

vRealize Operations Management Pack for vSAN 1.0 Guide

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VMware, Inc.
3401 Hillview Ave.
Palo Alto, CA 94304
www.vmware.com

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About This Book

The *VMware vRealize[®] Operations Management Pack for vSAN[™]* provides you with information on the installation, configuration, and use of the vSAN solution.

Intended Audience

The information in this guide is intended for storage administrators, data center architects, and IT operators.

VMware Technical Publications Glossary

VMware Technical Publications provides a glossary of terms that might be unfamiliar to you. For definitions of terms as they are used in VMware technical documentation, go to <http://www.vmware.com/support/pubs>.

Introduction to the vRealize Operations Management Pack for vSAN

1

With the vRealize Operations Management Pack for vSAN installed in vRealize Operations Manager, you can make vSAN operational in a production environment. You use dashboards provided with the solution to evaluate, manage, and optimize the performance of vSAN objects and vSAN-enabled objects in your vCenter Server system.

The vRealize Operations Management Pack for vSAN has the following features:

- Discovers vSAN disk groups in a vSAN datastore.
- Identifies the vSAN-enabled cluster compute resource, host system, and datastore objects in a vCenter Server system.
- Automatically adds related vCenter Server components that are in the monitoring state.

Installing and Configuring the Management Pack

2

When you install a management pack, you install the PAK file that you downloaded as part of the solution, and you configure the management pack instance.

This chapter includes the following topics:

- [“Install the Management Pack,”](#) on page 9
- [“Configure a vSAN Adapter Instance,”](#) on page 10
- [“Verify that the Adapter Instance is Connected and Collecting Data,”](#) on page 11
- [“Properties and Log Files,”](#) on page 12

Install the Management Pack

The vRealize Operations Management Pack for vSAN provides dashboards for vSAN objects.

Prerequisites

Read-only credentials are not adequate to connect and collect data from the vCenter Server. You must provide credentials with sufficient privileges. Verify that you have full credentials for:

- System.View
- System.Anonymous
- System.Read
- Host.Config.Storage
- StorageProfile.View
- StorageViews.View

Procedure

- 1 Log in to the vRealize Operations Manager user interface with administrator privileges.
- 2 In the left pane of vRealize Operations Manager, click the **Administration** icon and click **Solutions**.
- 3 On the **Solutions** tab, click the plus sign.
- 4 Browse to locate the temporary folder and select the PAK file for the vRealize Operations Management Pack for vSAN.

For example, `managementpack_name-buildnumber.pak`.

- 5 Click **Upload**.

The upload might take several minutes.

- 6 Read and accept the EULA, and click **Next**.
Installation details appear in the window during the process.
- 7 Ensure that you install the PAK file on the master node.
- 8 When the installation is complete, click **Finish**.

Configure a vSAN Adapter Instance

When configuring an adapter instance for the vRealize Operations Management Pack for vSAN, you add credentials for a vCenter Server.

Prerequisites

Only vCenter Server systems that are configured for both the vCenter adapter and the vSAN adapter appear in the inventory tree under the vSAN and Storage Devices. Verify that the vCenter Server that you will use to configure the vSAN adapter instance is also configured as a vCenter adapter instance for the VMware vSphere® solution. If not, add a vCenter adapter instance for that vCenter Server.

Procedure

- 1 In the vCenter Server text box, enter the FQDN or IP address of the vCenter Server instance to which you are connecting.

The vCenter Server FQDN or IP address must be reachable from all nodes in the vRealize Operations Manager cluster.

- 2 To add credentials on the Manage Solution page, click the plus sign.
 - a In the Credential name text box, enter the name by which you are identifying the configured credentials.
 - b Type the User name and Password for the vCenter Server instance.
 - c Click **OK**.

You configured credentials to connect to a vCenter Server instance.

- 3 Click **Advanced Settings**.
- 4 For Collection Interval, select a value of five minutes or greater.

The vSAN adapter collects Health Check Service and Performance Service metrics from vSphere objects. The Health Check Service interval is configured in the vSphere interface and is 60 minutes by default. If the Health Check Service interval is 60 minutes and the vSAN adapter collection interval is 5 minutes, the vSAN adapter reports:

- Same Health Check Service metrics 12 times.
- Most recent Performance Service metrics for each cycle.

- 5 Click **Test Connection** to validate the connection with your vCenter Server instance.
- 6 Accept the vCenter Server security certificate.
- 7 Click **Save Settings**.

The adapter is added to the Adapter Instance list and is active.

What to do next

To verify that the adapter is configured and collecting data from vSAN objects, wait a few collection cycles, then view application-related data.

- Inventory Explorer. Verify that all the objects related to the vSAN instance are listed. Objects should be in the collecting state and receiving data.

- Dashboards. Verify that vSAN Environment Overview, Optimize vSAN Deployments, and vSAN Performance are added to the default dashboards.
- The vSAN Performance dashboard uses the vSphere Virtual Machine metrics which are disabled in the vRealize Operations Manager Default Policy. For the dashboard to be fully functional, edit the attributes in the Default Policy to enable the Virtual Machine metrics for:
 - Virtual Disk|Average Read request size (bytes)
 - Virtual Disk|Average Write request size (bytes)

For information on how to edit attributes in a policy, see the Policy Workspace Collect Metrics and Properties help page in the [vRealize Operations Manager information center](#).
- Under **Environment > vSAN and Storage Devices**, verify that the vSAN hierarchy includes the following related vCenter Server system objects:
 - vSAN-enabled vCenter Server clusters
 - vSAN Fault Domains (optional)
 - vSAN-enabled Hosts
 - vSAN-enabled Datastores
 - vSAN Disk Groups
 - vSAN Datastore related VMs
 - vSAN Witness Hosts (optional)

Verify that the Adapter Instance is Connected and Collecting Data

You configured an adapter instance of the vRealize Operations Management Pack for vSAN with credentials for a vCenter Server. Now you want to verify that your adapter instance can retrieve information from vSAN objects in your environment.

To view the object types, from the left pane of the vRealize Operations Manager user interface, click **Administration > Inventory Explorer > Adapter Instances > vSAN Adapter Instance > <User_Created_Instance>**.

Table 2-1. Object Types that the vRealize Operations Management Pack for vSAN Discovers

Object Type	Description
vSAN Adapter Instance	The vRealize Operations Management Pack for vSAN instance.
vSAN Cluster	vSAN clusters in your data center.
vSAN Datastore	vSAN datastores in your data center.
vSAN Disk Group	A collection of SSDs and magnetic disks used by vSAN.
vSAN Fault Domain	A tag for a fault domain in your data center.
vSAN Host	vSAN hosts in your data center
vSAN Witness Host	A tag for a witness host of a stretched cluster, if the stretched cluster feature is enabled on the vSAN cluster.

The vSAN adapter also monitors the following objects discovered by the VMware vSphere adapter.

- Cluster Compute Resources
- Host System
- Datastore

Procedure

- 1 In the left pane of vRealize Operations Manager, click the **Administration** tab and click **Inventory Explorer**.
- 2 In the list of tags, expand **Adapter Instances** and expand **vSAN Adapter Instance**.
- 3 Select the adapter instance name to display the list of objects discovered by your adapter instance.
- 4 Slide the display bar to the right to view the object status.

Object Status	Description
Collection State	If green, the object is connected.
Collection Status	If green, the adapter is retrieving data from the object.

- 5 Deselect the adapter instance name and expand the **Object Types** tag.

Each Object Type name appears with the number of objects of that type in your environment.

What to do next

If objects are missing or not transmitting data, check to confirm that the object is connected. Then check for related alerts.

To ensure that the vSAN adapter can collect all performance data, the Virtual SAN performance service must be enabled in vSphere. For instructions on how to enable the service, see [Turn on Virtual SAN Performance Service in the VMware Virtual SAN documentation](#).

If the Virtual SAN performance service is disabled or experiencing issues, an alert is triggered for the vSAN adapter instance and the following errors appear in the adapter logs.

```
ERROR com.vmware.adapter3.vsan.metricloader.VsanDiskgroupMetricLoader.collectMetrics
  - Failed to collect performance metrics for Disk Group
com.vmware.adapter3.vsan.metricloader.VsanDiskgroupMetricLoader.collectMetrics
  - vSAN Performance Service might be turned OFF.
com.vmware.adapter3.vsan.metricloader.VsanDiskgroupMetricLoader.collectMetrics
  - (vim.fault.NotFound)
  {
    faultCause = null,
    faultMessage = (vmodl.LocalizableMessage)
      [
        com.vmware.vim.binding.impl.vmodl.LocalizableMessageImpl@98e1294
      ]
  }
```

Properties and Log Files

The vRealize Operations Management Pack for vSAN installation includes files that are useful for adapter performance tuning and troubleshooting.

Properties File

The `config.properties` file in the `conf` folder of the vSAN adapter contains general settings that apply to all adapter instances. You can modify these settings to adjust the adapter performance for your environment.

After updating the properties, stop and restart all vSAN adapter instances for the changes to take effect.

The file includes the following property settings.

Property	Description	Default Value
VIMCLIENT_READ_TIMEOUT	VIM Client read timeout in milliseconds	300000
VCENTER_RESOURCE_DISCOVERY_FREQUENCY	vCenter resources cache update frequency	5
RESOURCE_DISCOVERY_FREQUENCY	Frequency the resource collection should take place	5
DISCOVERY_POOL_SIZE	Pool size for discovery	3
COLLECTION_POOL_SIZE	Pool size for collection	5

Log Files

Log messages provide information related to the operation of the adapter. Instance-specific log files for the vSAN adapter are located in the `/usr/lib/vmware-vcops/user/log/adapters/VsanStorageAdapter/` folder. Administrator privileges are assigned to service users.

vRealize Operations Management Pack for vSAN Dashboards

3

vRealize Operations Management Pack for vSAN provides specific dashboards that you can use to monitor vSAN adapter instances.

Table 3-1. Management Pack for vSAN Dashboards

Dashboard	Purpose
vSAN Environment Overview	View end-to-end storage topology, health, and alerts.
Optimize vSAN Deployments	Provides high-level comparison of vSAN and non-vSAN environments.
vSAN Performance	Provides insights into virtual machine, disk group and ESXi host level performance of vSAN clusters and datastores

This chapter includes the following topics:

- [“vSAN Environment Overview,”](#) on page 15
- [“Optimize vSAN Deployments,”](#) on page 15
- [“vSAN Performance,”](#) on page 16
- [“Trend Views for vSAN Dashboards,”](#) on page 16

vSAN Environment Overview

This dashboard enables you to view end-to-end topology, health, and alerts for the following components:

- Cluster Compute Resource
- Host System
- vSAN Disk Group
- Virtual Machine
- Datastore

Optimize vSAN Deployments

This dashboard provides a high-level comparison of vSAN and non-vSAN environments.

- Non-vSAN Datastores
- Non-vSAN Virtual Machines
- Non-vSAN Virtual Machines IOPS and Latency Trend
- Top vSAN Datastores with Available Capacity

- Disk Group Latency
- vSAN Virtual Machines IOPS and Latency
- vSAN Virtual Machine IOPS and Latency Trend

vSAN Performance

This dashboard provides insights into virtual machine, disk group, and ESXi host level performance of vSAN clusters and datastores.

- vSAN clusters
- How are the VMs doing?
- Virtual Machine Latency and IOPS
- Does the Write Buffer have enough capacity?
- Disk Group Write Buffer Performance
- How is the Read Cache performing?
- Disk group Read Cache Performance
- Is utilization running high?
- ESXi Host CPU Utilization (%)
- ESXi Host RAM Consumed (%)

Trend Views for vSAN Dashboards

The vRealize Operations Management Pack for vSAN dashboards include the following views:

- vSAN Trend of Active Average and Max IOPS for Disk Groups
- vSAN Trend of Disk Group Read Cache Performance
- vSAN Trend of Active Average and Max IOPS
- vSAN Trend of Disk Group Write Buffer Performance
- vSAN Trend of Virtual Machine Disk IOPS and Latency
- vSAN Trend of Virtual Machine Disk IOPS and Latency
- vSAN Trend of ESXi Host CPU Utilization (%)
- vSAN Trend of ESXi Host RAM Consumed (%)

vRealize Operations Management Pack for vSAN Alert Definitions

4

When the vRealize Operations Management Pack for vSAN is installed, it adds alert definitions that you use to monitor and troubleshoot the components in your storage area network.

This chapter includes the following topics:

- [“Alerts in vRealize Operations Manager,”](#) on page 17
- [“Alerts in the vSphere Web Client,”](#) on page 18

Alerts in vRealize Operations Manager

vRealize Operations Manager generates an alert if a problem occurs with the components in the storage area network that the vSAN adapter is monitoring.

Table 4-1. vRealize Operations Management Pack for vSAN Alert Definitions

Alert	Alert Level	Affected Object Type	Description
Performance Service on vSAN cluster might be off or experience issues	Critical	vSAN Adapter Instance	Triggered when the vSphere Virtual SAN Performance Service is off or experiences issues for one of the vSAN-enabled cluster compute resources. Cleared by enabling Virtual SAN performance service in vSphere.
vSAN adapter instance failed to collect data from Virtual SAN Health Service. The health service might have issues.	Critical	vSAN Adapter Instance	Triggered when the vSAN adapter instance is unable to collect data from the vSphere Virtual SAN Health Service for one of the vSAN-enabled cluster compute resources. Check Virtual SAN health service settings in vSphere.
vSAN Cluster disk space usage is approaching capacity	Warning	Cluster Compute Resource	Triggered when the disk usage in a vSAN cluster reaches 80% of capacity. Cleared by removing virtual machines that are no longer in use or adding more disks to the cluster.
vSAN Cluster disk space capacity is less than 5%	Critical	Cluster Compute Resource	Triggered when the disk usage in a vSAN cluster reaches 95% of capacity. Cleared by removing virtual machines that are no longer in use or adding more disks to the cluster.

Table 4-1. vRealize Operations Management Pack for vSAN Alert Definitions (Continued)

Alert	Alert Level	Affected Object Type	Description
vSAN Cluster flash read cache is approaching capacity	Warning	Cluster Compute Resource	Triggered when the Read Cache (RC) in the vSAN cluster reaches 80% of capacity. Cleared by adding flash storage to the read cache.
vSAN Cluster flash read cache capacity is less than 5%	Critical	Cluster Compute Resource	Triggered when the Read Cache (RC) in the vSAN cluster reaches 95% of capacity. Cleared by adding flash storage to the read cache.
vSAN Cluster virtual disk count is approaching capacity	Warning	Cluster Compute Resource	Triggered when the number of virtual disks per host in the vSAN cluster reaches 75% of capacity. Cleared by adding most hosts to the cluster.
vSAN Cluster virtual disk count capacity is less than 5%	Critical	Cluster Compute Resource	Triggered when the number of virtual disks per host in the vSAN cluster reaches 95% of capacity. Cleared by adding most hosts to the cluster.
vSAN Disk Group read cache hit rate is less than 90%	Warning	vSAN Disk Group	Triggered when the vSAN disk group read cache hit rate is less than 90%. Cleared by adding more cache to accommodate the workload.
vSAN Disk Group read cache hit rate is less than 90% and write buffer free space is less than 10%	Warning	vSAN Disk Group	Triggered when the vSAN disk group read cache hit rate is less than 90% and the vSAN disk group write buffer free space is less than 10%. Cleared by adding more flash capacity to the vSAN disk group.
vSAN Host has no VMkernel NIC configured	Immediate	Host System	Triggered when vSAN host has no VMkernel NIC configured. Clears when the symptom disappears.

Alerts in the vSphere Web Client

The vSphere Web Client displays the results of health tests for the following vSAN monitored groups:

- Network
- Physical disk
- Cluster
- Limits
- Data
- Hardware compatibility
- Performance Service
- Stretched Cluster (if enabled)

Each group contains several individual checks. If a check fails, the vSAN adapter issues a warning or error level alert. The alert indicates the host or cluster where the problem occurred and provides a recommendation to clear the alert. For a complete list of all vSAN health test alerts, see [Knowledge Base article 2114803](#).

vRealize Operations Management Pack for vSAN Metrics and Properties

5

The vRealize Operations Management Pack for vSAN collects metrics for vSAN objects. It also displays object properties in the vRealize Operations Manager user interface.

You can view these metrics and properties from the vRealize Operations Manager user interface. From the vRealize Operations Manager user interface, click **Environment > All Objects > vSAN Adapter**. Select one of the vSAN adapter objects listed and click the **All Metrics** tab.

This chapter includes the following topics:

- [“Disk I/O and Disk Space Metrics for vSAN Disk Groups,”](#) on page 21
- [“Read Cache Metrics for vSAN Disk Groups,”](#) on page 22
- [“Write Buffer Metrics for vSAN Disk Groups,”](#) on page 22
- [“Congestion Metrics for vSAN Disk Groups,”](#) on page 22
- [“Properties for vSAN Disk Groups,”](#) on page 23
- [“Metrics for vSAN-Enabled vSphere Objects,”](#) on page 23
- [“Properties for vSAN-Enabled vSphere Objects,”](#) on page 23

Disk I/O and Disk Space Metrics for vSAN Disk Groups

The vRealize Operations Management Pack for vSAN collects the metrics you use to monitor the performance of your vSAN disk groups.

Disk I/O metrics for the vSAN disk groups include:

- Disk I/O | Reads Per Second (IOPS)
- Disk I/O | Writes Per Second (IOPS)
- Disk I/O | Max Observed Reads Per Second (IOPS)
- Disk I/O | Max Observed Writes Per Second (IOPS)
- Disk I/O | Throughput Read (bps)
- Disk I/O | Throughput Write (bps)
- Disk I/O | Average Read Latency (ms)
- Disk I/O | Average Write Latency (ms)

Disk space metrics for vSAN disk groups include:

- Disk Space | Capacity (bytes)
- Disk Space | Used (bytes)

- Disk Space | Usage (%)

Read Cache Metrics for vSAN Disk Groups

The vRealize Operations Management Pack for vSAN collects metrics and performs capacity trend analysis on a hybrid vSAN read cache. Read Cache metrics are not collected for a vSAN all-flash configuration.

Read cache metrics for the vSAN disk group include:

- Read Cache | Hit Rate (%)
- Read Cache | Miss Rate Ratio
- Read Cache | Read Cache Reads Per Second (IOPS)
- Read Cache | Read Cache Read Latency (ms)
- Read Cache | Read Cache Read I/O Count
- Read Cache | Read Cache Writes Per Second (IOPS)
- Read Cache | Read Cache Write Latency (ms)
- Read Cache | Read Cache Write I/O Count

Write Buffer Metrics for vSAN Disk Groups

The vRealize Operations Management Pack for vSAN collects the metrics you use to monitor the write buffer capacity of your vSAN disk groups.

A reasonably balanced system consumes a significant amount of write buffer. Before placing additional workload on the vSAN, check the write buffer metrics for the vSAN disk group.

- Write Buffer | Capacity (bytes)
- Write Buffer | Free (%)
- Write Buffer | Usage (%)
- Write Buffer | Used (byte)
- Write Buffer | Write Buffer Reads Per Second (IOPS)
- Write Buffer | Write Buffer Read Latency (ms)
- Write Buffer | Write Buffer Read I/O Count
- Write Buffer | Write Buffer Writes Per Second (IOPS)
- Write Buffer | Write Buffer Write Latency (ms)
- Write Buffer | Write Buffer Write I/O Count

Congestion Metrics for vSAN Disk Groups

The vRealize Operations Management Pack for vSAN collects congestion metrics for the vSAN disk group.

- Congestion | Memory Congestion - Favorite
- Congestion | SSD Congestion - Favorite
- Congestion | IOPS Congestion - Favorite
- Congestion | Slab Congestion
- Congestion | Log Congestion
- Congestion | Comp Congestion

Properties for vSAN Disk Groups

The vRealize Operations Management Pack for vSAN displays the following property for vSAN disk groups:

- vSAN Disk Groups:Configuration | vSAN Configuration

Metrics for vSAN-Enabled vSphere Objects

The vRealize Operations Management Pack for vSAN collects the metrics you use to monitor your vSAN-enabled vSphere objects.

Metrics for cluster compute resource and host system objects include:

- vSAN | Component Limit | Component Limit Used (%)
- vSAN | Component Limit | Total Component Limit
- vSAN | Component Limit | Used Component Limit
- vSAN | Disk Space | Disk Space Used (%)
- vSAN | Disk Space | Total Disk Space (GB)
- vSAN | Disk Space | Used Disk Space (GB)
- vSAN | Read Cache | Read Cache Reserved (%)
- vSAN | Read Cache | Reserved Read Cache Size (GB)
- vSAN | Read Cache | Total Read Cache Size (GB)

Performance metrics for cluster compute resource and datastore objects include:

- vSAN | Performance | Reads Per Second (IOPS)
- vSAN | Performance | Read Throughput
- vSAN | Performance | Average Read Latency
- vSAN | Performance | Writes Per Second (IOPS)
- vSAN | Performance | Write Throughput
- vSAN | Performance | Average Write Latency
- vSAN | Performance | Congestion
- vSAN | Performance | Outstanding I/O

Properties for vSAN-Enabled vSphere Objects

The vRealize Operations Management Pack for vSAN displays properties for your vSAN-enabled vSphere objects.

The vSAN adapter displays the following properties for the cluster compute resource objects discovered by the vCenter adapter:

- Cluster Configuration | vSAN Enabled
- Cluster Configuration | vSAN | Deduplication and Compression Enabled
- Cluster Configuration | vSAN | Preferred fault domain
- Cluster Configuration | vSAN | Stretched Cluster
- Cluster Configuration | vSAN | vSAN Configuration

The vSAN adapter displays the following property for the host system objects discovered by the vCenter adapter:

- Configuration | vSAN Enabled

The vSAN adapter displays the following property for the datastore objects discovered by the vCenter adapter:

- Configuration | vSAN Enabled

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