to the **Configuration Templates** page (Registry > Devices > Templates).
2. Locate the "VMware vSphere Template" and click its wrench icon ( ). The **Device Template Editor** page appears.
3. Click the **[Dyn Apps]** tab. The **Editing Dynamic Application Subtemplates** page appears.
4. Complete the following fields:



- **Template Name**. Type a new name for the device template.
- **Credentials**. Select the SOAP/XML credential that you created for VMware.

5. Click the next Dynamic Application listed in the **Subtemplate Selection** section on the left side of the page and then select the VMware SOAP/XML credential in the ***Credentials*** field.

6. Repeat step 5 until the you have selected the VMware SOAP/XML credential in the ***Credentials*** field for all of the Dynamic Applications listed in the **Subtemplate Selection** section.
7. Click **[Save As]**.

> CAUTION: Do not click the **[Save]** button, as it will save over the "VMware vSphere Template", which you may need for future use.

Chapter 3

Discovering a vCenter Server

Overview

The following sections describe how to discover a vCenter server and component devices for monitoring by SL1 using the *VMware: vSphere Base Pack* PowerPack.

Discovering a vCenter Server 15

Configuring the VMware Dynamic Applications 17

Configuring the "VMware: Events" Dynamic Application 17

Configuring the Polling Frequency for VMware Performance Dynamic Applications 18

Configuring the "VMware: Remove Session Cookies" Dynamic Application 19

Enable VM GUID Unique Identifier Threshold 20

Collecting Custom Performance Metrics 21

vSphere Performance Collection 21

VSAN Performance Collection 22

Viewing Component Devices 22

Relationships with Other Types of Component Devices 25

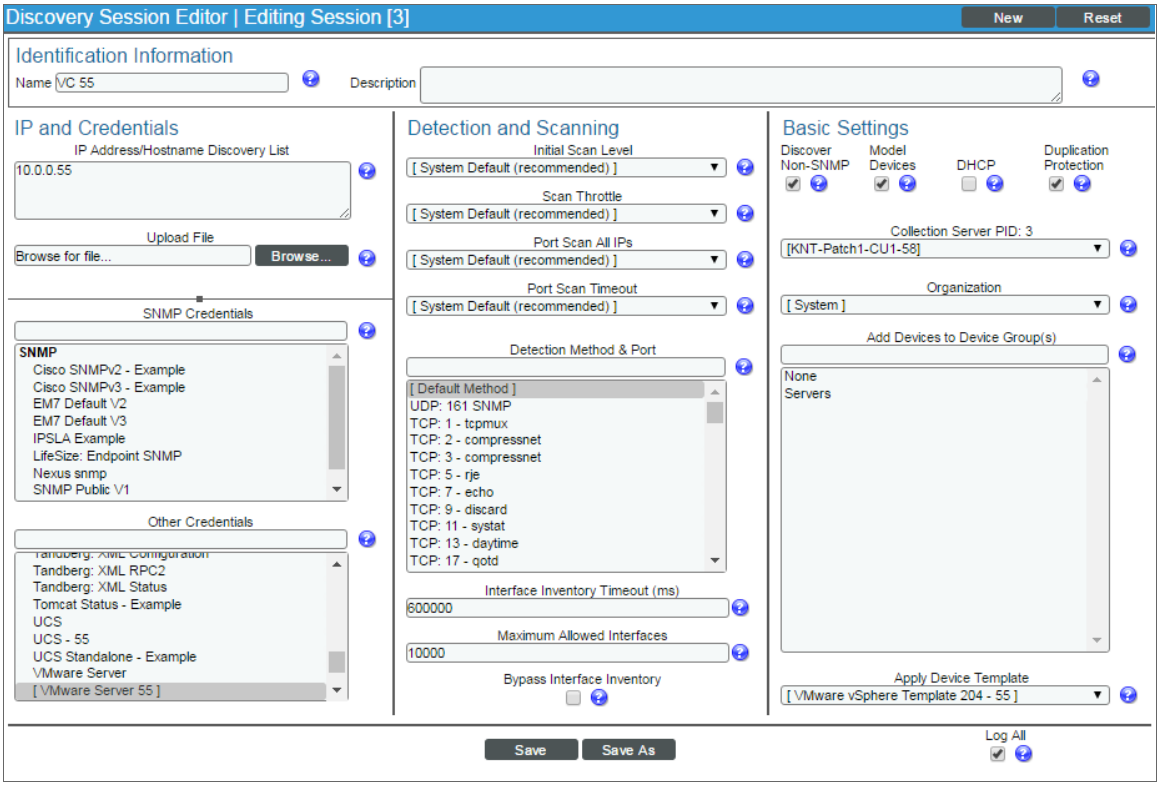
Determining Availability for Component Devices 26

Discovering a vCenter Server

To create and run a discovery session that will discover a vCenter server, perform the following steps:

1. Go to the **Discovery Control Panel** page (System > Manage > Discovery).

2. Click the **[Create]** button to create a new discovery session. The **Discovery Session Editor** modal page appears:



3. Enter values in the following fields:

   - ***IP Address Discovery List***. Type the IP address for the vCenter server.
   - ***SNMP Credentials***. If the Windows server that hosts the vCenter server is SNMP-enabled, then select the SNMP credential for the vCenter server in this field. If you do not select an SNMP credential in this field, then you must select the ***Discover Non-SNMP*** checkbox.
   - ***Other Credentials***. Select the SOAP/XML credential that you created for VMware.
   - ***Discover Non-SNMP***. If the Windows server that hosts the vCenter server is not SNMP-enabled, then you must select this checkbox.
   - ***Apply Device Template***. Select the device template that you created for VMware.

4. Optionally, you can enter values in the other fields on this page. For more information about the other fields on this page, see the ***Discovery & Credentials*** manual.
5. Click the **[Save]** button and then close the **Discovery Session Editor** modal page.
6. The discovery session you created will appear at the top of the **Discovery Control Panel** page. Click its lightning-bolt icon ( ) to run the discovery session.

7. The **Discovery Session** window appears. When the vCenter server is discovered, click its device icon ( ) to view the **Device Properties** page for the vCenter server.

Configuring the VMware Dynamic Applications

The following sections describe how to configure some of the Dynamic Applications in the *VMware: vSphere Base Pack*PowerPack .

Configuring the "VMware: Events" Dynamic Application

The "VMware: Events" Dynamic Application is designed to collect events from VMware devices using the VMware API and insert those events into the device log of the aligned vCenter server.

For SL1 to insert VMware events into the device log, the Data Collector that monitors the vCenter server must be configured to process API events. For instructions on how to configure a Data Collector to process API events, see the ***Global Settings*** chapter in the ***System Administration*** manual.

You can specify which types of events the "VMware: Events" Dynamic Application collects by editing the event dictionary Python script located in the "VMware Event Collection" snippet of the "VMware: Events" Dynamic Application. This event dictionary includes a series of rows that look like this:

```
"ClusterStatusChangedEvent": {"count": 0, "countAll": 0, "collect": True},
```

Each row begins with an event type. This event type value must match the "eventTypeId" value the VMware API uses in its "EventFilterSpec" data object to indicate which events should be collected. For more information, see VMware's documentation on the "EventFilterSpec" data object.

To specify which events the "VMware: Events" Dynamic Application collects:

1. Go to the **Dynamic Applications Manager** page (System > Manage > Applications).
2. Click the wrench icon ( ) for the "VMware: Events" Dynamic Application. The **Dynamic Applications Properties Editor** page appears.
3. Click the **[Snippets]** tab. The **Dynamic Applications Snippet Editor & Registry** page appears.
4. Click the wrench icon ( ) for the "VMware Event Collection" snippet.

5. Locate the section that looks like this:

```
event_dict = {
   "AlarmStatusChangedEvent": {"count": 0, "countAll": 0, "collect": True},
   "ClusterStatusChangedEvent": {"count": 0, "countAll": 0, "collect": True},
   "HostStatusChangedEvent": {"count": 0, "countAll": 0, "collect": True},
   "UserLoginSessionEvent": {"count": 0, "countAll": 0, "collect": True},
   "UserLogoutSessionEvent": {"count": 0, "countAll": 0, "collect": True},
   "VmEvent": {"count": 0, "countAll": 0, "collect": True},
   "VmMigratedEvent": {"count": 0, "countAll": 0, "collect": True},
   "other": {"count": 0, "countAll": 0, "collect": True},
}
```

6. Following the format shown above, add new rows for any additional event types you want to include in the event dictionary or delete the rows of any event types you want to remove from the event dictionary.
7. For each event type listed in the event dictionary:
   - If you want the Dynamic Application to collect that event type, change the `"collect"` value to `"True"`. For example:

     ```
     "AlarmStatusChangedEvent": {"count": 0, "countAll": 0, "collect": True},
     ```

   - If you do not want the Dynamic Application to collect that event type, change the `"collect"` value to `"False"`. For example:

     ```
     "UserLoginSessionEvent": {"count": 0, "countAll": 0, "collect": False},
     ```

   - If you want the Dynamic Application to collect all event types, locate the `"other"` line and change the `"collect"` value to `"True"`. For example:

     ```
     "other": {"count": 0, "countAll": 0, "collect": True},
     ```

NOTE: Changing the `"other" "collect"` value to `"True"` overrides any event types with a `"collect"` value of `"False"`. If you do not want to collect all event types, then you must either remove the `"other"` row or change its `"collect"` value to `"False"`.

8. Click the **[Save]** button.

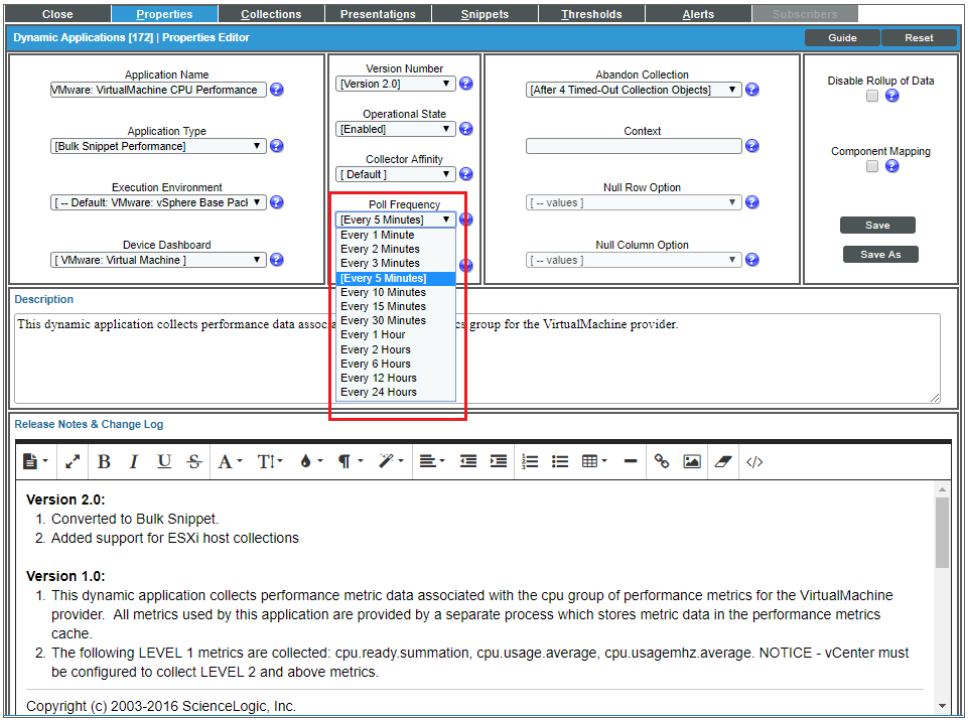
TIP: If you have edited the "VMware Event Collection" snippet and want to maintain your `event_dict` settings the next time the PowerPack is upgraded, you must copy the event dictionary Python script, install the new version of the PowerPack, and then follow the steps in this section to paste the settings into the "VMware Event Collection" snippet in the upgraded version of the "VMware: Events" Dynamic Application.

Configuring the Polling Frequency for VMware Performance Dynamic Applications

In the *VMware: vSphere Base Pack* PowerPack, some of the Dynamic Applications require that their ***Poll Frequency*** be set to a specific time to ensure the accuracy of the data they collect.

To set the polling frequency:

1. Go to the **Dynamic Applications Manager** page (System > Manage > Applications).
2. Search for the Dynamic Application whose polling frequency you want to update and click on its wrench icon ( ).
3. In the **Dynamic Applications Properties Editor**, use the drop-down in the ***Poll Frequency*** field to select the polling frequency.



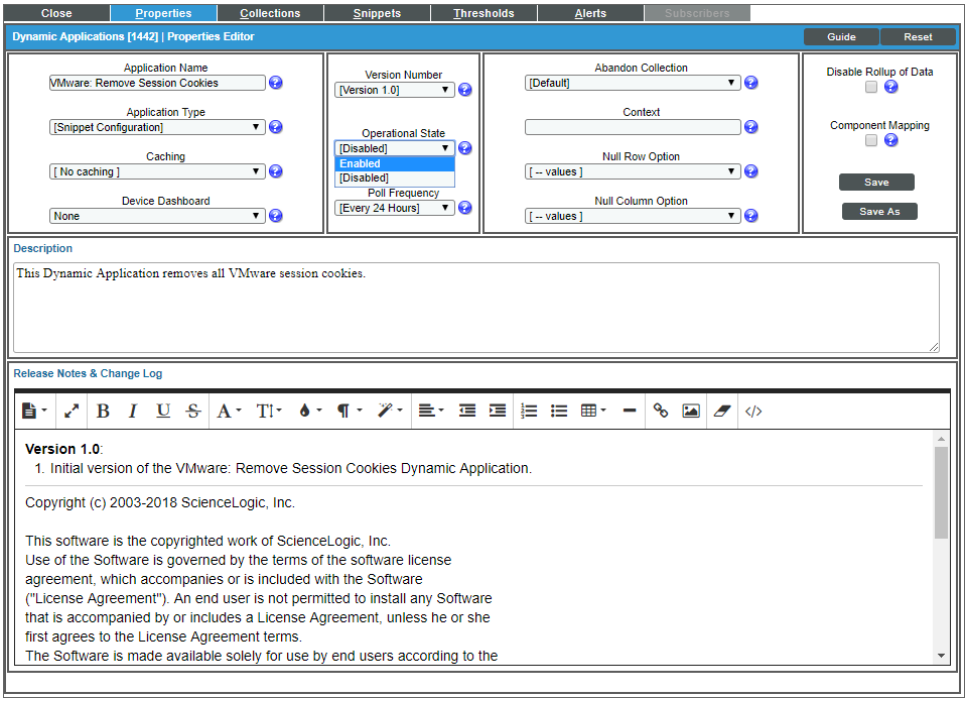
4. Set the polling frequencies for the following Dynamic Applications using the guidelines listed:
   - ***VMware: VirtualMachine CPU Performance***. No more than 5 minutes.
   - ***VMware: VirtualMachine Datastore Performance***. No more than 5 minutes.
   - ***VMware: VirtualMachine Disk Performance***. No more than 5 minutes.
   - ***VMware: QuickStats Cache***. No less than 5 minutes.
   - ***VMware: Inventory Cache***. Exactly 1 minute.
   - ***VMware: Datastore Space Performance***. No less than 15 minutes.

Configuring the "VMware: Remove Session Cookies" Dynamic Application

The "VMware: Remove Session Cookies" Dynamic Application allows users to force a new API session to collect new objects.

To execute the Dynamic Application:

1. Go to the **Dynamic Applications Manager** page (System > Manage > Applications).
2. Find the "VMware: Remove Session Cookies" Dynamic Application and click on its wrench icon ( ).
3. In the **Dynamic Applications Properties Editor** page, click the ***Operational State*** drop-down and select *Enabled*.



4. Align the "VMware: Remove Session Cookies" Dynamic Application to any VMware root device.
5. On the root device, go to the **[Collections]** tab on the **Device Properties** page and run the "VMware: Remove Session Cookies" Dynamic Application you just aligned by clicking the lightning bolt icon ( ).
6. After running the Dynamic Application, check the session logs. If you get an "Failed to retrieve security token from vSphere SSO server" error, run the Dynamic Application again.
7. When the "VMware: Remove Session Cookies" Dynamic Application has successfully run, change its ***Operational State*** back to *Disabled*.

Enable VM GUID Unique Identifier Threshold

The "Enable VM GUID unique identifier" threshold allows a VM to retain its ID when it is vMotioned to another vCenter. It changes The VMware UUID to VMware instanceUUID.

The following Dynamic Applications have this threshold:

- VMware: ClusterComputeResource VM Discovery
- VMware: HostSystem VM Discovery
- VMware: ResourcePool VM Discovery

To enable this threshold:

1. Go to the**Dynamic Applications Manager** page (System > Manage > Applications).
2. Find the Dynamic Application from the list above and click on its wrench icon ( ).
3. In the **Dynamic Applications Properties Editor** page, click on the **[Thresholds]** tab.
4. In the Threshold Object Registry pane, click on the wrench icon ( ) for the "Enable VM GUID unique identifier" Threshold Object.
5. Select *Enabled* in the ***Override Threshold Value*** dropdown and click **[Save]**. Repeat these steps for all three Dynamic Applications listed above.

NOTE: Changing this threshold will orphan all the existing virtual machine components. They will need to be moved to a virtual collector and deleted. The threshold for all three of the listed Dynamic Applications should be set that same way.

Collecting Custom Performance Metrics

vSphere Performance Collection

The *VMware: vSphere Base Pack* PowerPack enables you to collect custom performance metrics.

To add a new vSphere performance metric:

1. In the **Dynamic Applications Manager** page (System > Manage > Applications), find the Bulk Snippet Performance Dynamic Application aligned to the particular device type of interest(i.e., Virtual Machine or Datastore). Click on the wrench icon ( ) next to the Dynamic Application to open the**Dynamic Applications Properties Editor** page.
2. In the **[Collections]** tab, clone an existing collection object by selecting the wrench icon ( ) next to the object you want to clone.
3. Add a new object name and metric label using the ***Snippet Arguments*** field.

   The metric label format is: `<metric_group>.<metric_name>.<rollupType>`.
4. Click **[Save As]** to save the collection object as a new object without saving over the object that you cloned.

Details about the precise metric name, group, and rollup type can be found in the vSphere documentation for PerformanceManager. The vCenter managed object browser (MOB) at `https://<vCenter IP>/mob/?moid=PerfMgr` is an alternative source for counter labels if you know the counter ID. If it is decided that a new snippet must be added to the performance Dynamic Application, the following snippet code can be used as the basis for the new snippet:

```
from content import content_errors

from content import content_logger
```

```
from silo_vmware.VMwareBulkPerfMetrics import VMwareBulkPerfMetrics
CONTROL_PARAMS = {
# 'maxThreads': 8, # maximum number of threads per execution
# 'maxQueryMetrics': 64, # maximum number of metrics to include in QueryPerf,
default is 64 or comes from API if set
# 'intervalId': 300 # Default vCenter performance statistical interval
}

with content_errors.ErrorManager(self):
  with content_logger.LogManager(self) as logger:
  app_name = "VMwareClusterComputeResourcePerformanceSnippet"
  inst = VMwareBulkPerfMetrics(self, app_name, snippet_id, devices, self.oids,
  entity_type='ComputeResource', ctrl_params=CONTROL_PARAMS)
  inst.process()
```

VSAN Performance Collection

The process for VSAN performance collection is similar to the process for vSphere performance collection, but the snippet argument uses a URL-style pattern to designate the metric to be collected. Refer to the VSAN Management API documentation for more information.

For example, for VSAN cluster front-end stats, the collection object snippet arguments use a pattern similar to this, where the entity type and metric can be exchanged with the new metric of interest:

```
vsan://vsan-performance-manager/VsanPerfQueryPerf?entityType=cluster-
domclient&entityUuid=*&metricLabel=congestion
```

Details on the precise parameters that can be provided to the query can be found in the vSphere documentation for VsanPerfQueryPerf.

If a new snippet is required, the following snippet code can be used as the basis for the new snippet:

```
from content import content_errors
from content import content_logger
from silo_vmware_vsan.vsan_perf_app_collector import VsanPerfAppCollector
TAG = "VsanStoragePerfStats"
with content_errors.ErrorManager(self):
  with content_logger.LogManager(self) as logger:
    vsan_app = VsanPerfAppCollector(self, TAG, snippet_id)
    vsan_app.get_collections()
    vsan_app.collect()
    vsan_app.store()
```

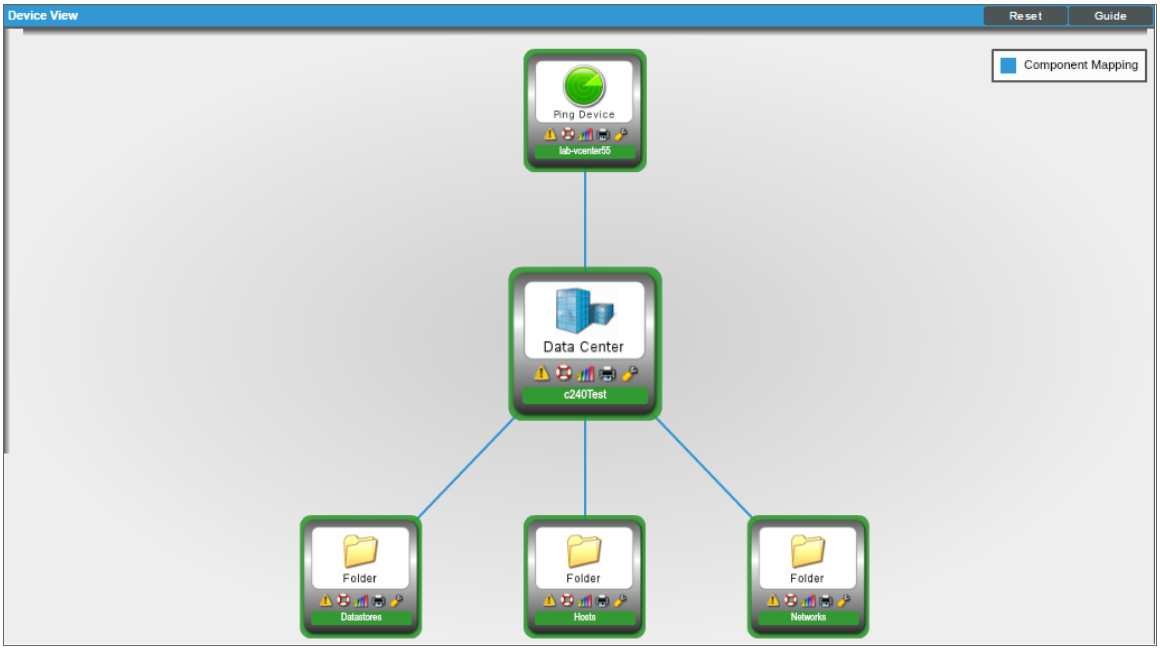
Viewing Component Devices

When SL1 performs collection for the "VMware: RootFolder Datacenter Discovery" Dynamic Application, SL1 will create component devices for the components managed by the vCenter server and align other Dynamic Applications to those component devices. Some of the Dynamic Applications aligned to the component devices are also used to create additional component devices. All component devices appear on the **Device Manager** page.

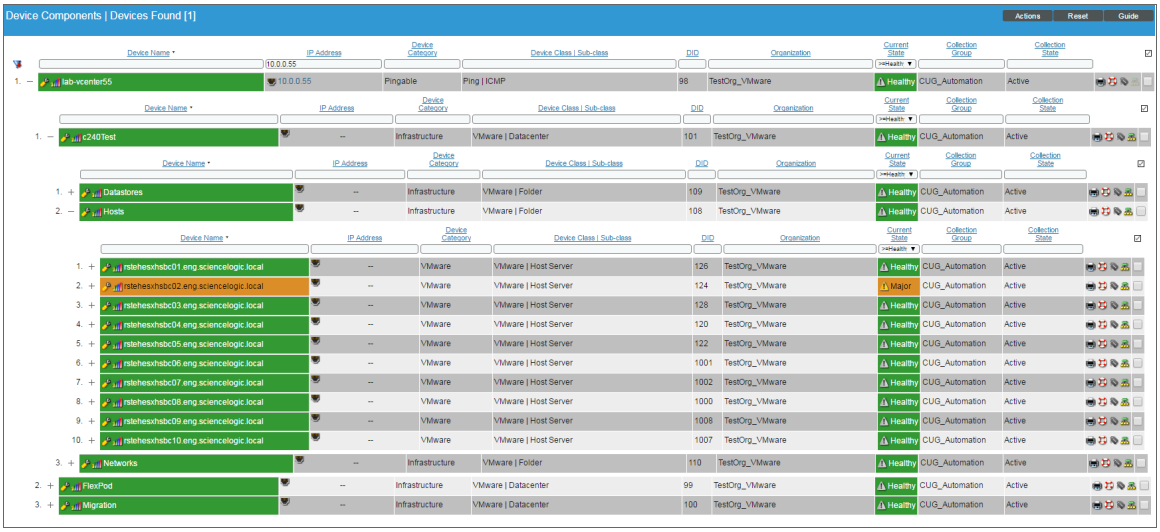
NOTE: During initial discovery, SL1 requests information about 200 devices per poll period until all component devices are discovered. After initial discovery, SL1 requests only the changes from the previously collected topology. If you have a large VMware infrastructure, it can take several collection cycles after the initial collection of the "VMware: RootFolder Datacenter Discovery" Dynamic Application for all component devices to be discovered.

In addition to the **Device Manager** page, you can view the vCenter server and all associated component devices in the following places in the user interface:

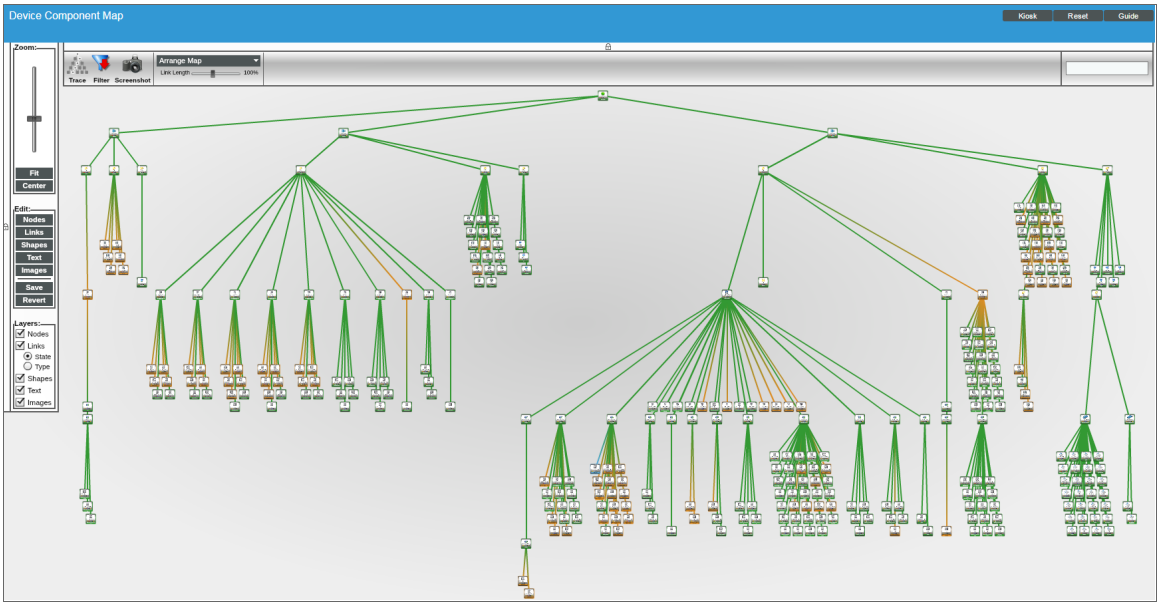
- The **Device View** modal page (click the bar-graph icon [ ] for a device, then click the **Topology** tab) displays a map of a particular device and all of the devices with which it has parent-child relationships. Double-clicking any of the listed devices reloads the page to make the selected device the primary device:



- The **Device Components** page (Registry > Devices > Device Components) displays a list of all root devices and component devices discovered by SL1. The **Device Components** page displays all root devices and component devices in an indented view, so you can easily view the hierarchy and relationships between child devices, parent devices, and root devices. To view the component devices associated with a vCenter server, find the vCenter server and click its plus icon (+):



- The **Component Map** page (Views > Device Maps > Components) allows you to view devices by root node and view the relationships between root nodes, parent components, and child components in a map. This makes it easy to visualize and manage root nodes and their components. SL1 automatically updates the **Component Map** as new component devices are discovered. The platform also updates each map with the latest status and event information. To view the map for a vCenter server, go to the **Component Map** page and select the map from the list in the left NavBar. To learn more about the **Component Map** page, see the *Views* manual.



Relationships with Other Types of Component Devices

In addition to the parent/child relationships between component devices, the following relationships are automatically created by the Dynamic Applications in the *VMware: vSphere Base Pack* PowerPack:

- VMware Virtual Machines and VMware Datastores
- VMware Virtual Machines and VMware Networks
- VMware Virtual Machines and Cisco Cloud Center
- VMware VirtualApps and VMware Networks
- VMware Hosts and VMware Datastores
- VMware Hosts and VMware Networks
- VMware Hosts and VMware Virtual Machines
- VMware Datastore Clusters and VMware Virtual Machines
- VMware Datastore Clusters and VMware Host Clusters
- VMware Datastore Clusters and VMware Hosts

SL1 can also automatically build relationships between VMware component devices and other associated devices. If you discover one or more of the following:

- A Dynatrace host using the Dynamic Applications in the *Dynatrace* PowerPack
- A Cisco UC VOS application using the Dynamic Applications in the *Cisco: UC VOS* PowerPack
- A Cisco CUCM cluster using the Dynamic Applications in the *Cisco: CUCM* PowerPack
- An EMC VNX device using the Dynamic Applications in the *EMC: VNX* PowerPack
- A NetApp device using the Dynamic Applications in the *NetApp Base Pack* PowerPack
- A UCS device using the Dynamic Applications in the *Cisco: UCS* PowerPack

SL1 automatically creates relationships between the following types of component devices, where appropriate:

- Dynatrace hosts and VMware Datastores
- Cisco UC VOS applications and VMware Datastores
- Cisco CUCM clusters and VMware Datastores
- EMC VNX LUNs and VMware Datastores
- NetApp LUNs and VMware Datastores
- NetApp Volumes and VMware Datastores
- VMware Hosts and UCS Service Profiles

Determining Availability for Component Devices

The Dynamic Applications that discover the component devices managed by a vCenter server include collection objects that define the availability status of those component devices.

The following types of component devices are considered unavailable if a vCenter server reports that the power state is off:

- Compute Resource
- Host Server (i.e., ESX and ESXi Servers)
- Virtual Machine

The following types of component devices are considered unavailable if a vCenter server loses its connection to an ESXi hypervisor host server:

- Host Server
- Virtual Machine

The following types of component devices are considered unavailable if a vCenter server does not include information about those components in the appropriate response:

- Distributed Virtual Switch
- Distributed Virtual Portgroup
- Folder
- Network
- Resource Pool

The following types of component devices are considered unavailable based on other conditions:

- ***Datastore***. A datastore is considered unavailable if it is not accessible. A datastore is not accessible if no hosts have successfully mounted the datastore volume.
- ***Cluster***. A cluster is considered unavailable if no hosts are associated with the cluster or all hosts associated with the cluster are powered off.

When a VMware device is shut down, an event is created to alert the user that the device is unavailable. If you turn off VMware devices intentionally, you can suppress these availability events.

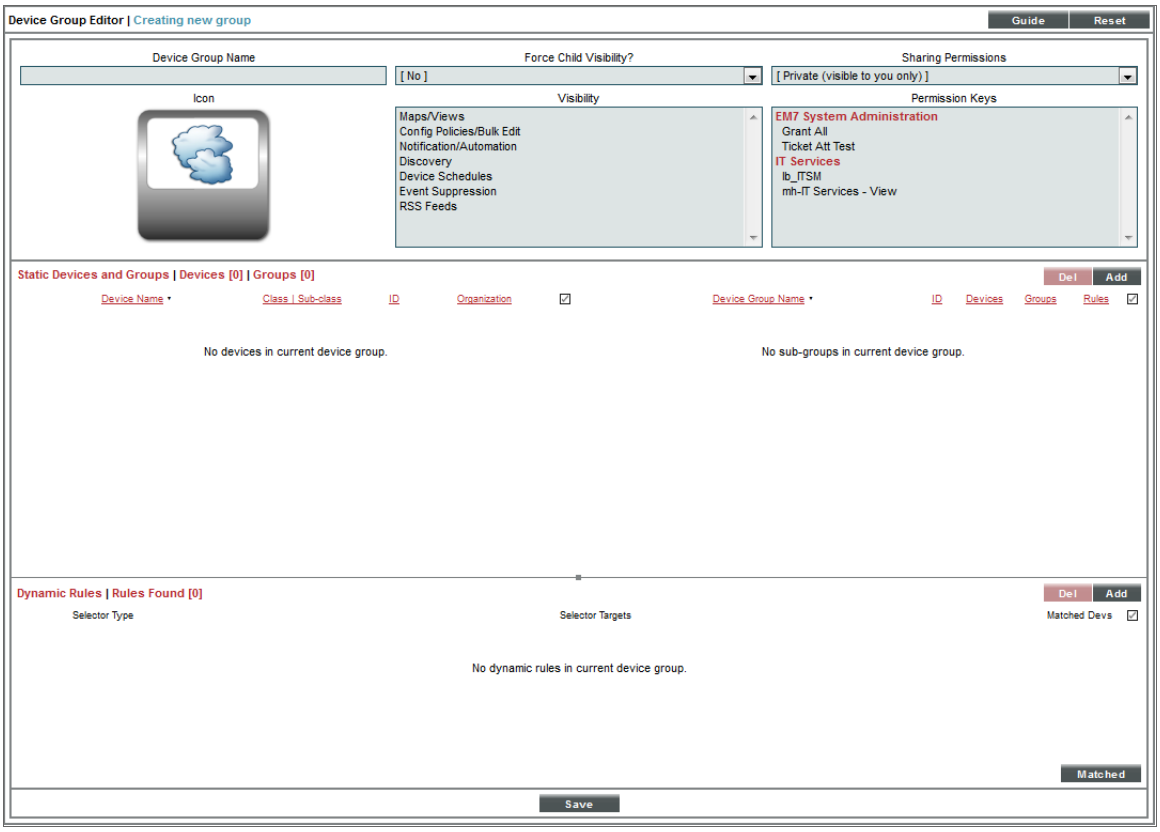
To suppress these events:

- Create a device group that contains the VMware devices for which you want to suppress availability events.
- Suppress that device group in the relevant Event Policies.

To create the device group:

1. Go to the **Device Groups** page (Registry > Devices > Device Groups).

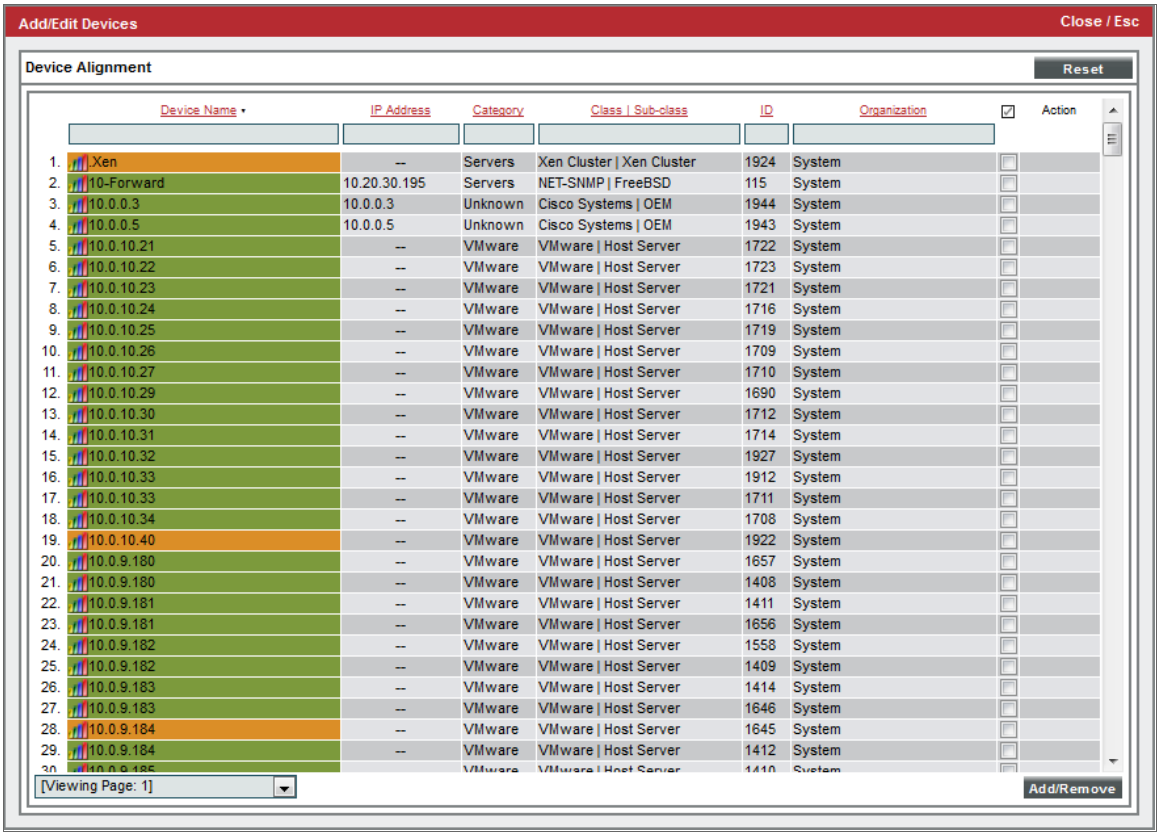
2. Click the **[Create]** button. The **Device Group Editor** page appears:



3. Enter values in the following fields:

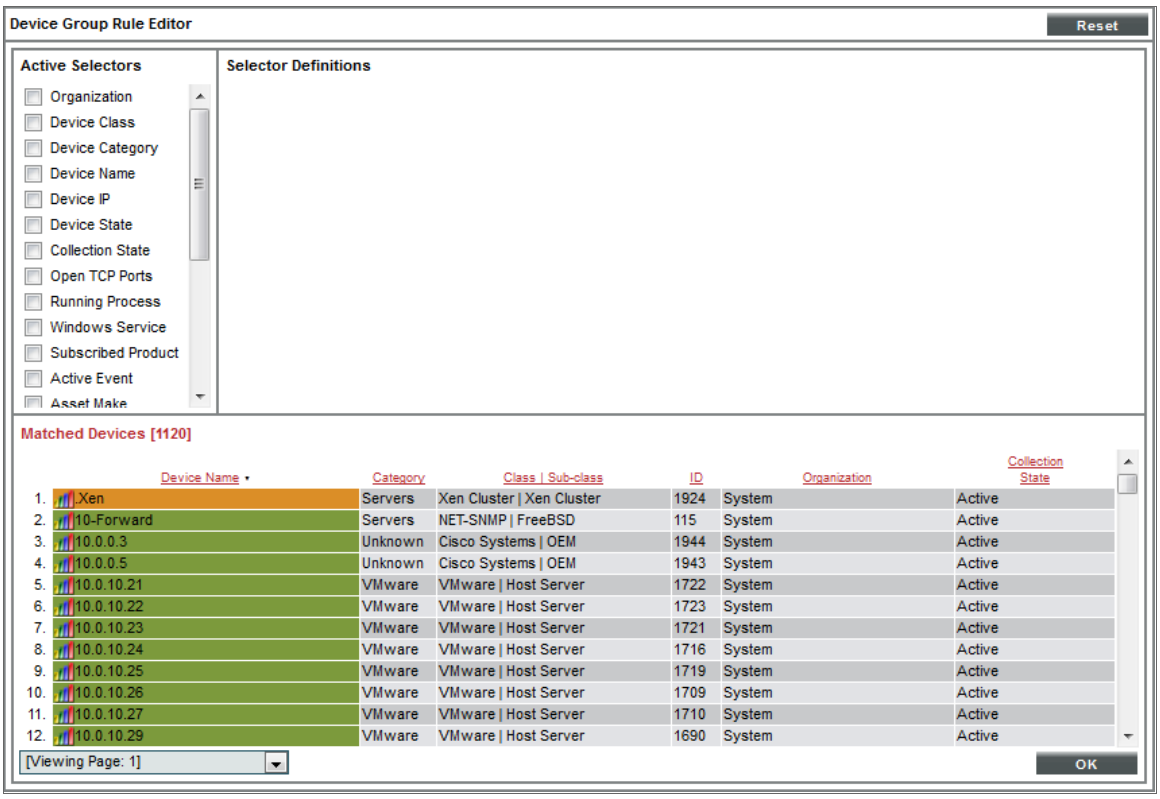
   - ***Device Group Name***. In this field you can enter a customized Device Group Name. For example, "Event Suppressed VMs".
   - ***Visibility***. Select *Event Suppression*.

4. If you want to suppress one or a few individual devices, click the **[Add]** button under the **Static Devices and Groups** pane and select *Add Devices*. The **Device Alignment** modal page appears:



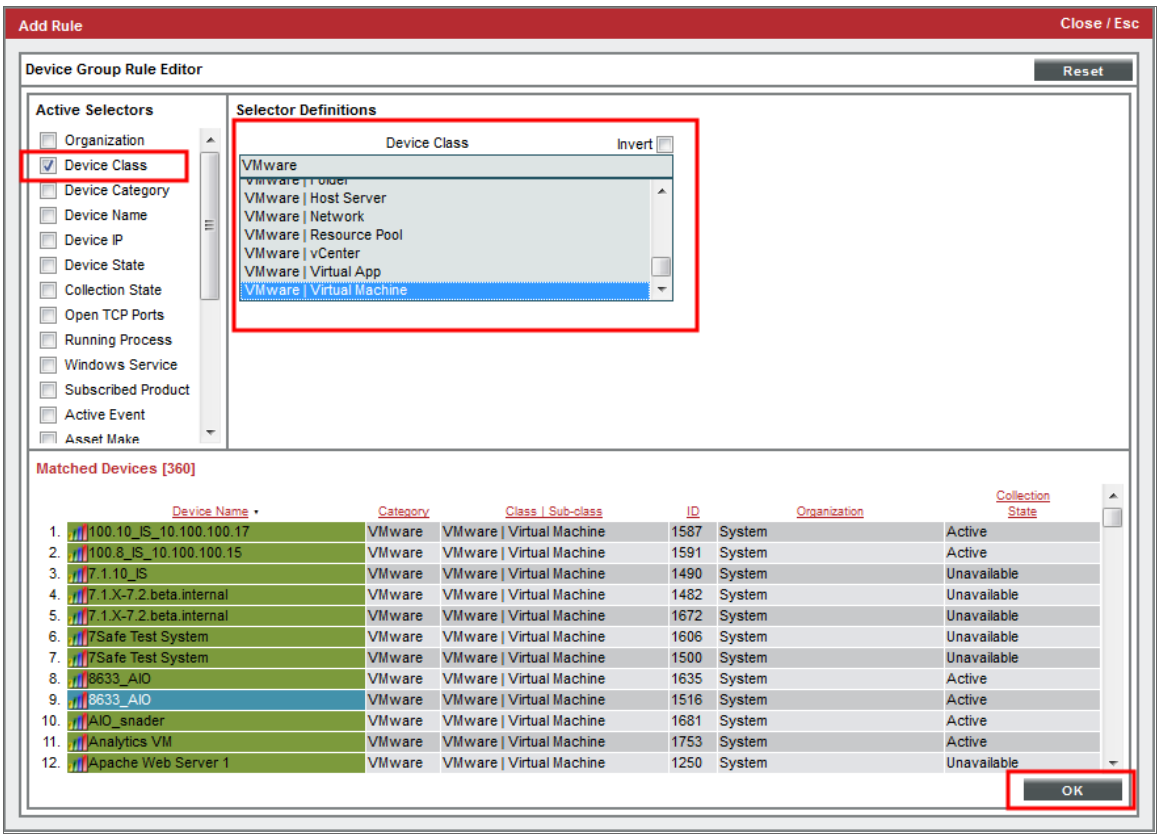
5. In the **Device Alignment** modal page, perform a search in the ***Class | Sub-class*** column for "Virtual Machine" to bring up the available VMware devices.
6. Find the device(s) for which you want to suppress availability events and select their checkbox ( ).
7. Click the **[Add/Remove]** button to add the device(s).

8. To add all VM devices to the device group, click the **[Add]** button in the **Dynamic Rules** pane of the **Device Group Editor** page. The **Device Group Rule Editor** page appears:



9. In the **Device Group Rule Editor** page, select the checkbox (☑) for ***Device Class*** in the **Active Selectors** pane.

10. In the **Selector Definitions** pane, the ***Device Class*** field appears. Perform a search for "VMware" in the ***Device Class*** field, and select *VMware | Virtual Machine*. All virtual machines will appear in the **Matched Devices** pane:

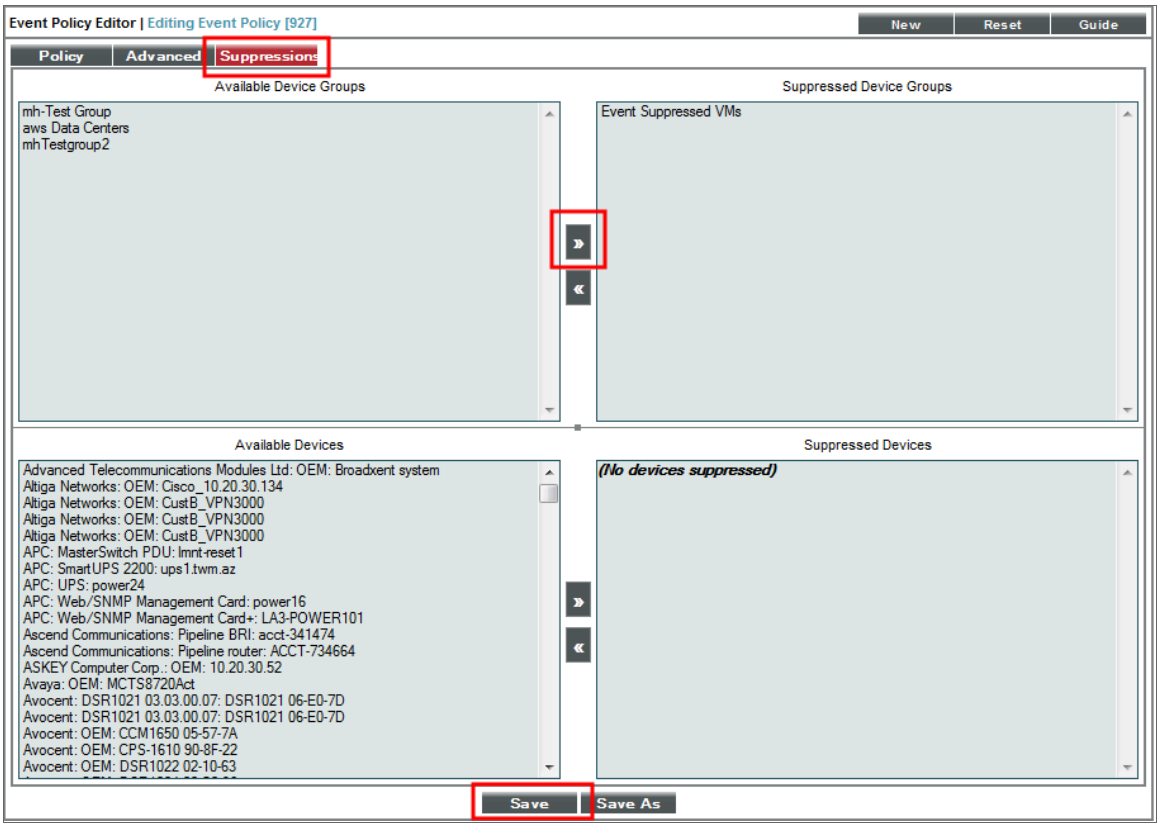


11. Click the **[OK]** button. The Device Class will appear in the **Dynamic Rules** pane.

Next, you need to suppress two Event Policies for this Device Group. To do this:

1. Go to the **Event Policy Manager** page (Registry > Events > Event Manager).
2. Perform a search in the ***Event Policy Name*** column for "Availability".

3. Click the wrench icon ( ) for the **Poller: Availability Check Failed** policy. The **Event Policy Editor** page appears:



4. Click the **[Suppressions]** tab in the **Event Policy Editor** page.
5. In the ***Available Device Groups*** field, select the device group you created. In this example, you would select *Event Suppressed VMs*.
6. Click the right arrow button, **[>>]**, and the device group moves to the ***Suppressed Device Groups*** field.
7. Click the **[Save]** button.
8. Repeat these steps for the **Poller: Availability Healthy** event policy to suppress events that will occur when a VMware device is turned back on again.

Chapter 4

VMware Dashboards

Overview

SL1 includes the *VMware: vSphere Dashboards* PowerPack, which contains dashboards that display data collected from VMware systems.

In addition, the *VMware: vSphere Base Pack* PowerPack includes device dashboards that provide summary information for VMware component devices. Each of these device dashboards is aligned as the default device dashboard for its equivalent device class.

The following sections describe how to install the *VMware: vSphere Dashboards* PowerPack and a description of each dashboard that is included in the *VMware: vSphere Dashboards* and *VMware: vSphere Base Pack* PowerPacks:

Installing the VMware: vSphere Dashboards PowerPack 33

VMware Host Performance Dashboard 34

VMware vCenter Overview Dashboard 36

VMware Device Dashboards 38

VMware: Cluster 39

VMware: Datastore 40

VMware: Datastore Cluster 41

VMware: Host 42

VMware: Resource Pool 43

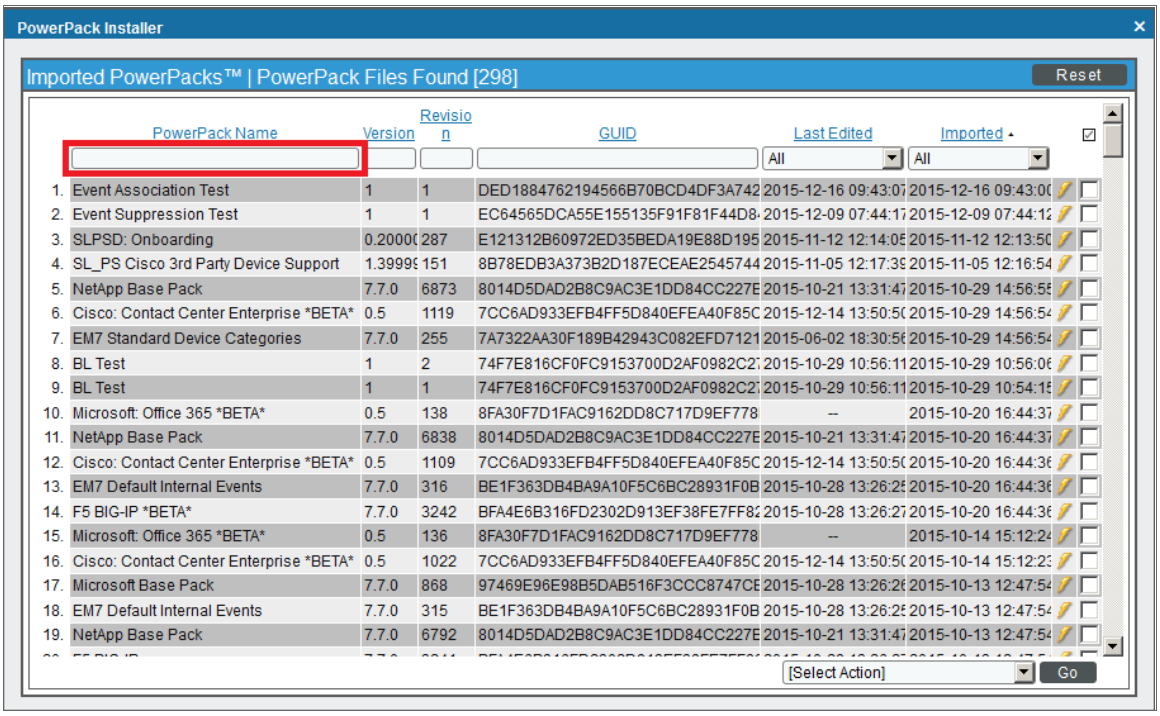
VMware: Virtual App 44

VMware: Virtual Machine 45

Installing the VMware: vSphere Dashboards PowerPack

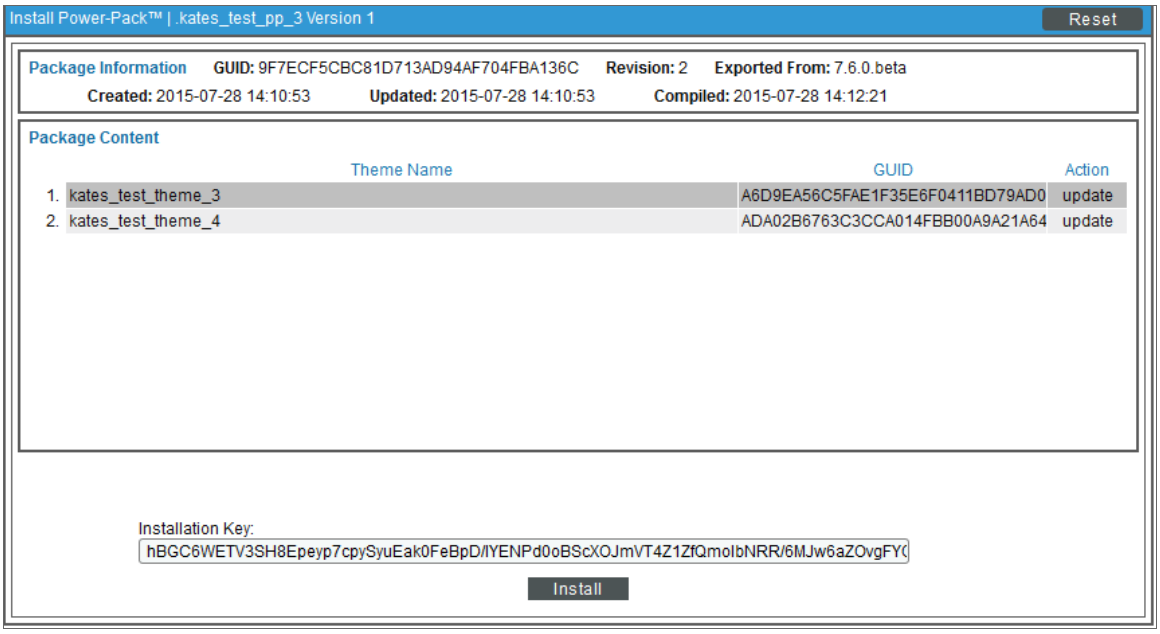
Before you can view the VMware Host Performance or VMware vCenter Overview dashboards in SL1, you must first install the *VMware: vSphere Dashboards* PowerPack. To do so:

1. Go to the **PowerPack Manager** page (System > Manage > PowerPacks).
2. Click the **[Actions]** button, then select *Install PowerPack*. The **Imported PowerPacks** modal page appears.
3. Use the search filter in the ***PowerPack Name*** column heading to locate the PowerPack you want to install. To do so, enter text to match, including special characters, and the **Imported PowerPacks** modal page displays only PowerPacks that have a matching name.



4. Click the lightning-bolt icon ( ) for the PowerPack that you want to install.

5. The **Install PowerPack** modal page appears. To install the PowerPack, click **[Install]**.

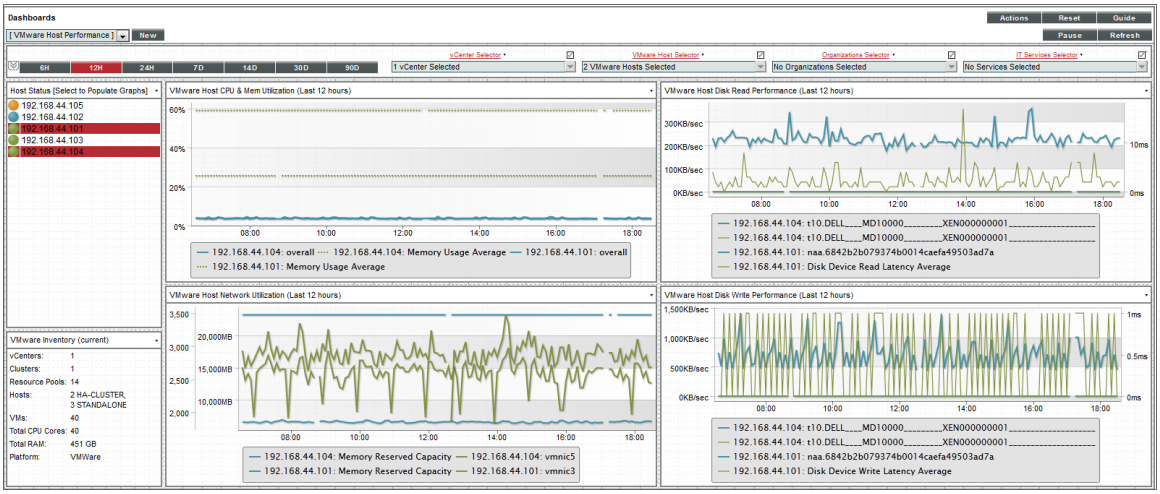


6. The PowerPack now appears in the **PowerPack Manager** page. The contents of the PowerPack are automatically installed in your SL1 system.

VMware Host Performance Dashboard

The VMware Host Performance dashboard allows service providers to monitor VMware hosts and diagnose problems with those hosts. The dashboard can include data from up to four hosts in each graph. This allows users to find correlations between hosts in data drops or spikes, making it easier for users to identify and diagnose issues.

The dashboard displays the following widgets:



Context Quick Selector. This widget is located along the top of the dashboard and contains:

- *Time span presets*. Users select the time span over which they want to view data. Selections range from 6 hours to 90 days.
- *vCenter Selector*. If a user has multiple vCenters, this drop-down list allows the user to select one or several vCenters for which they want to view data.
- *Organizations Selector*. This drop-down list allows a user to select specific organizations for which they want to view data.
- *IT Services Selector*. If a user has an ITSM service (for example, for e-commerce), the IT Services Selector drop-down list allows them to select an IT service for which they want to view data.

Host Status. Displays the IP address of each VMware ESX/ESXi server and its status with a color-coded "traffic light" icon. When you select one or more VMware ESX/ESXi server, the four performance widgets are populated with data from that host server(s). The status of each host is indicated as follows:

- Critical. Host has a serious problem that requires immediate attention.
- Major. Host has a problem that requires immediate attention.
- Minor. Host has a less-serious problem.
- Notice. Host has an informational event associated with it.
- Healthy. Host is running with no problems.

> **NOTE**: More than four hosts can be selected in the ***Host Status*** widget, but the dashboard will only display data from the first four that have been selected.

VMware Inventory. This widget displays information based on the user's credentials. The widget displays inventory information about the following:

- vCenters
- Clusters
- Resource Pools
- Hosts
- VMs
- Total CPU Cores
- Total RAM
- Platform

The following four widgets measure different aspects of VMware performance. Select one or more hosts in the ***Host Status*** widget to view data in these widgets:

- ***VMware Host CPU & Memory Utilization***. Displays overall and average CPU and Memory Utilization in percent. Displays a line graph with a line each for CPU Utilization and Memory Utilitization over the time period selected in the Context Quick Selector by percent.

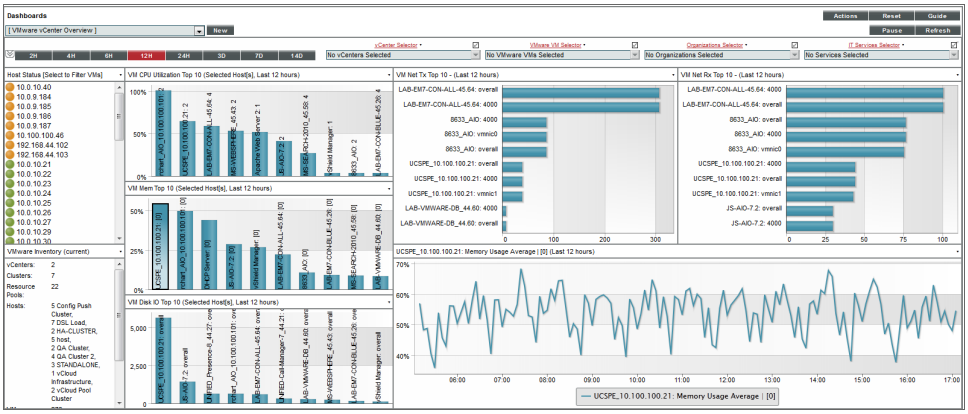
- ***VMware Host Disk Read Performance***. Displays the Disk Read Performance of the selected host in a line graph.
- ***VMware Host Network Utilization***. Displays the Network Utilization of the selected host in a line graph.
- ***VMware Host Disk Write Performance***. Displays the Disk Write Performance of the selected host in a line graph.

Each of the four performance widgets has the following features:

- The X-axis of each widget displays time selected in the Context Quick Selector by hours or days.
- For the selected VMware ESX/ESXi server, the Y-axis displays either performance or utilization by percentage or in a format that is auto-converted to the most consumable value based on the server.
- You can hide a data series by selecting the label in the legend that appears at the bottom of the widget. To show a hidden data series, select the label again.
- You can zoom in on a section of the graph by clicking, holding, and dragging your mouse across the section you want to view. If you are zoomed in on a section of the graph, you can revert to the original time span by selecting *Reset zoom* in the top-right corner of the graph.
- Hovering the cursor over a single line reveals details about specific data points. If you select a data point, the **Device Performance** page will open in a separate window with the graph for the selected metric displayed.

VMware vCenter Overview Dashboard

The VMware vCenter Overview dashboard allows users to have visibility into their VMware environment. Users can view how their VMs and hosts are performing over a given period of time. The dashboard allows diagnostics with its overlay capability. By selecting up to four hosts, the usage average of those devices and hosts can reveal correlations in spikes or drops in data, allowing the user to quickly diagnose issues.



Context Quick Selector. This widget contains the time span presets buttons, vCenter Selector, VMware VM Selector, Organizations Selector, and IT Services Selector.

- *Time span presets*. Users select the time span over which they want to view data. Selections range from 6 hours to 90 days.

- *vCenter Selector*. If a user has multiple vCenters, this drop-down list allows the user to select one or several vCenters for which they want to view data
- *VMware Host Selector*. This drop-down list allows a user to select up to four VMware Hosts for which they want to view data.
- *Organizations Selector*. This drop-down list allows a user to select specific organizations for which they want to view data
- *IT Services Selector*. If a user has an ITSM service for e-commerce, for example, the IT Services Selector drop-down list allows them to select an IT service for which they want to view data.

Host Status. Displays the IP address of each VMware server and its status with a color-coded "traffic light" icon. When one or more are selected, the graphs will be populated with data from that host server(s). The status of each host is indicated as follows:

- Critical. Host has a serious problem that requires immediate attention.
- Major. Host has a problem that requires immediate attention.
- Minor. Host has a less-serious problem.
- Notice. Host has an informational event associated with it.
- Healthy. Host is running with no problems.

NOTE: More than four hosts can be selected in the ***Host Status*** widget, but the dashboard will only display data from the first four that have been selected. It is recommended that you select VMware devices from the ***VMware VM Selector*** drop-down list in the ***Quick Context Selector*** widget.

VMware Inventory. This widget displays information based on the user's credentials. The widget displays inventory information about the following:

- vCenters
- Clusters
- Resource Pools
- Hosts
- VMs
- Total CPU Cores
- Total RAM
- Platform

VM CPU Utilization. Displays the 10 guest VMs with the highest average CPU utilization over the selected time period. The widget displays a bar graph with percentage utilized as the Y-axis.

VM Memory Top 10. Displays the 10 guest VMs with the highest average memory utilization over the selected time period. The widget displays a bar graph with percentage utilized as the Y-axis.

VM Disk IO Top 10. Displays the 10 guest VMs with the highest average disk usage over the selected time period. The widget displays a bar graph with disk utilization as the Y-axis.

VM Network Transmit Top 10. Displays the 10 guest VMs with the highest average outbound network utilization over the selected time period. The widget displays a bar graph with outbound network utilization as the Y-axis.

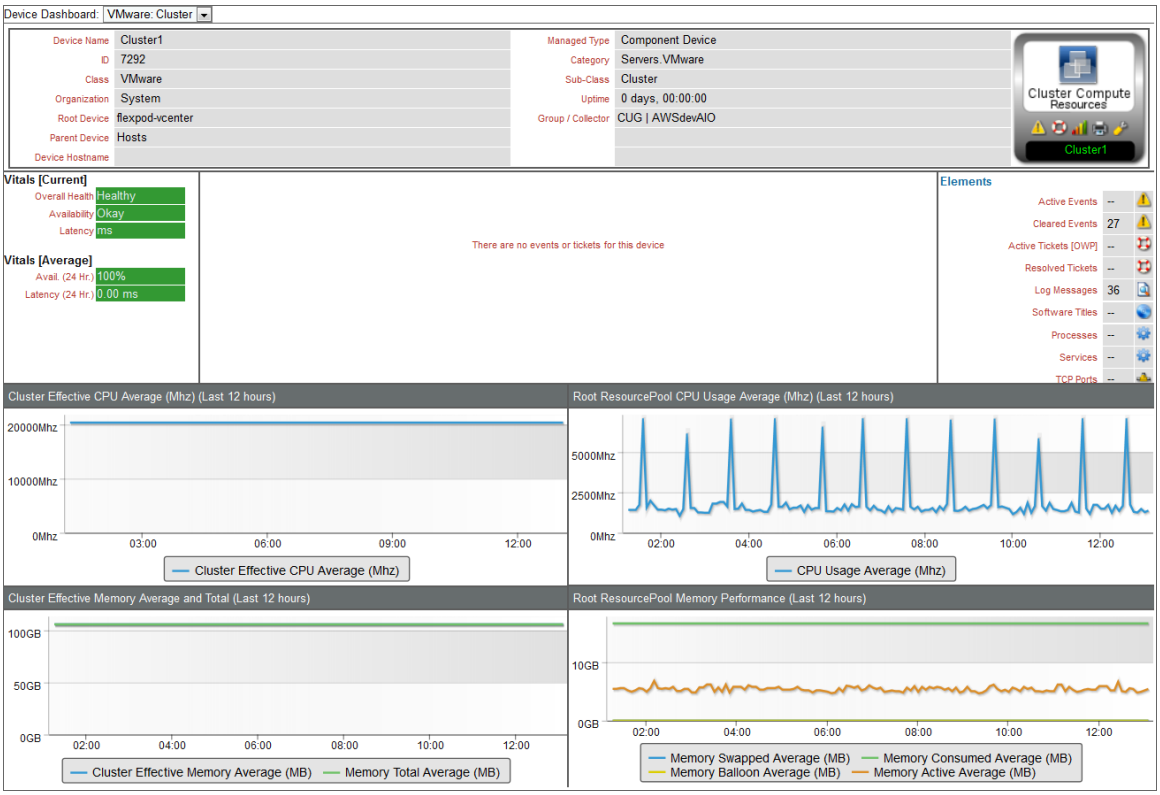
VM Network Receive Top 10. Displays the 10 guest VMs with the highest average inbound network utilization over the selected time period. The widget displays a bar graph with inbound network utilization as the Y-axis.

Detailed Performance Graph. The widget in the bottom-right of the dashboard displays data when a bar on any of the other graphs in this dashboard is selected. When a bar is selected, it displays the selected metric over time. You can select up to eight metrics to display in this graph by holding down the **<Ctrl>** key when you select each bar.

VMware Device Dashboards

The *VMware: vSphere Base Pack* PowerPack includes device dashboards that provide summary information for VMware component devices. Each of these device dashboards is aligned as the default device dashboard for its equivalent device class.

VMware: Cluster

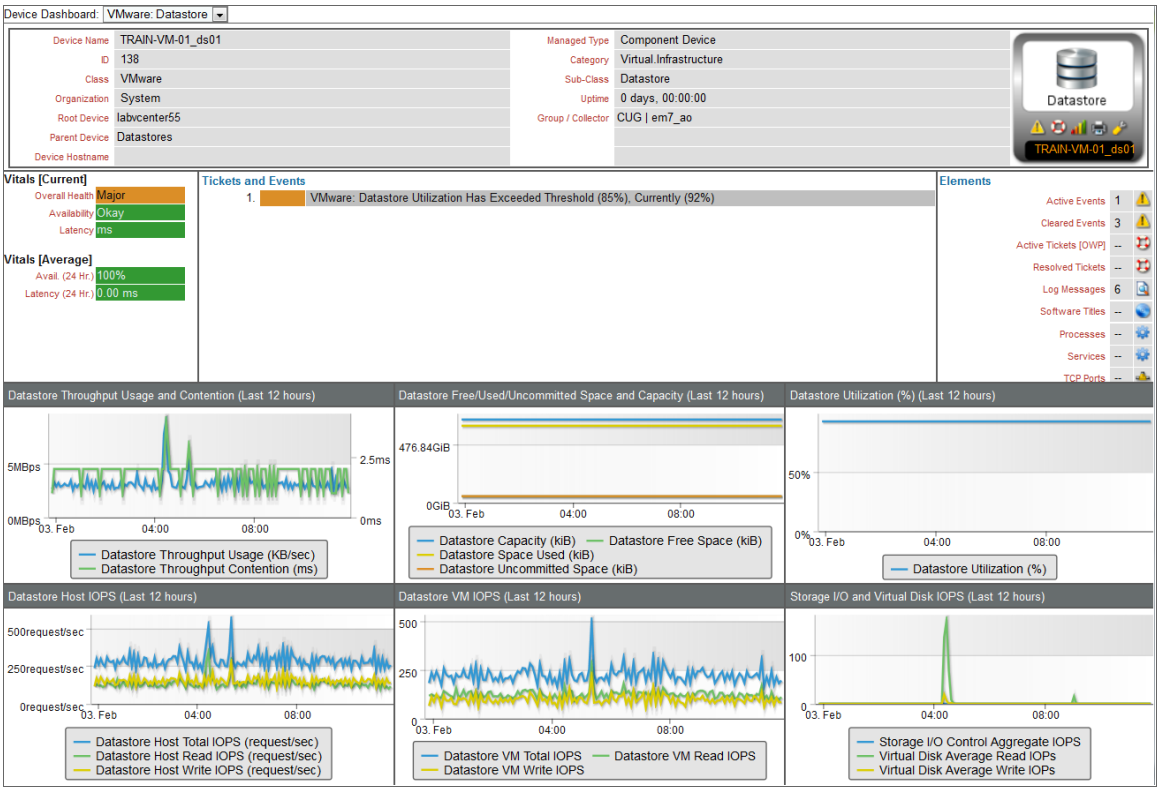


The VMware: Cluster device dashboard displays the following information:

- The basic information about the cluster
- The current health, availability, and latency for the cluster
- A list of active events and open tickets associated with the cluster
- A count of, and links to, the elements associated with the cluster
- Four instances of the Multi-series Performance Widget that display the following metrics trended over the last 12 hours:
    - Cluster Effective CPU Average
    - CPU Usage Average
    - Cluster Effective Memory Average
    - Memory Total Average
    - Memory Swapped Average
    - Memory Consumed Average

- Memory Balloon Average
- Memory Active Average

VMware: Datastore

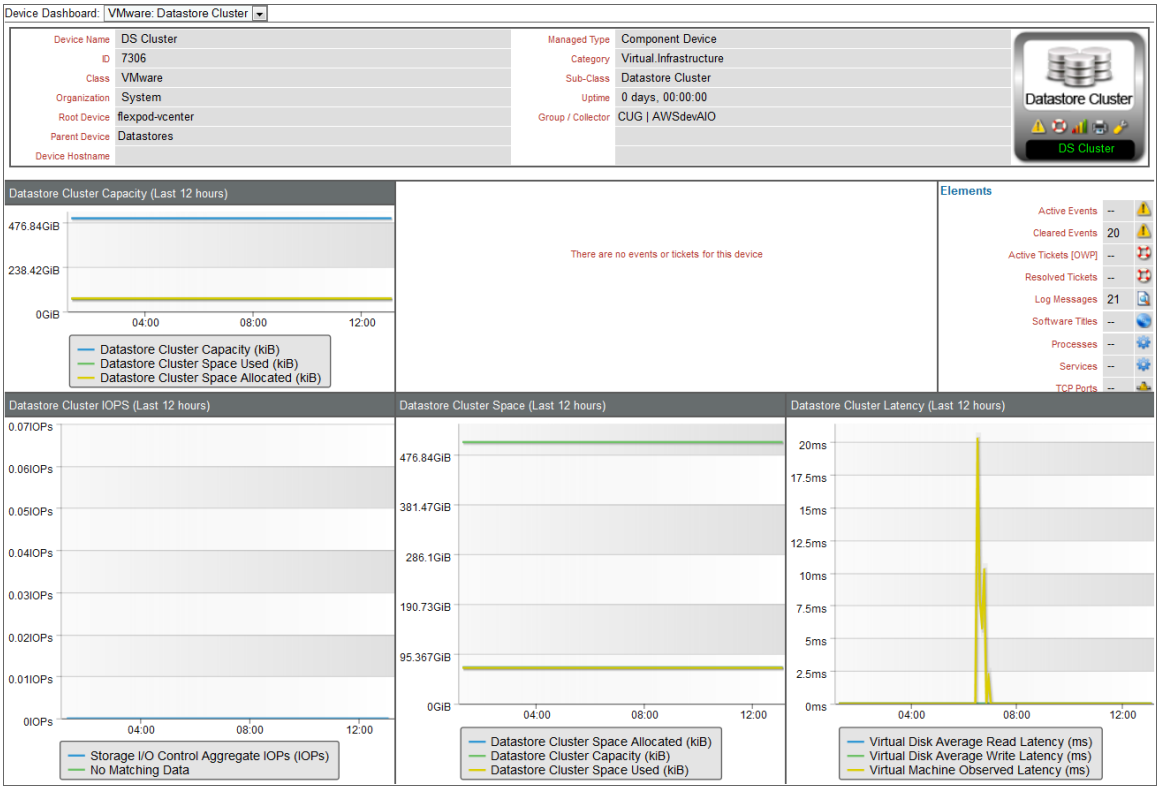


The VMware: Datastore device dashboard displays the following information:

- The basic information about the datastore
- The current health, availability, and latency for the datastore
- A list of active events and open tickets associated with the datastore
- A count of, and links to, the elements associated with the datastore
- Six instances of the Multi-series Performance Widget that display the following metrics trended over the last 12 hours:
    - Datastore Throughput Usage
    - Datastore Throughput Contention
    - Datastore Capacity
    - Datastore Free Space
    - Datastore Space Used
    - Datastore Uncommitted Space

- Datastore Utilization
- Datastore Host Total IOPS
- Datastore Host Read IOPS
- Datastore Host Write IOPS
- Datastore VM Total IOPS
- Datastore VM Read IOPS
- Datastore VM Write IOPS
- Storage I/O Control Aggregate IOPS
- Virtual Disk Average Read IOPS
- Virtual Disk Average Write IOPS

VMware: Datastore Cluster

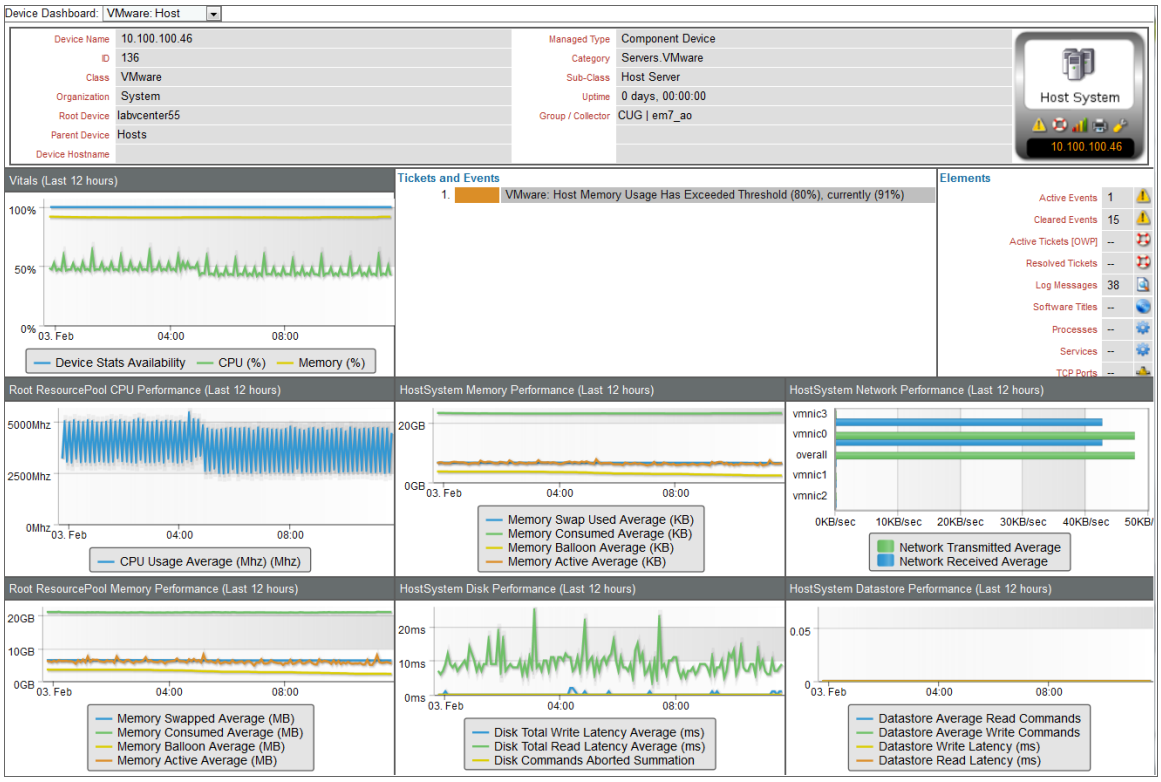


The VMware: Datastore Cluster device dashboard displays the following information:

- The basic information about the datastore cluster
- A list of active events and open tickets associated with the datastore cluster
- A count of, and links to, the elements associated with the datastore cluster

- Four instances of the Multi-series Performance Widget that display the following metrics trended over the last 12 hours:
    - Datastore Cluster Capacity
    - Datastore Cluster Space Used
    - Datastore Cluster Space Allocated
    - Storage I/O Control Aggregate IOPS
    - Virtual Disk Average Read Latency
    - Virtual Disk Average Write Latency
    - Virtual Machine Observed Latency

VMware: Host

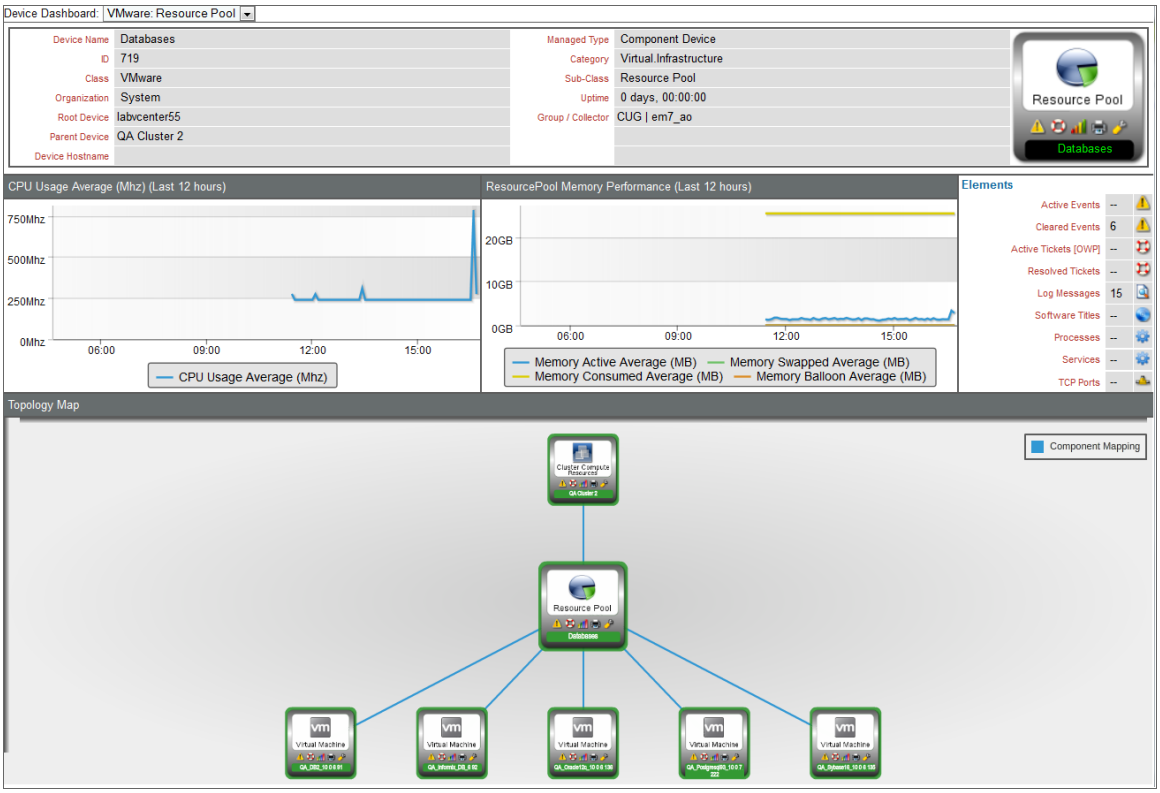


The VMware: Host device dashboard displays the following information:

- The basic information about the host
- A list of active events and open tickets associated with the host
- A count of, and links to, the elements associated with the host
- Seven instances of the Multi-series Performance Widget that display the following metrics trended over the last 12 hours:
    - Availability

- CPU (%)
- Memory (%)
- CPU Usage Average
- Memory Swap Used Average
- Memory Consumed Average
- Memory Balloon Average
- Memory Active Average
- Network Transmitted Average
- Network Received Average
- Disk Total Write Latency Average
- Disk Total Read Latency Average
- Disk Commands Aborted Summation
- Datastore Average Read Commands
- Datastore Average Write Commands
- Datastore Write Latency
- Datastore Read Latency

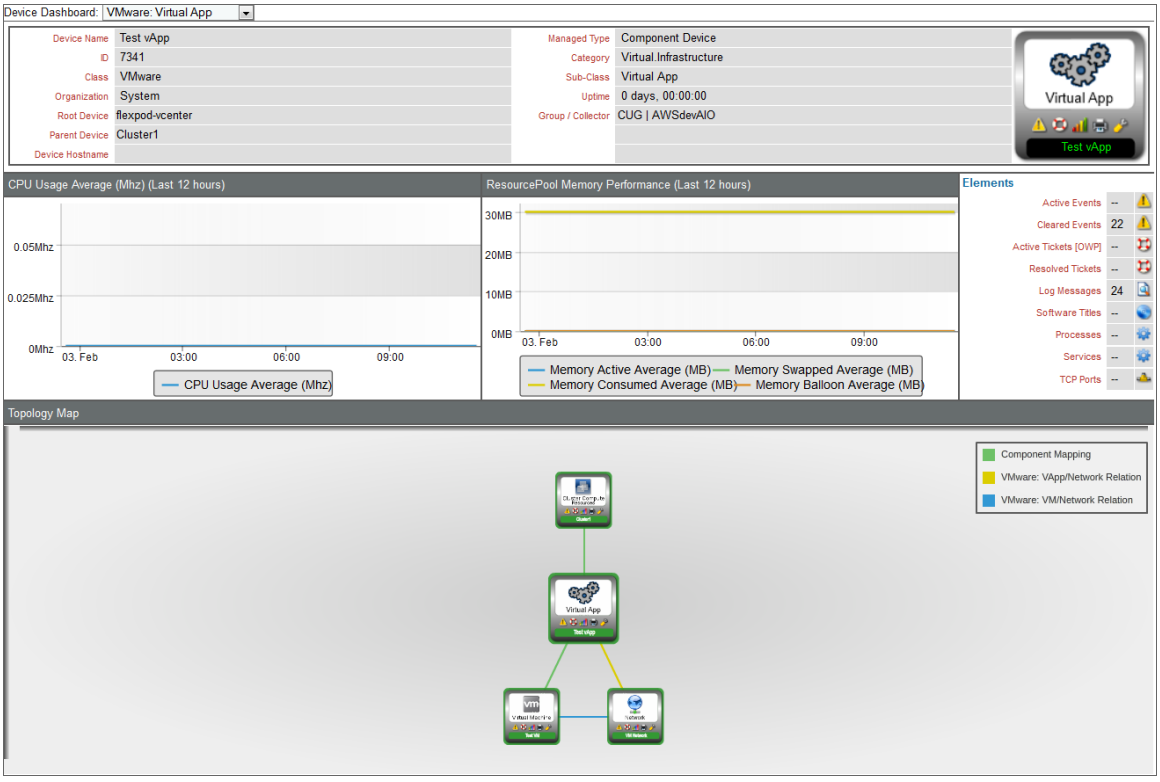
VMware: Resource Pool



The VMware: Resource Pool device dashboard displays the following information:

- The basic information about the resource pool
- A count of, and links to, the elements associated with the resource pool
- Two instances of the Multi-series Performance Widget that display the following metrics trended over the last 12 hours:
    - CPU Usage Average
    - Memory Active Average
    - Memory Swap Used Average
    - Memory Consumed Average
    - Memory Balloon Average
- A topology map that shows the devices that are directly related to the resource pool

VMware: Virtual App

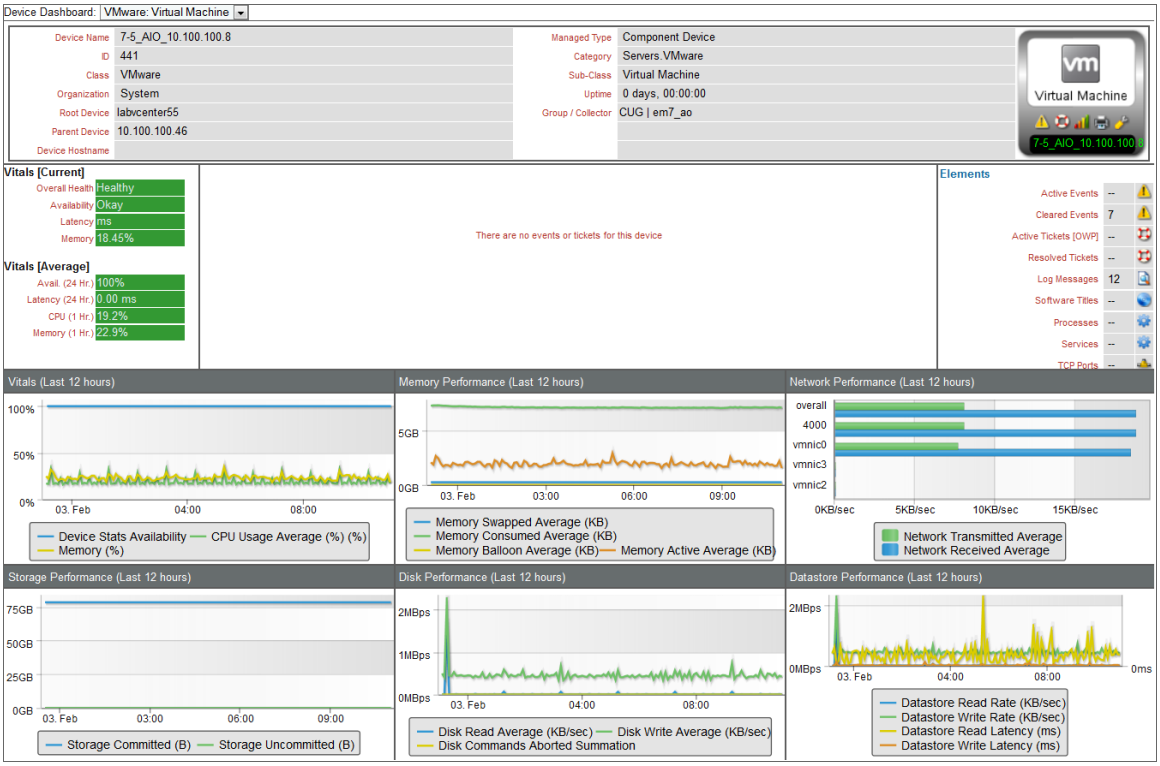


The VMware: Virtual App device dashboard displays the following information:

- The basic information about the virtual app
- A count of, and links to, the elements associated with the virtual app

- Two instances of the Multi-series Performance Widget that display the following metrics trended over the last 12 hours:
    - CPU Usage Average
    - Memory Active Average
    - Memory Swap Used Average
    - Memory Consumed Average
    - Memory Balloon Average
- A topology map that shows the devices that are directly related to the virtual app

VMware: Virtual Machine



The VMware: Virtual Machine device dashboard displays the following information:

- The basic information about the virtual machine
- The current health, availability, latency, CPU, and memory for the virtual machine
- A list of active events and open tickets associated with the virtual machine
- A count of, and links to, the elements associated with the virtual machine
- Six instances of the Multi-series Performance Widget that display the following metrics trended over the last 12 hours:
    - Availability

- CPU (%)
- Memory (%)
- Memory Swapped Average
- Memory Consumed Average
- Memory Balloon Average
- Memory Active Average
- Network Transmitted Average
- Network Received Average
- Storage Committed
- Storage Uncommitted
- Disk Read Average
- Disk Write Average
- Disk Commands Aborted Summation
- Datastore Read Rate
- Datastore Write Rate
- Datastore Read Latency
- Datastore Write Latency

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