



# **Monitoring VMware virtual infrastructure**

## **Active IQ Unified Manager**

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# Monitoring VMware virtual infrastructure

Active IQ Unified Manager provides visibility into the virtual machines (VMs) deployed on a datastore, and enables monitoring and troubleshooting storage and performance issues in a virtual environment. You can use this feature to determine any latency issues in your storage environment or when there is a reported performance event on your vCenter.

A typical virtual infrastructure deployment on ONTAP has various components that are spread across compute, network, and storage layers. Any performance lag in a VM application might occur due to a combination of latencies faced by the various components at the respective layers. This feature is useful for storage and vCenter admins and IT generalists who need to analyze a performance issue in a virtual environment and understand in which component the issue has occurred.

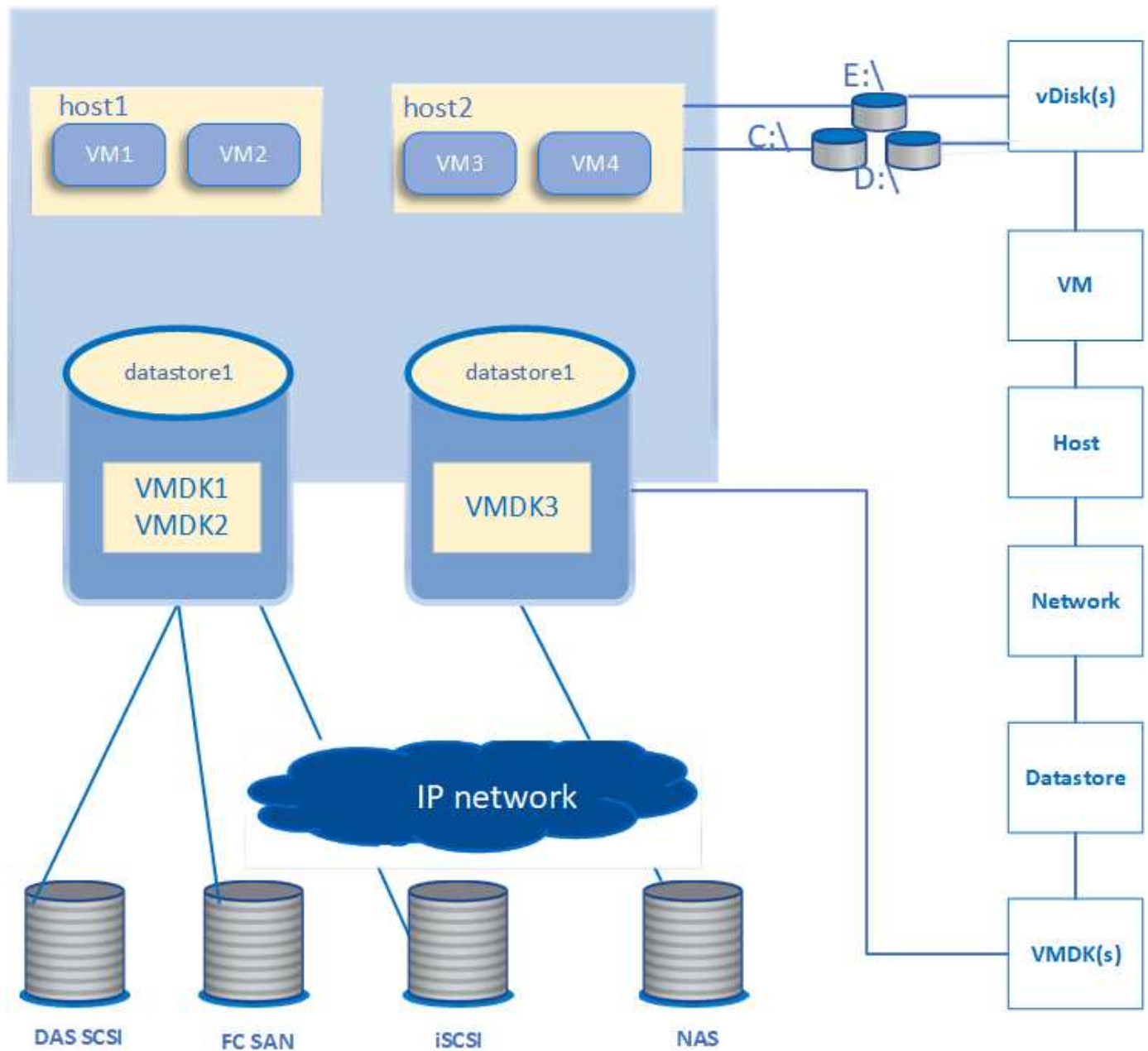
Unified Manager presents the underlying sub-system of a virtual environment in a topological view for determining whether a latency issue has occurred in the compute node, network, or storage. The view also highlights the specific object that causes the performance lag for taking remedial steps and addressing the underlying issue.

The virtual infrastructure deployed on ONTAP storage includes the following objects:

- **Datastore:** Datastores are virtual storage objects that are connected to the hosts of the VMs. Datastores are manageable storage entities of ONTAP, such as LUNs or volumes, used as a repository for VM files, such as log files, scripts, configuration files, and virtual disks. They are connected to the hosts in the environment via a SAN or IP network connection. Datastores outside of ONTAP that are mapped to the vCenter are not supported or displayed on Unified Manager.
- **Host:** A physical or virtual system that runs ESXi, the virtualization software from VMware, and hosts the VM.
- **vCenter:** A centralized control plane for managing the VMware VMs, ESXi hosts, and all related components in a virtual environment. For more information about vCenter, see VMware documentation.
- **Virtual disks:** The virtual disks on the host that have an extension as VMDK. Data from a virtual disk is stored on the corresponding VMDK.
- **VM:** A VMware virtual machine.
- **VMDK:** A virtual machine disk on the datastore that provides storage space for virtual disks. For each virtual disk, there is a corresponding VMDK.

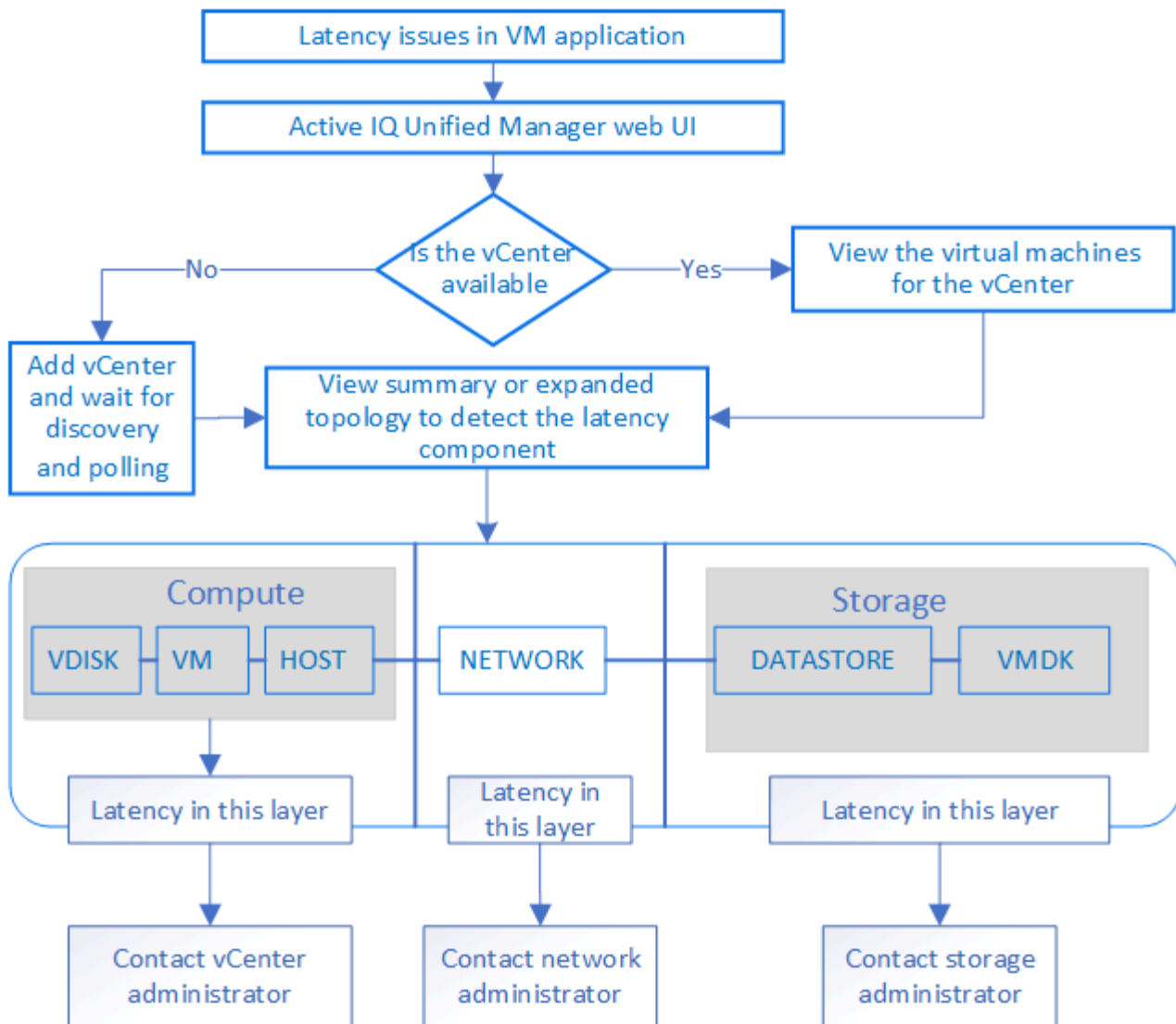
These objects are represented in a VM topology view.

## VMware virtualization on ONTAP



### User workflow

The following diagram displays a typical use case of using the VM topology view:



## What is not addressed

- Datastores that are outside of ONTAP and are mapped to the vCenter instances are not supported on Unified Manager. Any VMs with virtual disks on those datastores are also not supported.
- Only NAS and SAN volumes are supported as datastores, virtual volumes (vVols) are not supported.
- The views do not allow you to generate reports for analysing the performance of the various components

## Viewing and adding vCenter servers

For viewing and troubleshooting the performance of the virtual machines (VMs), the associated vCenters must be added on your Active IQ Unified Manager instance.

### Before you begin

Before adding or viewing the vCenters, ensure the following:

- You are aware of the vCenter names.
- The vCenters are reachable for a successful discovery.

- You know the IP address and have the credentials while adding the vCenter. The credentials must be of a vCenter administrator or a root user with read-only access to vCenter.
- The vCenter that you want to add runs vSphere 6.5 or later.
- The data collection setting in the vCenter server is set to level 3 for 5-minute interval
- The latency values in vCenter are configured in milliseconds, and not in microseconds, for successful calculations of the latency values.
- The time of the vCenter belongs to the time zone of the vCenter.

## About this task

For every vCenter added and discovered, Unified Manager collects the configuration data, such as the vCenter and ESXi server details, ONTAP mapping, datastore details, and number of VMs hosted. It further collects the performance metrics of the components.

## Steps

1. Go to **VMWARE > vCenter**, and check whether your vCenter is available on the list.



If your vCenter is not available, you must add the vCenter.

- a. Click **Add**.
- b. Add the correct IP address for the vCenter and ensure that the device is reachable.
- c. Add the user name and password of the administrator or root user with read-only access to vCenter.
- d. Add the custom port number if you are using any port other than the default 443.
- e. Click **Save**. Upon successful discovery, a server certificate is displayed for you to accept.

When you accept the certificate, the vCenter is added to the list of available vCenters. Adding the device does not result into data collection for the associated VMs, and the collection occurs at the scheduled intervals.

2. If your vCenter is available on the **vCenters** page, check its status. Hovering your mouse over the **Status** field displays whether your vCenter is performing as expected or whether there is a warning or error.



Adding the vCenter allows you to view the following statuses. However, the performance and latency data of the corresponding VMs might take up to an hour after adding the vCenter to be accurately reflected.

- Green: Normal, indicating that the vCenter has been discovered, and performance metrics have been successfully collected
- Yellow: Warning (for example, when the statistics level for the vCenter server has not been set to 3 or above to obtain statistics for each object)
- Orange: Error (indicates any internal errors, such as exception, failure in configuration data collection, or the vCenter being unreachable) You can click the column display icon (**Show/Hide**) to view the status message for a vCenter status and troubleshoot the issue.

3. In case the vCenter is unreachable or the credentials have changed, edit the vCenter details. Select the vCenter, and then click **Edit**.
4. Make the necessary changes on the **Edit VMware vCenter Server** page.

5. Click **Save**.

Upon successful discovery, the status of the vCenter changes.

## Monitoring virtual machines

For any latency issue on the virtual machine (VM) applications, you might need to monitor the VMs to analyze and troubleshoot the cause.

Active IQ Unified Manager enables you to view the detailed topology of a VM application that displays the components to which the VM is related, for example, the host of the VM or the datastore connected to it. The topology view displays the underlying components in their specific layers, in the following order: **Virtual Disk > VM > Host > Network > Datastore > VMDK**.



For viewing the metrics of the datastore (in the storage layer), the parent ONTAP cluster must be added to Unified Manager, and the discovery (polling or metrics collection) for the cluster must be complete.

You can determine the I/O path and component-level latencies from a topological aspect and identify whether storage is the cause of the performance issue. The summary view of the topology displays the I/O path, and highlights the component that has IOPS and latency issues for you to decide on the troubleshooting steps. You can also have an expanded view of the topology that depicts each component separately along with latency of that component. You can select a component to determine the I/O path highlighted through the layers.

### vCenter data collection schedule

For polling vCenter configuration data, Unified Manager follows the same schedule as for collecting cluster configuration data. For information about vCenter configuration and performance data collection schedule, see "Cluster configuration and performance data collection activity".

vCenter collects real-time 20-second performance data samples and rolls them up to 5-minute samples. The schedule for performance data collection of Unified Manager is based on the default settings of vCenter server. Unified Manager processes the 5-minute samples obtained from vCenter and calculates an hourly average of the IOPS and latency for the virtual disks, VMs, and hosts. For datastores, Unified Manager calculates an hourly average of the IOPS and latency from samples obtained from ONTAP. These values are available at the top of the hour. The performance metrics are not available immediately after a vCenter is added, and is available only when the next hour starts. Performance data polling begins on completing a cycle of configuration data collection.

### Viewing summary topology

To determine performance issues by viewing the VMs in a summary topology

1. Go to **VMWARE > Virtual Machines**.
2. Search for your VM by typing its name in the search box. You can also filter your search results based on specific criteria by clicking on the **Filter** button. However, If you cannot find your VM, ensure that the corresponding vCenter has been added and discovered.



vCenter servers allow special characters (such as %, &, \*, \$, #, @, !, \, /, :, \*, ?, ", <, >, |, ;, ') in the names of vSphere entities, such as VM, cluster, datastore, folder, or file. The VMware vCenter Server and ESX/ESXi Server do not escape special characters used in the display names. However, when the name is processed in Unified Manager, it is displayed differently. For example, a VM named as %\$VC\_AIQUM\_clone\_191124% in vCenter server is displayed as %25\$VC\_AIQUM\_clone\_191124%25 in Unified Manager. You must keep a note of this issue when you query a VM with a name having a special characters in it.

3. Check the status of the VM. The VM statuses are retrieved from vCenter. The following statuses are available. For more information about these statuses, see VMware documentation.
  - Normal
  - Warning
  - Alert
  - Not monitored
  - Unknown
4. Click the down arrow beside the VM to see the summary view of the topology of the components across the compute, network, and storage layers. The node that has latency issues is highlighted. The summary view displays the worst latency of the components. For example, if a VM has more than one virtual disk, this view displays the virtual disk that has the worst latency among all the virtual disks.
5. To analyze the latency and throughput of the datastore over a period of time, click the **Workload Analyzer** button on top of the datastore object icon. You go to the Workload Analysis page, where you can select a time range and view the performance charts of the datastore. For more information about workload analyzer, see *Troubleshooting workloads using the workload analyzer*.

[Troubleshooting workloads using the workload analyzer](#)

## Viewing expanded topology

You can drill down to each component separately by viewing the expanded topology of the VM.

1. From the summary topology view, click **Expand Topology**. You can see the detailed topology of each component separately with the latency numbers for each object. If there are multiple nodes in a category, for example multiple nodes in the datastore or VMDK, the node with worst latency is highlighted in red.
2. To check the IO path of a specific object, click on that object to see the IO path and the corresponding mapping. For example, to see the mapping of a virtual disk, click the virtual disk to view its highlighted mapping to the respective VMDK. In case of a performance lag of these components, you can collect more data from ONTAP and troubleshoot the issue.



Metrics are not reported for VMDKs. In the topology, only the VMDK names are displayed, and not metrics.



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