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SolarWinds

Virtualization Manager

Version 7.1

Deployment Guide

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SolarWinds Virtualization Manager Deployment Guide, Version 7.1

SolarWinds Virtualization Manager, Version 7.1

SolarWinds Virtual Infrastructure Monitor, Version 7.1

Revised: 3/13/2017

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Introduction to scaling your Virtualization Manager deployment

This deployment guide suggests system requirements for deploying the Virtualization Manager appliance.

The guide is organized into small, medium, and large deployment recommendations to help you determine which size best fits your environment. Not all possible scenarios are included in this document, so consider the recommendations in this document as guidelines.

Continue with the section corresponding to the size of your environment:

- Up to 3000 virtual machines
- Up to 6000 virtual machines
- Up to 10 000 virtual machines
- More than 10 000 virtual machines: contact SolarWinds Sales Engineering for assistance.

The recommendations are based on the premise that you will be integrating the Virtualization Manager appliance with your Orion installation. For information about integrating the Virtualization Manager appliance with an Orion installation, see the Virtualization Manager Administrator Guide.

Small deployments - up to 3000 virtual machines

Small Virtualization Manager deployments generally have up to 3000 virtual machines.

Recommended hardware and software for the Virtualization Manager appliance

HARDWARE AND SOFTWARE	RECOMMENDATION
vCPU	4
Memory	8 GB
System storage	10 GB
Data storage	200 GB
Federated collector	In general, it is not necessary to deploy a federated collector in small deployments. Deploying a federated collector is recommended if the network connection between the VMAN appliance and the data sources is slow.

Recommended hardware and software for the Orion Server

The recommended storage space is the extra space needed for integrating the Orion Server with the Virtualization Manager appliance. For detailed information about the hardware, software, and database requirements of Orion Server, see Plan your production deployment.

HARDWARE AND SOFTWARE	RECOMMENDATION
CPU	3.0 GHz CPU. For production environments, a quad-core processor is recommended.
Memory	8 GB
Storage	20 GB
Additional Polling Engine (APE)	If you poll a large number of elements by other Orion modules, it is recommended that you deploy an APE to spread the polling load.

For information about planning your deployment with federated collectors and APEs, see Use federated collectors and APEs to scale your deployment.

Medium deployments - up to 6000 virtual machines

Medium Virtualization Manager deployments generally have up to 6000 virtual machines.

Recommended hardware and software for the Virtualization Manager appliance

HARDWARE AND SOFTWARE	RECOMMENDATION
vCPU	8
Memory	32 GB
System storage	10 GB
Data storage	500 GB (~500 IOPS or higher)
Federated collector	Deploying federated collectors is recommended, especially for data sources with more than 1000 VMs. Requirements for each federated collector: ■ 4 vCPU

HARDWARE AND SOFTWARE	RECOMMENDATION
	■ 6 GB memory ■ 30 GB system storage

If the CPU or memory load is too high, add more resources to the VMAN appliance.

If the database is too big, follow these procedures to reduce the database size:

- Configure shorter data retention periods
- Skip the collection of storage path-related samples

Recommended hardware and software for the Orion Server

The recommended storage space is the extra space needed for integrating the Orion Server with the Virtualization Manager appliance. For detailed information about the hardware, software, and database requirements of Orion Server, see Plan your production deployment.

HARDWARE AND SOFTWARE	RECOMMENDATION
CPU	3.0 GHz CPU. For production environments, a quad-core processor is recommended.
Memory	8 GB
Storage	20 GB
Additional Polling Engine (APE)	Deploy at least one APE to spread the collection load. As best practice, deploy one APE for each data source with more than 3000 VMs. Requirements for each APE: ■ 3.0 GHz CPU. For production environments, a quad-core processor is recommended. ■ 8 GB memory ■ 20 GB storage

For information about planning your deployment with federated collectors and APEs, see Use federated collectors and APEs to scale your deployment.

Large deployments - up to 10 000 virtual machines

Large Virtualization Manager deployments generally have up to 10 000 virtual machines.

Recommended hardware and software for the Virtualization Manager appliance

HARDWARE AND SOFTWARE	RECOMMENDATION
vCPU	16
Memory	64 GB
System storage	10 GB
Data storage	1 TB (~1000 IOPS or higher)
Federated collector	Deploying federated collectors is recommended, especially for data sources with more than 1000 VMs. Requirements for each federated collector: ■ 4 vCPU ■ 6 GB memory ■ 30 GB system storage

If the CPU or memory load is too high, add more resources to the VMAN appliance.

If the database is too big, follow these procedures to reduce the database size:

- Configure shorter data retention periods
- Skip the collection of storage path-related samples

Recommended hardware and software for the Orion Server

The recommended storage space is the extra space needed for integrating the Orion Server with the Virtualization Manager appliance. For detailed information about the hardware, software, and database requirements of Orion Server, see Plan your production deployment.

HARDWARE AND SOFTWARE	RECOMMENDATION
CPU	3.0 GHz CPU. For production environments, a quad-core processor is recommended.
Memory	8 GB
Storage	20 GB

HARDWARE AND SOFTWARE	RECOMMENDATION
Additional Polling Engine (APE)	Deploy at least two APEs to spread the collection load. As best practice, deploy one APE for each data source with more than 3000 VMs. Requirements for each APE: ■ 3.0 GHz CPU. For production environments, a quad-core processor is recommended. ■ 8 GB memory ■ 20 GB storage

For information about planning your deployment with federated collectors and APEs, see Use federated collectors and APEs to scale your deployment.

Extra large deployments - over 10 000 virtual machines

If you are deploying Virtualization Manager in an environment that is bigger than the large deployment, contact SolarWinds Sales Engineering for assistance.

Extra large deployment example

As an example, consider an integrated environment that consists of the following entities:

- 20 000 VMs
- 800 hosts
- 150 clusters
- 2500 datastores

An environment such as this requires about 38 GB of storage space for one year.

Let's see how this requirement breaks down for individual VMs, hosts, clusters, and datastores. Assuming that you use the default data retention settings, the following storage space is required per entity.

With default retention settings, detailed statistics are retained for seven days, hourly statistics for 30 days, and daily statistics for 365 days.

ENTITY	STORAGE REQUIREMENT
VM	1550 KB
Host	650 KB
Cluster	650 KB
Datastore	850 KB

In our example, this means that approximately 33 GB of storage space is required:

- 20 000 VMs require 30 GB.
- 800 hosts require 0.5 GB.
- 150 clusters require 0.1 GB.
- 2500 datastores require 2 GB

For monitoring hardware health, additional space is needed. The required storage space for hardware health monitoring depends on the following:

- The number of hosts being managed as nodes in Orion.
- The number of sensors monitored on each host.

In general, the storage space requirement for one host sensor is approximately 600 KB.

In our example, if you monitor 800 hosts, with 10 sensors on each host, the storage space requirement will be approximately 5 GB.

Licensing implications

Virtualization Manager is licensed according to the number of processor sockets on your physical hardware.

Physical hardware is ESX hosts for VMware or Windows Servers for Hyper-V.

Virtualization Manager is available in the following license sizes:

- SolarWinds Virtualization Manager VMS8 (up to 8 sockets)
- SolarWinds Virtualization Manager VMS16 (up to 16 sockets)
- SolarWinds Virtualization Manager VMS32 (up to 32 sockets)
- SolarWinds Virtualization Manager VMS64 (up to 64 sockets)
- SolarWinds Virtualization Manager VMS112 (up to 112 sockets)
- SolarWinds Virtualization Manager VMS192 (up to 192 sockets)
- SolarWinds Virtualization Manager VMS320 (up to 320 sockets)
- SolarWinds Virtualization Manager VMS480 (up to 480 sockets)
- SolarWinds Virtualization Manager VMS640 (up to 640 sockets)
- SolarWinds Virtualization Manager VMS800 (up to 800 sockets)
- SolarWinds Virtualization Manager VMS1120 (up to 1120 sockets)
- SolarWinds Virtualization Manager VMS1440 (up to 1440 sockets)
- SolarWinds Virtualization Manager VMS1680 (up to 1680 sockets)
- SolarWinds Virtualization Manager VMS1920 (up to 1920 sockets)
- SolarWinds Virtualization Manager VMS2400 (up to 2400 sockets)
- SolarWinds Virtualization Manager VMS3040 (up to 3040 sockets)
- SolarWinds Virtualization Manager VMS3840 (up to 3840 sockets)
- SolarWinds Virtualization Manager VMS4800 (up to 4800 sockets)

Basic deployment principles

When planning a VMAN deployment, consider the following:

- In medium and large deployments, SolarWinds recommends that you deploy federated collectors or Additional Polling Engines (APE) for each 2000-3000 virtual machines, and split the collection load in a way that each collector or APE collects similar amounts of data.
- In medium and large deployments, delegate all collection jobs to federated collectors and APEs from the Virtualization Manager master appliance and the Orion Server.
- If you collect data from large vCenters containing more than 4000-5000 VMs, increase the memory assigned to the federated collector that collects from the vCenter.
- Any one of the deployment factors could cause the recommended size to grow from small to medium to large. For example, the number of VMs per vCenter significantly affects the amount of resources you need.

Scale Virtualization Manager deployments

As environments grow, you can scale your Virtualization Manager deployment without extensive migration.

You can expand disk space, assign additional shared or dedicated CPU and RAM resources, and the virtual appliance dynamically takes advantage of these new resources.

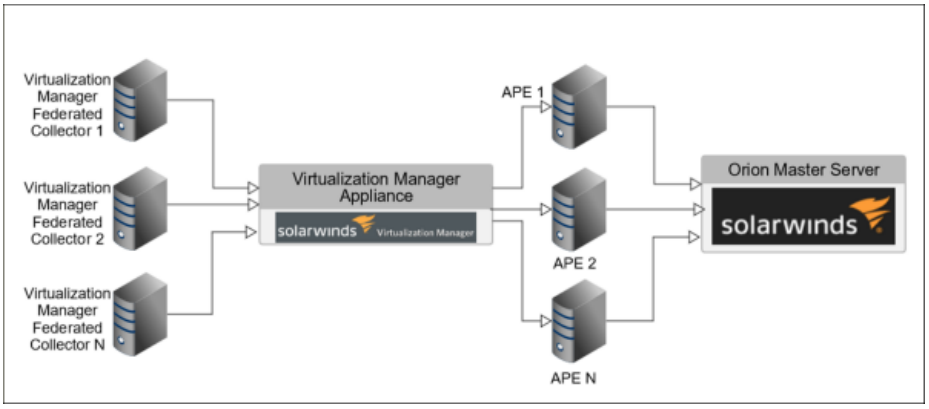
If you are deploying Virtualization Manager in an environment that is bigger than the large deployment, contact SolarWinds Sales Engineering for assistance.

Use federated collectors and APEs to scale your deployment

By using federated collectors and Additional Polling Engines (APEs), you can scale your Orion installation to process data coming from the Virtualization Manager appliance.

You can assign data sources, for example, vCenters to APEs to spread the load and avoid overloading the Orion Main Poller.

Configure your deployment according to the following diagram. The arrows represent the data flow.



For more information about federated collectors, see Installing a federated collector.

For more information about APEs, see Use Additional Polling Engine to balance polling.

Assign an APE to a vCenter server:

1. In the Orion Web Console, click Settings > Manage Nodes.
2. Select the vCenter server from the list, and click More Actions > Change Polling Engine.

Deployment best practices

Best practices for deploying the Virtualization Manager appliance include:

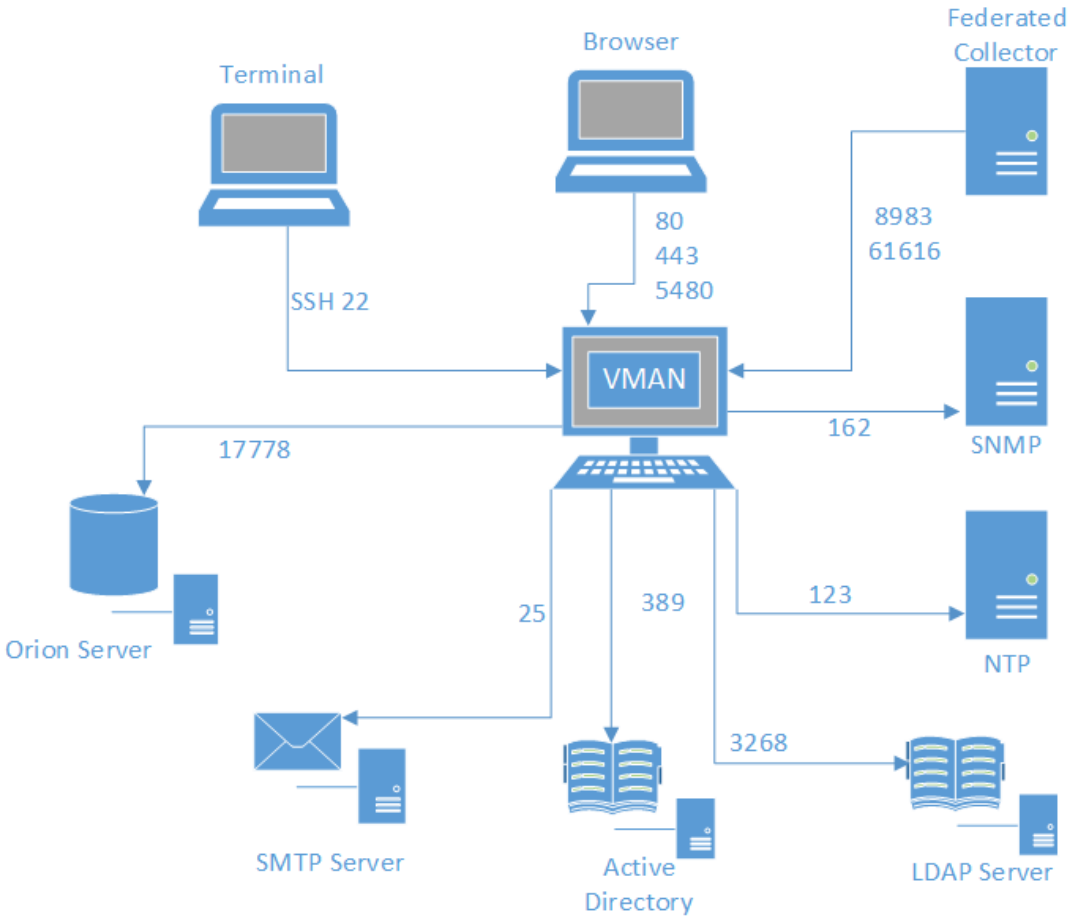
- Apply the correct port requirements based on the features and components you use.
- Fine-tune your installation to ensure peak performance.

Port requirements

Features and components affecting the port requirements of the Virtualization Manager appliance include:

- VMware data collection
- Hyper-V data collection
- Active Directory and LDAP authentication
- Sending email notifications (in alerting and reporting)
- Sending SNMP traps (in alerting)
- Orion integration
- Federated collectors

Port requirements of the master appliance



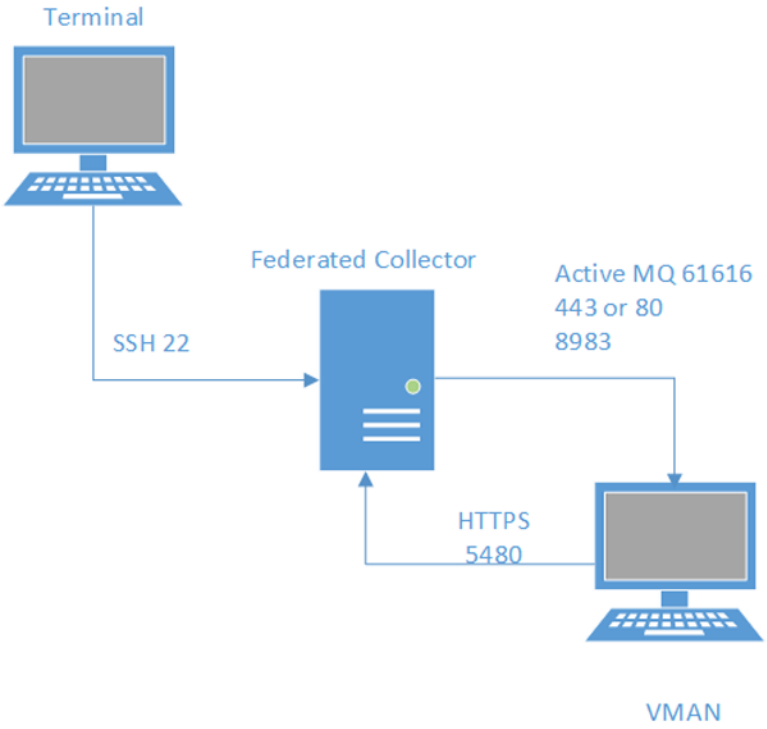
Required inbound ports on the master appliance

INBOUND PORT	USAGE
443 or 80	Performs auto-upgrade or version upgrade on federated collectors if federated collectors are configured
8983	Access from federated collectors to the master appliance during initial setup
443	HTTPS access to the Virtualization Manager user interface
5480	HTTPS access to the Management Console
61616	Active MQ master-collector communication
22	SSH access to the virtual appliance

Required outbound ports on the master appliance

OUTBOUND PORT	USAGE
162	Sends SNMP traps
25	Sends emails through SMTP
389	Active Directory authentication
3268	LDAP authentication
17778	Communicates with the SolarWinds Orion server if the integration with Orion is enabled If you use Virtualization Manager integrated with NPM or SAM in an environment with multiple polling engines and federated collectors, open TCP port 17778 from the primary collector to every polling engine that is used to poll virtualization data.
123	Uses the NTP service

Port requirements of the federated collector



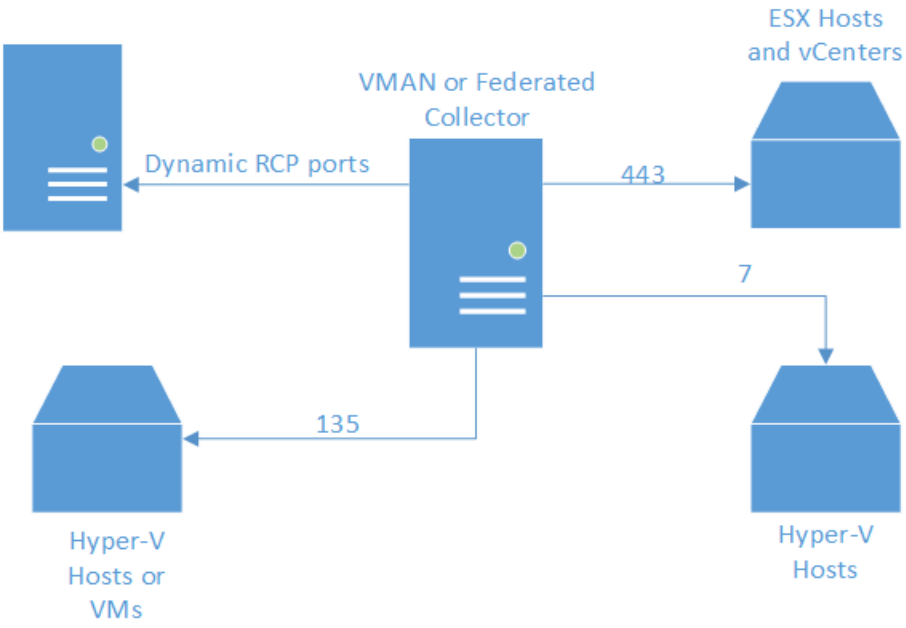
Inbound ports on the federated collector

PORT	USAGE
5480	HTTPS access to the federated collector.
22	SSH access to the federated collector.

Outbound ports on the federated collector

PORT	USAGE
61616	Active MQ master-collector communication.
443 or 80	Performing auto-upgrade or version upgrade.
8983	Access from federated collectors to the master appliance during initial setup.

Port requirements for data collection



Configure the following outbound ports on the master or the collector for data collection.

PORT	USAGE
443	Data collection from ESX hosts and vCenters.
7	Access to Hyper-V hosts that were added by using a fully qualified domain name.
135	WMI data collection from Hyper-V hosts or VMs.
Dynamic RCP ports	WMI communication. You can configure the available ports on the WMI target or policy.

Fine-tune the Virtualization Manager Appliance for optimal performance

The following section contains troubleshooting and configuration tips to help you achieve ideal performance on environments with more than 3000 virtual machines.

High CPU usage

To help lower CPU usage, turn on shallow indexing. Shallow index is an optional feature created to alleviate performance issues of customers with large environment. Shallow documents only contain references to data and this makes them much smaller than deep documents, while deep indexing creates a large load on the Virtualization Manager appliance.

1. Log in to the Management Console of the Virtualization Manager appliance (`https://IP_address:5480`) as user `admin` with the password `admin`.

2. Click SolarWinds Mgmt > Edit Configuration.
3. Add the following lines to the hyper9-config.xml file:
   - `<entry key="index.lucene.shallowIndex">true</entry>`
   - `<entry key="index.lucene.search.lazyFetching">true</entry>`
4. Save the configuration file, and confirm the restart of Tomcat.

If the CPU usage remains high, add more CPU to your installation. The Virtualization Manager appliance is delivered with four vCPUs by default. Increase the number of vCPUs until the CPU load decreases below 80%.

Slow database response and overall slow performance

In case of slow performance, add more RAM to the Virtualization Manager appliance. You can add up to 64 GB RAM to VMAN.

If you must add more, limit Java memory to 32 GB. Java uses half of the available memory by default, and the rest is used by the operating system and the database.

To limit Java memory and to turn on Garbage Collection logging:

1. Run the following command: sudo vim /etc/tomcat/tomcat.conf
2. Locate the following lines in the configuration file:

   ```
   # Uncomment the next line to turn on garbage collection logging
   # JAVA_OPTS="$JAVA_OPTS -XX:+PrintGC -XX:+PrintGCDetails -
   XX:+PrintGCDateStamps -Xloggc:/var/hyper9/logs/gc-${TIME}.log"
   ```
3. Uncomment the setting so that the lines read as follows:

   ```
   # Uncomment the next line to turn on garbage collection logging
   JAVA_OPTS="$JAVA_OPTS -XX:+PrintGC -XX:+PrintGCDetails -
   XX:+PrintGCDateStamps -Xloggc:/var/hyper9/logs/gc-${TIME}.log"
   ```
4. Locate the following line: `JAVA_OPTS="$JAVA_OPTS -Xmx${HEAP_MEGS}M"` and replace it with `JAVA_OPTS="$JAVA_OPTS -Xmx32000M -Xms32000M"`
5. Save the file.
6. Restart the Tomcat service by running the following command: `sudo service tomcat restart`

Integration issues between the Virtualization Manager appliance and the Orion Server

To solve integration issues, install Virtualization Manager 6.3.0-Hotfix2 or Virtualization Manager version 6.3.1.

The database is too large

To solve issues with database size, consider the following methods.

Skip the collection of basic configuration data during performance jobs

1. In the Virtualization Manager appliance, click Setup > Advanced Setup > System Properties.
2. Change the value of the `datacollection.sample.ignore.basic.config.data` property to `true`.

If this property is set to true, the changes in the virtualization environment will be skipped during performance data collection. If new VMs are added, or VMs are moved to a different host, the change will only be visible after a configuration collection job, which runs every 12 hours by default.

Skip the collection of storage path-related samples

1. In the Virtualization Manager appliance, click Setup > Advanced Setup > System Properties.
2. Change the value of the `collection.vmware.skip_storagepath_samples` property to `true`.

If this property is set to true, the collection of per-StoragePath samples will be skipped. These samples are not necessary for the functionality of Virtualization Manager, and only the per-StoragePath drill-down graphs will be missing.

Shorten the retention period of raw data

1. In the Virtualization Manager appliance, click Setup > Advanced Setup > System Properties.
2. Change the value of the `Days to Retain Performance Data Hourly Rollups` property to 30 (90 by default).
3. Change the value of the `Days to Retain Raw Performance Data` property to 5 (14 by default).

In this case, detailed graph data will not be available for the past days.

Delete old alerts and trends

1. In the Virtualization Manager appliance, click Setup > Advanced Setup > System Properties.
2. Change the value of the `months.to.keep.alerts` property to 6 (12 by default).
3. Change the value of the `months.to.keep.trends` property to 6 (12 by default).

Issues during data collection

If more then 2000 VMs are collected in total, consider deploying federated collectors. This will relieve the load on the main appliance. Install new collectors so that each collector collects about 2000-3000 VMs.

For installation instructions, see Installing a federated collector.

To configure new collectors:

1. Disable all collection jobs.
2. Restart the collector that is already deployed.
3. Deploy more collectors, and split the collection load in a way that each collector collects two vCenters (2000-3000 VMs per collector). Balance the load so that each collector collects the same amount of data. No special configuration for collectors is needed.
4. Configure all performance jobs to run every 30 minutes, instead of the default 10 minutes. Then increase the frequency after you established that Virtualization Manager can handle the load.
5. Enable all data sources for collection.

Data collection stops, data is not transmitted from federated collectors, and the message queue is full

1. Access the `broker.properties` file under /etc/hyper9/broker.properties.
2. Increase the default value of the `policy.dataAccessSampleDataQueue.memLimit` and `policy.dataAccessStorageQueue.memLimit` properties from the default 40 MB to 100 MB.

Also increase the size of the message queue from the default 40 MB:

1. Log in to the VMAN master appliance as an admin, using SSH (PuTTY).
2. Execute the following commands to increase the queue size from 40 MB to 140 MB. This procedure includes restarting Virtualization Manager:

   ```
   sudo sed -i "s/>41943040</>141943040</g" /etc/hyper9/broker.properties
   sudo service tomcat restart
   ```
3. Restart all collectors in the Virtualization Manager admin interface.