



# Monitoring

## NetApp Solutions

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# Monitoring

## Monitoring using Cloud Insights for VMs in Red Hat OpenShift Virtualization

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This section of the reference document provides details for integrating NetApp Cloud Insights with a Red Hat OpenShift Cluster to monitor OpenShift Virtualization VMs.

NetApp Cloud Insights is a cloud infrastructure monitoring tool that gives you visibility into your complete infrastructure. With Cloud Insights, you can monitor, troubleshoot, and optimize all your resources including your public clouds and your private data centers. For more information about NetApp Cloud Insights, refer to the [Cloud Insights documentation](#).

To start using Cloud Insights, you must sign up on the NetApp BlueXP portal. For details, refer to the [Cloud Insights Onboarding](#)

Cloud Insights has several features that enable you to quickly and easily find data, troubleshoot issues, and provide insights into your environment. You can find data easily with powerful queries, you can visualize data in dashboards, and send email alerts for data thresholds you set. Refer to the [video tutorials](#) to help you understand these features.

For Cloud Insights to start collecting data you need the following

### Data Collectors

There are 3 types of Data Collectors:

- \* Infrastructure (storage devices, network switches, compute infrastructure)
- \* Operating Systems (such as VMware or Windows)
- \* Services (such as Kafka)

Data Collectors discover information from the data sources, such as ONTAP storage device (infrastructure data collector). The information gathered is used for analysis, validation, monitoring, and troubleshooting.

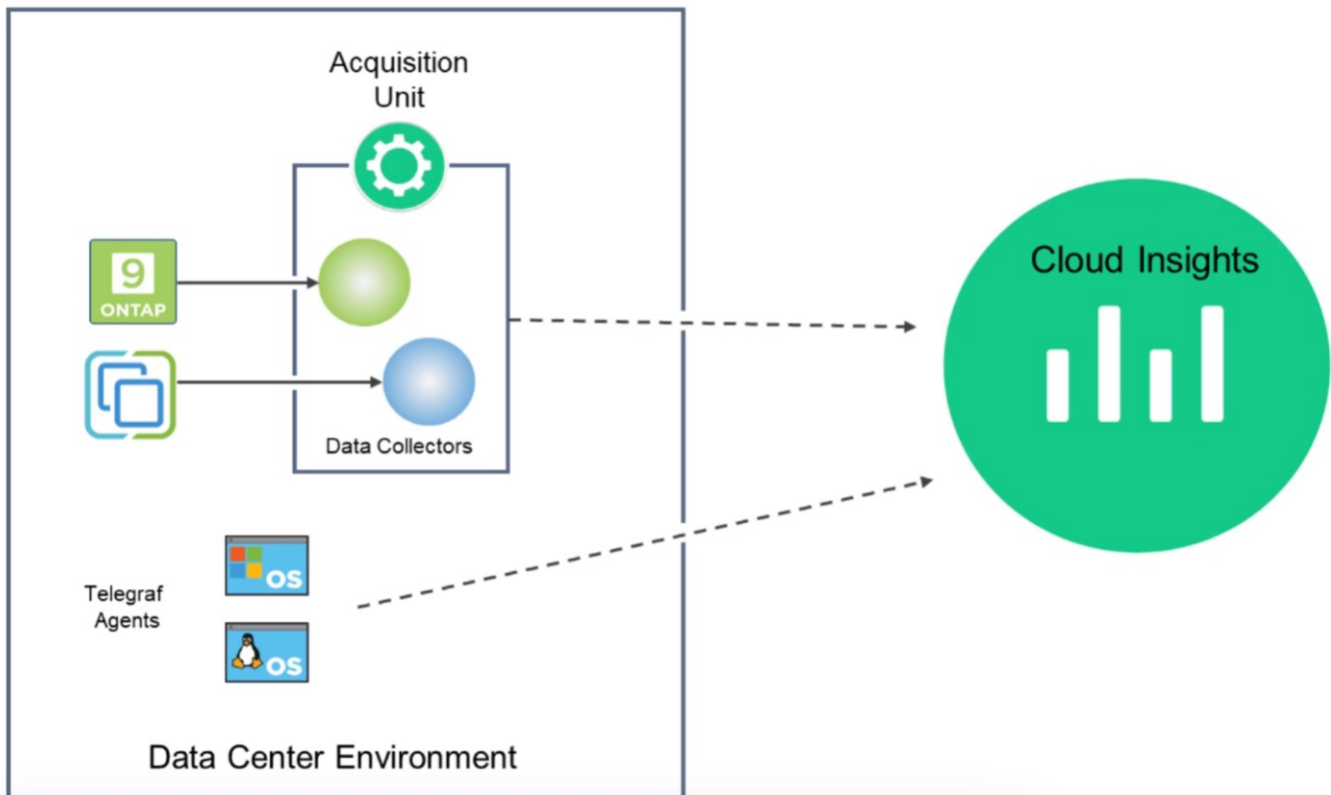
### Acquisition Unit

If you are using an infrastructure Data Collector, you also need an Acquisition Unit to inject data into Cloud Insights. An Acquisition Unit is a computer dedicated to hosting data collectors, typically a Virtual Machine. This computer is typically located in the same data center/VPC as the monitored items.

### Telegraf Agents

Cloud Insights also supports Telegraf as its agent for collection of integration data. Telegraf is a plugin-driven server agent that can be used to collect and report metrics, events, and logs.

Cloud Insights Architecture



## Integration with Cloud Insights for VMs in Red Hat OpenShift Virtualization

To start collecting data for VMs in OpenShift Virtualization you will need to install:

1. A Kubernetes monitoring operator and data collector to collect Kubernetes data  
For complete instructions, refer to the [documentation](#).
2. An acquisition unit to collect data from ONTAP storage that provides persistent storage for the VM disks  
For complete instructions, refer to the [documentation](#).
3. A data collector for ONTAP  
For complete instructions, refer to the [documentation](#)

Additionally, if you are using StorageGrid for VM backups, you need a data collector for the StorageGRID as well.

## Sample Monitoring capabilities for VMs in Red Hat OpenShift Virtualization

This section discusses monitoring using Cloud Insights for VMs in Red Hat OpenShift Virtualization.

### Monitoring based on events and creating Alerts

Here is a sample where the namespace that contains a VM in OpenShift Virtualization is monitored based on

events. In this example, a monitor is created based on `logs.kubernetes.event` for the specified namespace in the cluster.

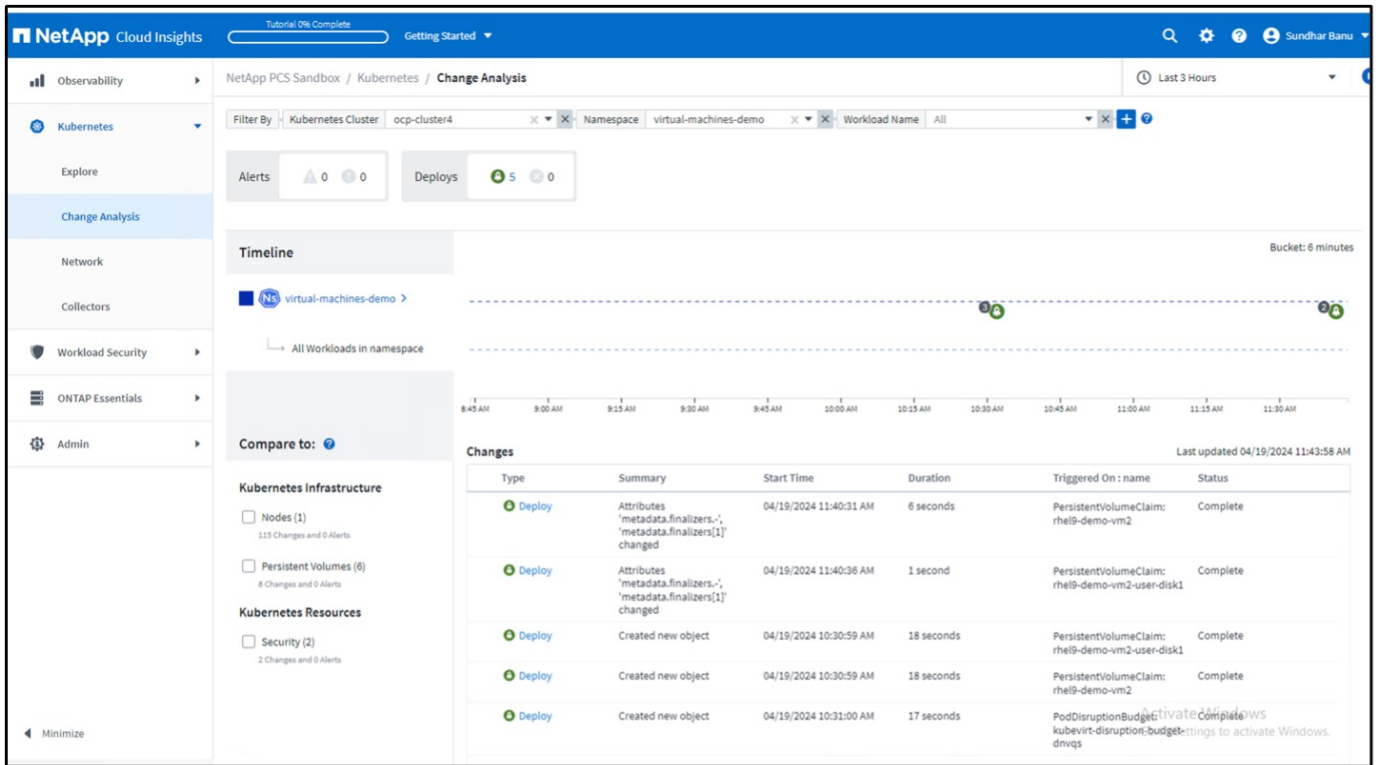
The screenshot shows the 'Edit log monitor' configuration page in the NetApp PCS Sandbox. The breadcrumb trail is 'NetApp PCS Sandbox / Observability / Alerts / Manage Monitors / Monitor virtual-machines-demo-ns'. The page title is 'Edit log monitor'. A yellow warning banner at the top states: 'Filter/Advanced Query and Group by in section 1 must not be empty. If alert resolution is based on log entry, section 3 filter/advanced query also must not be empty.' Below this, a step indicator shows '1 Select the log to monitor'. The configuration includes: 'Log Source' set to 'logs.kubernetes.event'; 'Filter By' with two filters: 'kubernetes\_cluster' set to 'ocp-cluster-4' and 'involvedobject.namespace' set to 'virtual-machines-demo'; and 'Group By' set to 'reason'. A table below shows '27 items found' with columns for 'timestamp', 'type', 'source', and 'message'. Two entries are visible, both dated '04/19/2024 10:31:18 AM' and of type 'logs.kubernetes.event'. The first entry's source is 'kubernetes\_cluster:ocp-cluster4;namespace:cloudinsights-monitoring;pod\_name:netapp-ci-event-exporter-7f7c8d84c4-sk7t9;' and its message is 'VirtualMachineInstance started.'. The second entry's source is 'kubernetes\_cluster:ocp-cluster4;namespace:cloudinsights-monitoring;pod\_name:netapp-ci-event-exporter-7f7c8d84c4-sk7t9;' and its message is 'VirtualMachineInstance defined.'. Below the table, a step indicator shows '2 Define alert behavior'. The configuration for this step is: 'Create an alert at severity' set to 'Warning', 'when the conditions above occur' set to '1', and 'time' set to '1'.

This query provides all the events for the virtual machine in the namespace. (There is only one virtual machine in the namespace). An advanced query can also be constructed to filter based on the event where the reason is “failed” or “FailedMount” These events are typically created when there is an issue in creating a PV or mounting the PV to a pod indicating issues in the dynamic provisioner for creating persistent volumes for the VM.

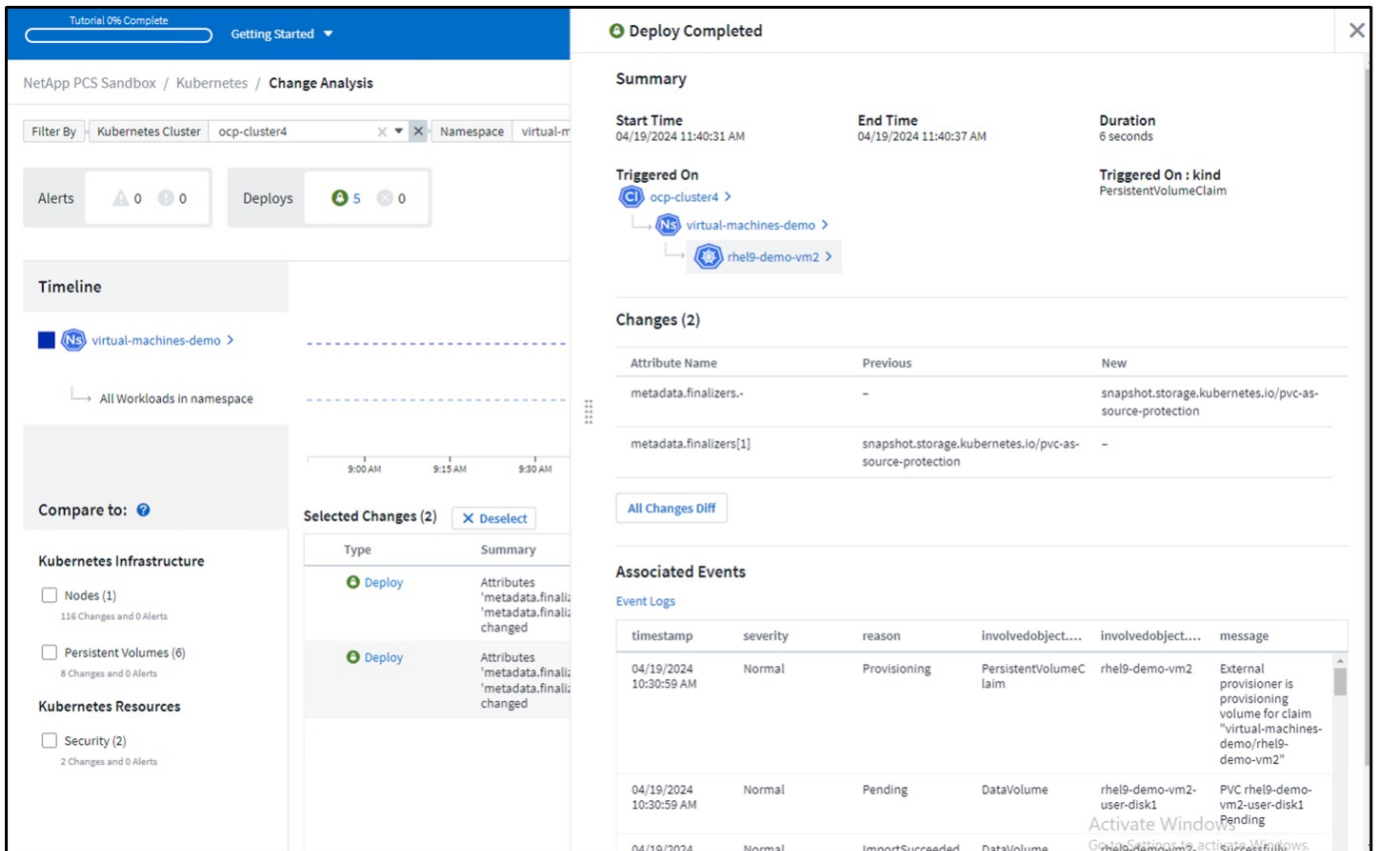
While creating the Alert Monitor as shown above, you can also configure notification to recipients. You can also provide corrective actions or additional information that can be useful to resolve the error. In the above example, additional information could be to look into the Trident backend configuration and storage class definitions for resolving the issue.

## Change Analytics

With Change Analytics, you can get a view of what changed in the state of your cluster including who made that change which can help in troubleshooting issues.



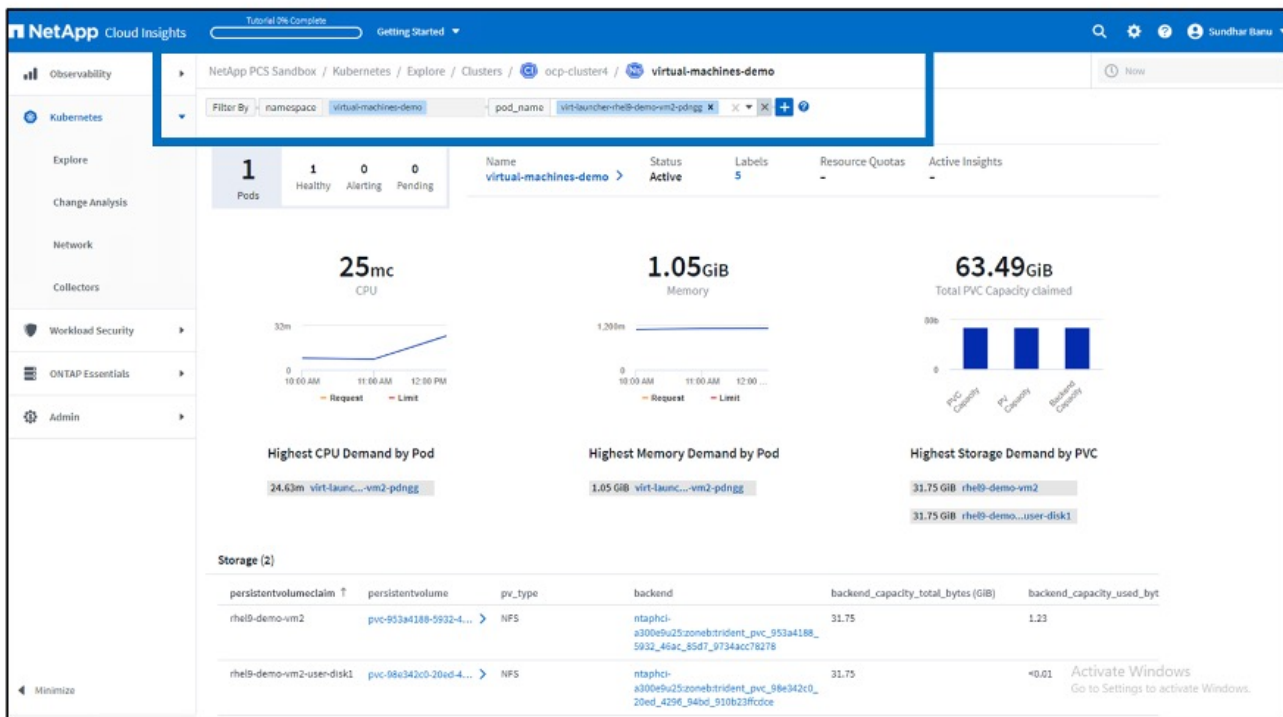
In the above example, Change Analysis is configured on the OpenShift cluster for the namespace that contains an OpenShift Virtualization VM. The dashboard shows changes against the timeline. You can drill down to see what changed and the click on All Changes Diff to see the diff of the manifests. From the manifest, you can see that a new backup of the persistent disks was created.



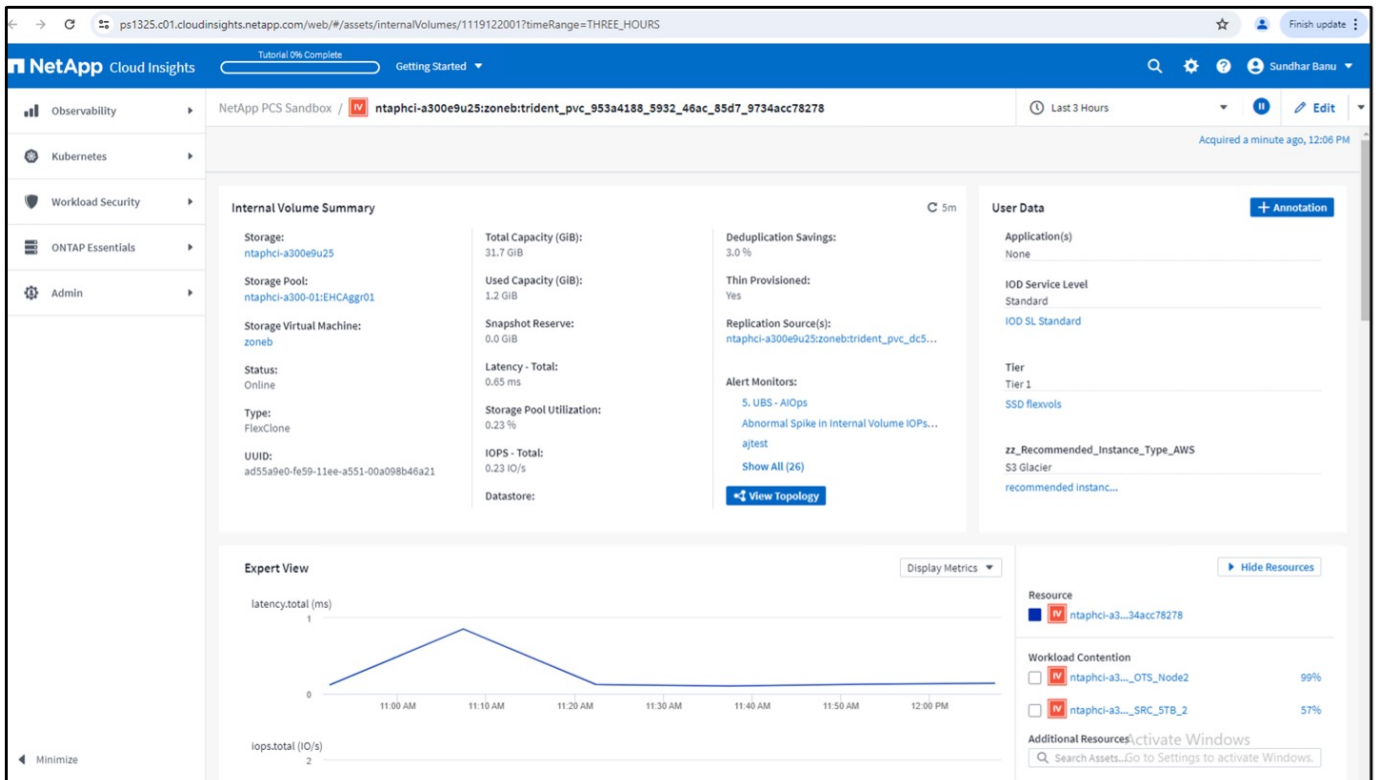
All Changes Diff			
Previous		New	
<b>Expand 45 lines ...</b>			
46	kind: DataVolume	46	kind: DataVolume
47	name: rhel9-demo-vm2	47	name: rhel9-demo-vm2
48	uid: dcf93b7a-71bc-409b-ad12-4916d05e0980	48	uid: dcf93b7a-71bc-409b-ad12-4916d05e0980
49	- resourceVersion: "8569671"	49	+ resourceVersion: "8619670"
50	uid: 953a4188-5932-46ac-85d7-9734acc78278	50	uid: 953a4188-5932-46ac-85d7-9734acc78278
51	spec:	51	spec:
52	accessModes:	52	accessModes:
<b>Expand 15 lines ...</b>			

## Backend Storage Mapping

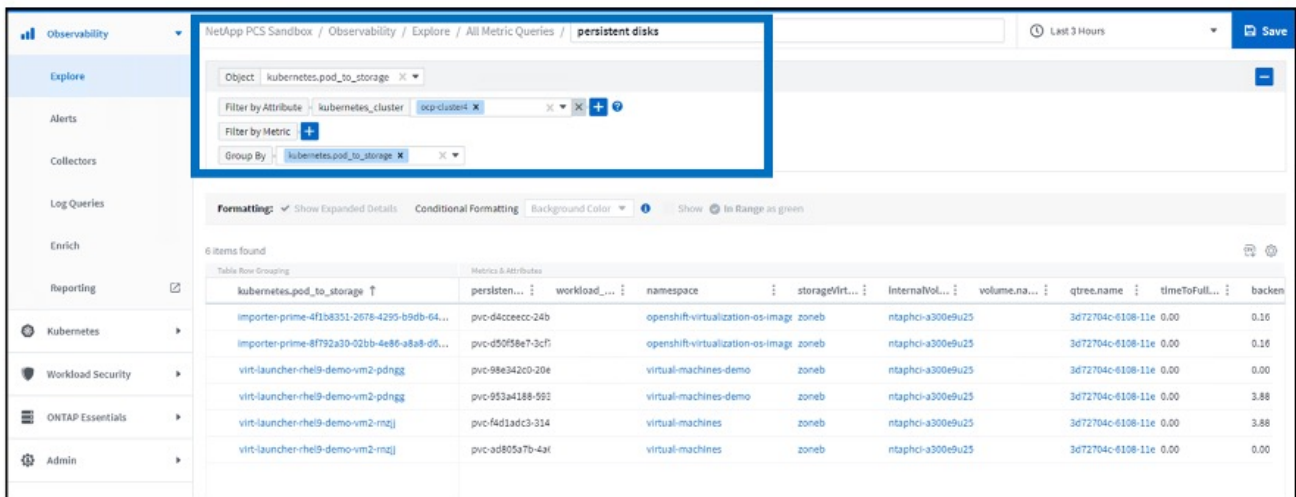
With Cloud Insights, you can easily see the backend storage of the VM disks and several statistics about the PVCs.



You can click on the links under the backend column, which will pull data directly from the backend ONTAP storage.



Another way to look at all the pod to storage mapping is creating an All Metrics query From Observability menu under Explore.



Clicking on any of the links will give you the corresponding details from ONTP storage. For example, clicking on an SVM name in the storageVirtualMachine column will pull details about the SVM from ONTAP. Clicking on an internal volume name will pull details about the volume in ONTAP.



storageVirtualMachin...	internalVolume.name	volume.na..
zation-os-image zoneb		ntaphci-a300e9u25:zoneb:trident_p
zation-os-image zoneb		ntaphci-a300e9u25:zoneb:trident_p
demo zoneb		ntaphci-a300e9u25:zoneb:trident_p
demo zoneb		ntaphci-a300e9u25:zoneb:trident_p
	zoneb	ntaphci-a300e9u25:zoneb:trident_p
	zoneb	ntaphci-a300e9u25:zoneb:trident_p

The screenshot displays the NetApp PCS Sandbox interface for a Storage Virtual Machine (SVM) in the 'zoneb' namespace. The main view is titled 'Storage Virtual Machine Summary' and includes the following details:

- Type:** Data
- State:** Running
- Storage:** ntaphci-a300e9u25
- Physic:** Default
- Allowed Protocols:** cifs, nfs, cifs, udpr, nfs, cifs
- Internal Volume Limit:** N/A
- Capacity (GB):** 1,874.4 GB
- Used Capacity (GB):** 107.6 GB
- Deduplication Savings:** 0.1%
- Compression Savings:** 0.1%
- IOPS - Total:** 26.21 IOPS
- Latency - Total:** 0.24 ms
- Comment:**
- UUID:** 33348361-c8b0-11e6-8300-000990549423
- Alert Monitors:**

The 'Expert View' section shows two line graphs over time (from 9:45 AM to 12:15 PM):

- latency\_total (ms):** A line graph showing latency fluctuating between approximately 0.15 ms and 0.30 ms.
- io\_persec (IOPS):** A line graph showing IOPS fluctuating between approximately 20 and 40.

Additional information includes:

- Resource:** zoneb
- Top Cert Buttons:** ntaphci-a3... (97%)
- Additional Resources:** Search resources...
- User Data:** Application(s): None, CTL\_storage Users: Standard, CTL\_rule: CTL\_rule, iSCSI Service Level: LSI3, iSCSI SL: LSI3, Tier: Tier 1, SSD: None.
- Alert Monitors:** 5, 1,885 - Alerts: Abnormal Spikes in Internal Volume IOPS... (Alert), Show All (24), New Dashboard.
- Expert View:** latency\_total (ms) graph showing values around 0.25 ms.
- Resource:** ntaphci-a3...\_R6420ccaf
- Top Correlated:** ntaphci-a3...\_R6420ccaf (100%), ntaphci-a3...\_R6420ccaf (100%), ntaphci-a300-02 (100%).

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