



# Collecting Data

## Cloud Insights

NetApp  
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# Collecting Data

## Getting started gathering data

After you have signed up for Cloud Insights and log in to your environment for the first time, you will be guided through the following steps in order to begin collecting and managing data.

Data collectors discover information from your data sources, such as storage devices, network switches, and virtual machines. The information gathered is used for analysis, validation, monitoring and troubleshooting.

Cloud Insights utilizes three types of data collectors:

- Operating Systems
- Services
- Infrastructure

Select your first data collector from the supported vendors and models available. You can easily add additional data collectors later.

## Install an Acquisition Unit

If you selected an *Infrastructure* data collector, an Acquisition Unit is required to inject data into Cloud Insights. You will need to download and install the Acquisition Unit software on a server or VM to collect data for Cloud Insights. A single Acquisition Unit can be used for multiple data collectors.



ONTAP Data  
Management  
Software

### Install Acquisition Unit

Cloud Insights collects device data via one or more Acquisition Units installed on local servers. Each Acquisition Unit can host multiple Data Collectors, which send device metrics to Cloud Insights for analysis.

#### What Operating System or Platform Are You Using?

 Linux ▼

[Linux Versions Supported](#) ⓘ [Production Best Practices](#) ⓘ

#### Installation Instructions

[Need Help?](#)

##### 1 [Copy Installer Snippet](#)


*This snippet has a unique key valid for 24 hours for this Acquisition Unit only.*

[+ Reveal Installer Snippet](#)

##### 2 Paste the snippet into a bash shell to run the installer.

##### 3 Waiting for Acquisition Unit to connect...

- Follow the [instructions](#) displayed to install your Acquisition Unit. Once the Acquisition Unit software is installed, the Continue button is displayed and you can proceed to the next step.

3 [Continue](#)  New acquisition unit detected!

You may set up additional acquisition units later if needed. For example, you may want different Acquisition Units collecting information from data centers in different regions.

## Configure the Data Collector - Infrastructure

For *Infrastructure* data collectors, you will be asked to fill out the data collector fields presented:

- Give the data collector a unique and meaningful name.
- Enter the user name and password to connect to the device, as appropriate.
- Fill in any other mandatory fields in *Configuration* and *Advanced Configuration* sections.
- Click **Test Connection** to test the connection to the device.
- Click **Add Collector** to save the data collector.

You will be able to configure additional data collectors later.

## Configure the Data Collector - Operating Systems and Services

### Operating System:

For *Operating System* data collectors, choose a platform (MacOS, Linux, Windows) to install a Cloud Insights Agent.

You must have at least one agent to collect data from Services.

The agent also collects data from the host itself, for use in Cloud Insights. This data is categorized as "Node" data in widgets, etc.

- Open a terminal or command window on the agent host or VM, and paste the displayed command to install the agent.
- When installation is complete, click **Complete Setup**.

### Services:

For *Service* data collectors, click on a tile to open the instructions page for that service.

- Choose a platform and an Agent Access Key.
- If you don't have an agent installed on that platform, follow the instructions to install the agent.
- Click **Continue** to open the data collector instruction page.
- Follow the instructions to configure the data collector.
- When configuration is complete, click **Complete Setup**.

## Add Dashboards

Depending on the type of initial data collector you selected to configure (storage, switch, etc.), one or more relevant dashboards will be imported. For example, if you configured a storage data collector, a set of storage-related dashboards will be imported, and one will be set as your Cloud Insights Home Page. You can change the home page from the **Dashboards > Show All Dashboards** list.

You can import additional dashboards later, or [create your own](#).

## That's all there is to it

After you complete the initial setup process, your environment will begin to collect data.

If your initial setup process is interrupted (for example, if you close the browser window), you will need to follow the steps manually:

- Choose a Data Collector
- Install an Agent or Acquisition Unit if prompted
- Configure the Data Collector

## Acquisition Unit Requirements

You must install an Acquisition Unit (AU) in order to acquire information from your infrastructure data collectors (storage, VM, port, EC2, etc.). Before you install the Acquisition Unit, you should ensure that your environment meets operating system, CPU, memory, and disk space requirements.

### Requirements

Component	Linux Requirement	Windows Requirement
Operating system	<p>A computer running a licensed version of one of the following:</p> <ul style="list-style-type: none"><li>* Centos (64-bit): 7.2 through 7.9, Stream 8, Stream 9</li><li>* Debian (64-bit): 9 and 10</li><li>* Oracle Enterprise Linux (64-bit): 7.5 through 7.9, 8.1 through 8.4</li><li>* Red Hat Enterprise Linux (64-bit): 7.2 through 7.9, 8.1 through 8.6</li><li>* Ubuntu Server: 18.04 and 20.04 LTS</li></ul> <p>This computer should be running no other application-level software. A dedicated server is recommended.</p>	<p>A computer running a licensed version of one of the following:</p> <ul style="list-style-type: none"><li>* Microsoft Windows 10 64-bit</li><li>* Microsoft Windows Server 2012</li><li>* Microsoft Windows Server 2012 R2</li><li>* Microsoft Windows Server 2016</li><li>* Microsoft Windows Server 2019</li><li>* Microsoft Windows Server 2022</li><li>* Microsoft Windows 11</li></ul> <p>This computer should be running no other application-level software. A dedicated server is recommended.</p>
CPU	2 CPU cores	Same
Memory	8 GB RAM	Same
Available disk space	<p>50 GB</p> <p>For Linux, disk space should be allocated in this manner:</p> <ul style="list-style-type: none"><li>/opt/netapp 10 GB</li><li>/var/log/netapp 40 GB</li><li>/tmp at least 1 GB available during installation</li></ul>	50 GB

Network	<p>100 Mbps/1 Gbps Ethernet connection, static IP address, and port 80 or 443 connectivity from Acquisition Unit to *.cloudinsights.netapp.com or your Cloud Insights environment (i.e. https://&lt;environment_id&gt;.c01.cloudinsights.netapp.com) is required. For requirements between Acquisition Unit and each Data Collector, please refer to instructions for the <a href="#">Data Collector</a>.</p> <p>If your organization requires proxy usage for internet access, you may need to understand your organization's proxy behavior and seek certain exceptions for Cloud Insights to work. For example, does your organization block access by default, and only allow access to specific web sites/domains by exception? If so, you will need to get the following domain added to the exception list:</p> <p>*.cloudinsights.netapp.com</p> <p>For more information, ready about Proxies <a href="#">here</a> or <a href="#">here</a>.</p>	Same
Permissions	<p>Sudo permissions on the Acquisition Unit server. /tmp must be mounted with exec capabilities.</p>	Administrator permissions on the Acquisition Unit server
Virus Scan		During installation, you must completely disable all virus scanners. Following installation, the paths used by the Acquisition Unit software must be excluded from virus scanning.

## Additional recommendations

- For accurate audit and data reporting, it is strongly recommended to synchronize the time on the Acquisition Unit machine using **Network Time Protocol (NTP)** or **Simple Network Time Protocol (SNTP)**.

## Regarding Sizing

You can get started with a Cloud Insights Acquisition Unit with just 8GB memory and 50GB of disk space, however, for larger environments you should ask yourself the following questions:

Do you expect to:

- Discover more than 2500 virtual machines or 10 large (> 2 node) ONTAP clusters, Symmetrix, or HDS/HPE VSP/XP arrays on this Acquisition Unit?
- Deploy 75 or more total data collectors on this Acquisition Unit?

For each "Yes" answer above, it is recommend to add 8 GB of memory and 50 GB of disk space to the AU. So for example if you answered "Yes" to both, you should deploy a 24GB memory system with 150GB or more of disk space. On Linux, the disk space to be added to the log location.

For additional sizing questions, contact NetApp Support.

## Configuring Acquisition Units

Cloud Insights collects device data using one or more Acquisition Units installed on local servers. Each Acquisition Unit can host multiple Data Collectors, which send device metrics to Cloud Insights for analysis.

This topic describes how to add Acquisition Units and describes additional steps required when your environment uses a proxy.



For accurate audit and data reporting, it is strongly recommended to synchronize the time on the Acquisition Unit machine using **Network Time Protocol (NTP)** or **Simple Network Time Protocol (SNTP)**.

## Adding a Linux Acquisition Unit

### Before you begin

- If your system is using a proxy, you must set the proxy environment variables before the acquisition unit is installed. For more information, see [Setting proxy environment variables](#).

### Steps for Linux Acquisition Unit Installation

1. Log in as Administrator or Account Owner to your Cloud Insights environment.
2. Click **Admin > Data Collectors > Acquisition Units > +Acquisition Unit**

The system displays the *Install Acquisition Unit* dialog. Choose Linux.

## Install Acquisition Unit

Cloud Insights collects device data via one or more Acquisition Units installed on local servers. Each Acquisition Unit can host multiple Data Collectors, which send device metrics to Cloud Insights for analysis.

### What Operating System or Platform Are You Using?

[Linux Versions Supported](#) ⓘ

[Production Best Practices](#) ⓘ

### Installation Instructions

[Need Help?](#)

#### 1 [Copy Installer Snippet](#)

*This snippet has a unique key valid for 24 hours for this Acquisition Unit only.*

[+ Reveal Installer Snippet](#)

#### 2 Paste the snippet into a bash shell to run the installer.

#### 3 Waiting for Acquisition Unit to connect...

1. Verify that the server or VM hosting the Acquisition Unit meets the recommended system requirements.
2. Verify that the server is running a supported version of Linux. Click *OS Versions Supported (i)* for a list of supported versions.
3. Copy the Installation command snippet in the dialog into a terminal window on the server or VM that will host the Acquisition unit.
4. Paste and execute the command in the Bash shell.

### After you finish

- Click **Admin > Data Collectors > Acquisition units** to check the status of Acquisition Units.
- You can access the Acquisition Unit logs at `/var/log/netapp/cloudinsights/acq/acq.log`
- Use the following script to control the Acquisition Unit:
  - `cloudinsights-service.sh` (stop, start, restart, check the status)
- Use the following script to uninstall the Acquisition Unit:
  - `cloudinsights-uninstall.sh`

### Setting proxy environment variables

For environments that use a proxy, you must set the proxy environment variables before you add the Acquisition Unit. The instructions for configuring the proxy are provided on the *Add Acquisition Unit* dialog.

1. Click + in *Have a Proxy Server?*
2. Copy the commands to a text editor and set your proxy variables as needed.

Note: Be aware of restrictions on special characters in proxy username and password fields: '%' and '!' are allowed in the username field. ':', '%', and '!' are allowed in the password field.

3. Run the edited command in a terminal using the Bash shell.
4. Install the Acquisition Unit software.



## Proxy Configuration

The Acquisition Unit uses 2-way/mutual authentication to connect to the Cloud Insights server. The client certificate must be passed to the Cloud Insights server to be authenticated. To accomplish this, the proxy must be set up to forward the https request to the Cloud Insights server without decrypting the data.

The simplest way to do this is to specify wildcard configuration in your proxy/firewall to communicate with Cloud Insights, for example:

```
*.cloudinsights.netapp.com
```



The use of an asterisk (\*) for wildcard is common, but your proxy/firewall configuration may use a different format. Check with your proxy documentation to ensure correct wildcard specification in your environment.

## Viewing Proxy URLs

You can view your proxy endpoint URLs by clicking the **Proxy Settings** link when choosing a data collector during onboarding, or the link under *Proxy Settings* on the **Help > Support** page. A table like the following is displayed.

Proxy Settings					×
If your organization requires proxy usage for internet access, you need to understand your organization's proxy behavior and seek certain exceptions for Cloud Insights to work. The simplest way is to add the following domains to the exception list:					
Hostname	Port	Protocol	Methods	Endpoint URL Purpose	
qtrjkso.proxyserver.cloudinsights-dev.netapp.com	443	https	GET, POST, PATCH, PUT, DELETE	Tenant	
00b1100.1234.abcd.12bc.a1b2c3ef56a7.proxyserver.cloudinsights-dev.netapp.com	443	https	GET, POST, PATCH, PUT, DELETE	Acquisition Unit Ingestion	
aulogin.proxyserver.cloudinsights-dev.netapp.com	443	https	GET, POST, PATCH, PUT, DELETE	Acquisition Unit Authentication	
portal.proxy.cloud.netapp.com	443	https	GET, POST, PATCH, PUT, DELETE	Gateway	
					Close

If you have Cloud Secure in your environment, the configured endpoint URLs will also be displayed in this list.

## Adding a Windows Acquisition Unit

### Steps for Windows Acquisition Unit Installation

1. Log in to the Acquisition Unit server/VM as a user with Administrator permissions.
2. On that server, open a browser window and log in to your Cloud Insights environment as Administrator or Account Owner.
3. Click **Admin > Data Collectors > Acquisition Units > +Acquisition Unit**.

The system displays the *Install Acquisition Unit* dialog. Choose Windows.

## Install Acquisition Unit

Cloud Insights collects device data via one or more Acquisition Units installed on local servers. Each Acquisition Unit can host multiple Data Collectors, which send device metrics to Cloud Insights for analysis.

### What Operating System or Platform Are You Using?

 Windows ▼

[Windows Versions Supported](#) ⓘ

[Production Best Practices](#) ⓘ

### Installation Instructions

[Need Help?](#)

1 [Download Installer \(Windows 64-bit\)](#)

2 [Copy Access Key](#)

*This access key is a unique key valid for 24 hours for this Acquisition Unit only.*

[+ Reveal Access Key](#)

3 Paste access key into installer when prompted.

4 Please ensure you have copied and pasted the access key into the installer.

[+ Have a Proxy Server?](#)

1. Verify that the server or VM hosting the Acquisition Unit meets the recommended system requirements.
2. Verify that the server is running a supported version of Windows. Click *OS Versions Supported (i)* for a list of supported versions.
3. Click the **Download Installer (Windows 64-bit)** button.
4. Copy the Access Key. You will need this during the Installation.
5. On the Acquisition Unit server/VM, execute the downloaded installer.
6. Paste the Access Key into the installation wizard when prompted.
7. During installation, you will be presented with the opportunity to provide your proxy server settings.

### After you finish

- Click **Admin > Data Collectors > Acquisition units** to check the status of Acquisition Units.
- You can access the Acquisition Unit log in <install dir>\Cloud Insights\Acquisition Unit\log\acq.log
- Use the following script to stop, start, restart, or check the status of the Acquisition Unit:

```
cloudinsights-service.sh
```

### Proxy Configuration

The Acquisition Unit uses 2-way/mutual authentication to connect to the Cloud Insights server. The client certificate must be passed to the Cloud Insights server to be authenticated. To accomplish this, the proxy must be set up to forward the https request to the Cloud Insights server without decrypting the data.

The simplest way to do this is to specify wildcard configuration in your proxy/firewall to communicate with Cloud Insights, for example:

\*.cloudinsights.netapp.com



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Proxy Settings					×
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Hostname	Port	Protocol	Methods	Endpoint URL Purpose	
qtrjkso.proxyserver.cloudinsights-dev.netapp.com	443	https	GET, POST, PATCH, PUT, DELETE	Tenant	
00b1100.1234.abcd.12bc.a1b2c3ef56a7.proxyserver.cloudinsights-dev.netapp.com	443	https	GET, POST, PATCH, PUT, DELETE	Acquisition Unit Ingestion	
aulogin.proxyserver.cloudinsights-dev.netapp.com	443	https	GET, POST, PATCH, PUT, DELETE	Acquisition Unit Authentication	
portal.proxy.cloud.netapp.com	443	https	GET, POST, PATCH, PUT, DELETE	Gateway	
					Close

If you have Cloud Secure in your environment, the configured endpoint URLs will also be displayed in this list.

## Uninstalling an Acquisition Unit

To uninstall the Acquisition Unit software, do the following:

### Windows:

1. On the Acquisition Unit server/VM, open Control Panel and choose **Uninstall a Program**. Select the Cloud Insights Acquisition Unit program for removal.
2. Click Uninstall and follow the prompts.

### Linux:

1. On the Acquisition Unit server/VM, run the following command:

```
sudo cloudinsights-uninstall.sh -p
```

2. For help with uninstall, run:

```
sudo cloudinsights-uninstall.sh --help
```

## Both:

1. After uninstalling the AU software, go to **Admin > Data Collectors** and select the **Acquisition Units** tab.
2. Click the Options button to the right of the Acquisition Unit you wish to uninstall, and select *Delete*. You can delete an Acquisition Unit only if there are no data collectors assigned to it.

NOTE: You cannot delete the default Acquisition Unit. Select another AU as the default before deleting the old one.

## Reinstalling an Acquisition Unit

To re-install an Acquisition Unit on the same server/VM, you must follow these steps:

### Before you begin

You must have a temporary Acquisition Unit configured on a separate server/VM before re-installing an Acquisition Unit.

### Steps

1. Log in to the Acquisition Unit server/VM and uninstall the AU software.
2. Log into your Cloud Insights environment and go to **Admin > Data Collectors**.
3. For each data collector, click the Options menu on the right and select *Edit*. Assign the data collector to the temporary Acquisition Unit and click **Save**.

You can also select multiple data collectors of the same type and click the **Bulk Actions** button. Choose *Edit* and assign the data collectors to the temporary Acquisition Unit.

4. After all of the data collectors have been moved to the temporary Acquisition Unit, go to **Admin > Data Collectors** and select the **Acquisition Units** tab.
5. Click the Options button to the right of the Acquisition Unit you wish to re-install, and select *Delete*. You can delete an Acquisition Unit only if there are no data collectors assigned to it.
6. You can now re-install the Acquisition Unit software on the original server/VM. Click **+Acquisition Unit** and follow the instructions above to install the Acquisition Unit.
7. Once the Acquisition Unit has been re-installed, assign your data collectors back to the Acquisition Unit.

## Viewing AU Details

The Acquisition Unit (AU) detail page provides useful detail for an AU as well as information to help with troubleshooting. The AU detail page contains the following sections:

- A **summary** section showing the following:
  - **Name** and **IP** of the Acquisition Unit
  - Current connection **Status** of the AU
  - **Last Reported** successful data collector poll time
  - The **Operating System** of the AU machine
  - Any current **Note** for the AU. Use this field to enter a comment for the AU. The field displays the most recently added note.
- A table of the AU's **Data Collectors** showing, for each data collector:
  - **Name** - Click this link to drill down into the data collector's detail page with additional information

- **Status** - Success or error information
- **Type** - Vendor/model
- **IP** address of the data collector
- Current **Impact** level
- **Last Acquired** time - when the data collector was last successfully polled

### Acquisition Unit Summary

<b>Name</b> xp-linux <b>IP</b> 10.197.120.145	<b>Connection Status</b> OK - <a href="#">Need Help?</a> <b>Last Reported</b> 2 minutes ago	<b>Operating System</b> Linux	<b>Note</b> 
--	--	----------------------------------	-----------------

### Data Collectors (3)

[+ Data Collector](#)
[Bulk Actions](#)

<input type="checkbox"/>	Name ↑	Status	Type	IP	Impact	Last Acquired	
<input type="checkbox"/>	foo	<span>!</span> Inventory failed	NetApp Data ONTAP 7-Mode	foo	Low	Never	⋮
<input type="checkbox"/>	xp-cisco	All successful	Cisco MDS Fabric Switches	10.197.136.66		2 minutes ago	⋮
<input type="checkbox"/>	xpcdot26	All successful	NetApp ONTAP Data Management Software	10.197.136.26		8 minutes ago	⋮

For each data collector, you can click on the "three dots" menu to Clone, Edit, Poll, or Delete the data collector. You can also select multiple data collectors in this list to perform bulk actions on them.

To restart the Acquisition Unit, click the **Restart** button at the top of the page. Drop down this button to attempt to **Restore Connection** to the AU in the event of a connection problem.

## Configuring an Agent to Collect Data (Windows/Linux/Mac)

Cloud Insights uses [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. Input plugins are used to collect the desired information into the agent by accessing the system/OS directly, by calling third-party APIs, or by listening to configured streams (i.e. Kafka, statsD, etc). Output plugins are used to send the collected metrics, events, and logs from the agent to Cloud Insights.

The current Telegraf version for Cloud Insights is **1.22.3**.



For accurate audit and data reporting, it is strongly recommended to synchronize the time on the Agent machine using **Network Time Protocol (NTP)** or **Simple Network Time Protocol (SNTP)**.



If you want to verify the installation files before installing the Agent, see the section below on [Verifying Checksums](#).

## Installing an Agent

If you are installing a Service data collector and have not yet configured an Agent, you are prompted to first install an Agent for the appropriate Operating System. This topic provides instructions for installing the Telegraf agent on the following Operating Systems:

- [Windows](#)
- [RHEL and CentOS](#)
- [Ubuntu and Debian](#)
- [macOS](#)
- [Kubernetes](#)

To install an agent, regardless of the platform you are using, you must first do the following:

1. Log into the host you will use for your agent.
  2. Log in to your Cloud Insights site and go to **Admin > Data Collectors**.
  3. Click on **+Data Collector** and choose a data collector to install.
1. Choose the appropriate platform for your host (Windows, Linux, macOS, etc.)
  2. Follow the remaining steps for each platform.



Once you have installed an agent on a host, you do not need to install an agent again on that host.



Once you have installed an agent on a server/VM, Cloud Insights collects metrics from that system in addition to collecting from any data collectors you configure. These metrics are gathered as **"Node" metrics**.



If you are using a proxy, read the proxy instructions for your platform before installing the Telegraf agent.

## Windows

### Pre-requisites:

- PowerShell must be installed
- If you are behind a proxy, you must follow the instructions in the **Configuring Proxy Support for Windows** section.

### Configuring Proxy Support for Windows



If your environment uses a proxy, read this section before you install.



The steps below outline the actions needed to set the *http\_proxy/https\_proxy* environment variables. For some proxy environments, users may also need to set the *no\_proxy environment* variable.

For systems residing behind a proxy, perform the following to set the *https\_proxy* and/or *http\_proxy*

environment variable(s) **PRIOR** to installing the Telegraf agent:

```
[System.Environment]::SetEnvironmentVariable("https_proxy",  
"<proxy_server>:<proxy_port>",  
[System.EnvironmentVariableTarget]::Machine)
```

## Installing the agent

### Steps to install agent on Windows:

1. Choose an Agent Access Key.
2. Copy the command block from the agent installation dialog. You can click the clipboard icon to quickly copy the command to the clipboard.
3. Open a PowerShell window
4. Paste the command into the PowerShell window and press Enter.
5. The command will download the appropriate agent installer, install it, and set a default configuration. When finished, it will restart the agent service. The command has a unique key and is valid for 24 hours.
6. Click **Finish** or **Continue**

After the agent is installed, you can use the following commands to start/stop the service:

```
Start-Service telegraf  
Stop-Service telegraf
```

## Uninstalling the Agent

To uninstall the agent on Windows, do the following in a PowerShell window:

1. Stop and delete the Telegraf service:

```
Stop-Service telegraf  
sc.exe delete telegraf
```

2. Remove the certificate from the trustore:

```
cd Cert:\CurrentUser\Root  
rm E5FB7B68C08B1CA902708584C274F8EFC7BE8ABC
```

3. Delete the *C:\Program Files\telegraf* folder to remove the binary, logs, and configuration files
4. Remove the *SYSTEM\CurrentControlSet\Services\EventLog\Application\telegraf* key from the registry

### Upgrading the Agent

To upgrade the telegraf agent, do the following:

1. Stop and delete the telegraf service:

```
Stop-Service telegraf  
sc.exe delete telegraf
```

2. Delete the *SYSTEM\CurrentControlSet\Services\EventLog\Application\telegraf* key from the registry
3. Delete *C:\Program Files\telegraf\telegraf.conf*
4. Delete *C:\Program Files\telegraf\telegraf.exe*
5. [Install the new agent](#).

### RHEL and CentOS

#### Pre-requisites:

- The following commands must be available: curl, sudo, ping, sha256sum, openssl, and dmidecode
- If you are behind a proxy, you must follow the instructions in the **Configuring Proxy Support for RHEL/CentOS** section.

#### Configuring Proxy Support for RHEL/CentOS



If your environment uses a proxy, read this section before you install.



The steps below outline the actions needed to set the *http\_proxy/https\_proxy* environment variables. For some proxy environments, users may also need to set the *no\_proxy environment* variable.

For systems residing behind a proxy, perform the following steps **PRIOR** to installing the Telegraf agent:



1. Set the `https_proxy` and/or `http_proxy` environment variable(s) for the current user:

```
export https_proxy=<proxy_server>:<proxy_port>
```

2. Create `/etc/default/telegraf`, and insert definitions for the `https_proxy` and/or `http_proxy` variable(s):

```
https_proxy=<proxy_server>:<proxy_port>
```

## Installing the agent



### Install Agent

Quickly setup an agent in your environment and immediately start monitoring data

#### Select existing API Access Token or create a new one

default\_ingestion\_api\_key1 (...xEKVyK) ▼

+ API Access Token

Production Best Practices ?

#### Installation Instructions

[Need Help?](#)

- 1 For environments operating behind a proxy server, follow the instructions to [configure proxy support to install and run Telegraf](#).

- 2 [Copy Agent Installer Snippet](#)

This snippet has a unique key and is valid for 24 hours. Already have an agent in your environment? [View Troubleshooting](#)

⊕ Reveal Agent Installer Snippet

- 3 Open a terminal window and paste the snippet in a Bash shell (requires curl, sudo, ping, sha256sum, and dmidcode).

- 4 [Complete Setup](#)

## Steps to install agent on RHEL/CentOS:

1. Choose an Agent Access Key.
2. Copy the command block from the agent installation dialog. You can click the clipboard icon to quickly copy the command to the clipboard.
3. Open a Bash window
4. Paste the command into the Bash window and press Enter.
5. The command will download the appropriate agent installer, install it, and set a default configuration. When finished, it will restart the agent service. The command has a unique key and is valid for 24 hours.
6. Click **Finish** or **Continue**

After the agent is installed, you can use the following commands to start/stop the service:

If your operating system is using systemd (CentOS 7+ and RHEL 7+):

```
sudo systemctl start telegraf
sudo systemctl stop telegraf
```

If your operating system is not using systemd (CentOS 7+ and RHEL 7+):

```
sudo service telegraf start
sudo service telegraf stop
```

### Uninstalling the Agent

To uninstall the agent on RHEL/CentOS, in a Bash terminal, do the following:

1. Stop the Telegraf service:

```
systemctl stop telegraf (If your operating system is using systemd
                          (CentOS 7+ and RHEL 7+))
/etc/init.d/telegraf stop (for systems without systemd support)
```

2. Remove the Telegraf agent:

```
yum remove telegraf
```

3. Remove any configuration or log files that may be left behind:

```
rm -rf /etc/telegraf*
rm -rf /var/log/telegraf*
```

### Upgrading the Agent

To upgrade the telegraf agent, do the following:

1. Stop the telegraf service:

```
systemctl stop telegraf (If your operating system is using systemd
                          (CentOS 7+ and RHEL 7+))
/etc/init.d/telegraf stop (for systems without systemd support)
```

2. Remove the previous telegraf agent:

```
yum remove telegraf
```

### 3. [Install the new agent.](#)

## Ubuntu and Debian

### Pre-requisites:

- The following commands must be available: curl, sudo, ping, sha256sum, openssl, and dmidecode
- If you are behind a proxy, you must follow the instructions in the **Configuring Proxy Support for Ubuntu/Debian** section.

### Configuring Proxy Support for Ubuntu/Debian



If your environment uses a proxy, read this section before you install.



The steps below outline the actions needed to set the *http\_proxy/https\_proxy* environment variables. For some proxy environments, users may also need to set the *no\_proxy environment* variable.

For systems residing behind a proxy, perform the following steps **PRIOR** to installing the Telegraf agent:

1. Set the *https\_proxy* and/or *http\_proxy* environment variable(s) for the current user:

```
export https_proxy=<proxy_server>:<proxy_port>
```

2. Create `/etc/default/telegraf`, and insert definitions for the *https\_proxy* and/or *http\_proxy* variable(s):

```
https_proxy=<proxy_server>:<proxy_port>
```

### Installing the agent



## Install Agent

Quickly setup an agent in your environment and immediately start monitoring data

### Select existing API Access Token or create a new one

default\_ingestion\_api\_key1 (...xEKVyK) ▼

+ API Access Token

Production Best Practices ?

### Installation Instructions

[Need Help?](#)

**1** For environments operating behind a proxy server, follow the instructions to [configure proxy support to install and run Telegraf](#).

**2** [Copy Agent Installer Snippet](#)

This snippet has a unique key and is valid for 24 hours. Already have an agent in your environment? [View Troubleshooting](#)

⊕ Reveal Agent Installer Snippet

**3** Open a terminal window and paste the snippet in a Bash shell (requires curl, sudo, ping, sha256sum, and dmidcode).

**4** [Complete Setup](#)

### Steps to install agent on Debian or Ubuntu:

1. Choose an Agent Access Key.
2. Copy the command block from the agent installation dialog. You can click the clipboard icon to quickly copy the command to the clipboard.
3. Open a Bash window
4. Paste the command into the Bash window and press Enter.
5. The command will download the appropriate agent installer, install it, and set a default configuration. When finished, it will restart the agent service. The command has a unique key and is valid for 24 hours.
6. Click **Finish** or **Continue**

After the agent is installed, you can use the following commands to start/stop the service:

If your operating system is using systemd:

```
sudo systemctl start telegraf
sudo systemctl stop telegraf
```

If your operating system is not using systemd:

```
sudo service telegraf start
sudo service telegraf stop
```

## Uninstalling the Agent

To uninstall the agent on Ubuntu/Debian, in a Bash terminal, run the following:

1. Stop the Telegraf service:

```
systemctl stop telegraf (If your operating system is using systemd)
/etc/init.d/telegraf stop (for systems without systemd support)
```

2. Remove the Telegraf agent:

```
dpkg -r telegraf
```

3. Remove any configuration or log files that may be left behind:

```
rm -rf /etc/telegraf*
rm -rf /var/log/telegraf*
```

## Upgrading the Agent

To upgrade the telegraf agent, do the following:

1. Stop the telegraf service:

```
systemctl stop telegraf (If your operating system is using systemd)
/etc/init.d/telegraf stop (for systems without systemd support)
```

2. Remove the previous telegraf agent:

```
dpkg -r telegraf
```

3. [Install the new agent.](#)

## macOS

### Pre-requisites:

- The following commands must be available: curl, sudo, openssl, and shasum
- If you are behind a proxy, you must follow the instructions in the **Configuring Proxy Support for macOS** section.

### Configuring Proxy Support for macOS



If your environment uses a proxy, read this section before you install.



The steps below outline the actions needed to set the *http\_proxy/https\_proxy* environment variables. For some proxy environments, users may also need to set the *no\_proxy environment* variable.

For systems residing behind a proxy, perform the following to set the *https\_proxy* and/or *http\_proxy* environment variable(s) for the current user **PRIOR** to installing the Telegraf agent:

```
export https_proxy=<proxy_server>:<proxy_port>
```

**AFTER** installing the Telegraf agent, add and set the appropriate *https\_proxy* and/or *http\_proxy* variable(s) in */Applications/telegraf.app/Contents/telegraf.plist*:

```
...
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE plist PUBLIC "-//Apple//DTD PLIST 1.0//EN"
"http://www.apple.com/DTDs/PropertyList-1.0.dtd">
<plist version="1.0">
<dict>
  <key>EnvironmentVariables</key>
  <dict>
    <key>https_proxy</key>
    <string><proxy_server>:<proxy_port></string>
  </dict>
  <key>Program</key>
  <string>/Applications/telegraf.app/Contents/MacOS/telegraf</string>
  <key>Label</key>
  <string>telegraf</string>
  <key>ProgramArguments</key>
  <array>
    <string>/Applications/telegraf.app/Contents/MacOS/telegraf</string>
    <string>--config</string>
    <string>/usr/local/etc/telegraf.conf</string>
    <string>--config-directory</string>
    <string>/usr/local/etc/telegraf.d</string>
  </array>
  <key>RunAtLoad</key>
  <true/>
</dict>
</plist>
...
```

Then, restart Telegraf after loading the above changes:

```
sudo launchctl stop telegraf
sudo launchctl unload -w /Library/LaunchDaemons/telegraf.plist
sudo launchctl load -w /Library/LaunchDaemons/telegraf.plist
sudo launchctl start telegraf
```

## Installing the agent



### Install Agent

Quickly setup an agent in your environment and immediately start monitoring data

#### Select existing API Access Token or create a new one

default\_ingestion\_api\_key1 (...xEKVyK)

+ API Access Token

Production Best Practices ?

#### Installation Instructions

[Need Help?](#)

- 1 For environments operating behind a proxy server, follow the instructions to [configure proxy support to install and run Telegraf](#).
- 2 [Copy Agent Installer Snippet](#)  
This snippet has a unique key and is valid for 24 hours. Already have an agent in your environment? [View Troubleshooting](#)  
[+ Reveal Agent Installer Snippet](#)
- 3 Open a terminal window and paste the snippet in a Bash shell (requires sudo, shasum, and curl).
- 4 [Complete Setup](#)

#### Steps to install agent on macOS:

1. Choose an Agent Access Key.
2. Copy the command block from the agent installation dialog. You can click the clipboard icon to quickly copy the command to the clipboard.
3. Open a Bash window
4. Paste the command into the Bash window and press Enter.
5. The command will download the appropriate agent installer, install it, and set a default configuration. When finished, it will restart the agent service. The command has a unique key and is valid for 24 hours.
6. If you previously installed a Telegraf agent using Homebrew, you will be prompted to uninstall it. Once the previously installed Telegraf agent is uninstalled, re-run the command in step 5 above.
7. Click **Finish** or **Continue**

After the agent is installed, you can use the following commands to start/stop the service:

```
sudo launchctl start telegraf
sudo launchctl stop telegraf
```

## Uninstalling the Agent

To uninstall the agent on macOS, in a Bash terminal, run the following:

1. Stop the Telegraf service:

```
sudo launchctl stop telegraf
```

2. Uninstall the telegraf agent:

```
cp /Applications/telegraf.app/scripts/uninstall /tmp  
sudo /tmp/uninstall
```

3. Remove any configuration or log files that may be left behind:

```
rm -rf /usr/local/etc/telegraf*  
rm -rf /usr/local/var/log/telegraf.*
```

## Upgrading the Agent

To upgrade the telegraf agent, do the following:

1. Stop the telegraf service:

```
sudo launchctl stop telegraf
```

2. Uninstall the previous telegraf agent:

```
cp /Applications/telegraf.app/scripts/uninstall /tmp  
sudo /tmp/uninstall
```

3. [Install the new agent.](#)

## Kubernetes

The NetApp Kubernetes Monitoring Operator (NKMO) is the preferred method for installing Kubernetes for Cloud Insights Insights, for more flexible configuration of monitoring in fewer steps, as well as enhanced opportunities for monitoring other software running in the K8s cluster.



## Verifying Checksums

The Cloud Insights agent installer performs integrity checks, but some users may want to perform their own verifications before installing or applying downloaded artifacts. To perform a download-only operation (as opposed to the default download-and-install), these users can edit the agent installation command obtained from the UI and remove the trailing “install” option.

Follow these steps:

1. Copy the Agent Installer snippet as directed.
2. Instead of pasting the snippet into a command window, paste it into a text editor.
3. Remove the trailing “--install” (Linux/Mac) or “-install” (Windows) from the command.
4. Copy the entire command from the text editor.
5. Now paste it into your command window (in a working directory) and run it.

Non-Windows (these examples are for Kubernetes; actual script names may vary):

- Download and install (default):

```
installerName=cloudinsights-kubernetes.sh ... && sudo -E -H  
./$installerName --download --install
```

- Download-only:

```
installerName=cloudinsights-kubernetes.sh ... && sudo -E -H  
./$installerName --download
```

Windows:

- Download and install (default):

```
!$(($installerName=".\\cloudinsights-windows.ps1") ... -and  
$(&$installerName -download -install)
```

- Download-only:

```
!$($installerName=".\"cloudinsights-windows.ps1") ... -and
$(&$installerName -download)
```

The download-only command will download all required artifacts from Cloud Insights to the working directory. The artifacts include, but may not be limited to:

- an installation script
- an environment file
- YAML files
- a signed checksum file (sha256.signed)
- a PEM file (netapp\_cert.pem) for signature verification

The installation script, environment file, and YAML files can be verified using visual inspection.

The PEM file can be verified by confirming its fingerprint to be the following:

```
E5:FB:7B:68:C0:8B:1C:A9:02:70:85:84:C2:74:F8:EF:C7:BE:8A:BC
```

More specifically,

- Non-Windows:

```
openssl x509 -fingerprint -sha1 -noout -inform pem -in netapp_cert.pem
```

- Windows:

```
Import-Certificate -Filepath .\netapp_cert.pem -CertStoreLocation  
Cert:\CurrentUser\Root
```

The signed checksum file can be verified using the PEM file:

- Non-Windows:

```
openssl smime -verify -in sha256.signed -CAfile netapp_cert.pem -purpose  
any
```

- Windows (after installing the certificate via Import-Certificate above):

```
Get-AuthenticodeSignature -FilePath .\sha256.ps1 $result = Get-AuthenticodeSignature -FilePath .\sha256.ps1 $signer = $result.SignerCertificate Add-Type -Assembly System.Security [Security.Cryptography.X509Certificates.X509Certificate2UI]::DisplayCertificate($signer)
```

Once all of the artifacts have been satisfactorily verified, the agent installation can be initiated by running:

Non-Windows:

```
sudo -E -H ./<installation_script_name> --install
```

Windows:

```
.\cloudinsights-windows.ps1 -install
```

## Troubleshooting Agent Installation

Some things to try if you encounter problems setting up an agent:

Problem:	Try this:
I already installed an agent using Cloud Insights	If you have already installed an agent on your host/VM, you do not need to install the agent again. In this case, simply choose the appropriate Platform and Key in the Agent Installation screen, and click on <b>Continue</b> or <b>Finish</b> .
I already have an agent installed but not by using the Cloud Insights installer	Remove the previous agent and run the Cloud Insights Agent installation, to ensure proper default configuration file settings. When complete, click on <b>Continue</b> or <b>Finish</b> .

Additional information may be found from the [Support](#) page or in the [Data Collector Support Matrix](#).

## Configuring an Agent on Kubernetes

Cloud Insights uses [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. Input plugins are used to collect the desired information into the agent by accessing the system/OS directly, by calling third-party APIs, or by listening to configured streams (i.e. Kafka, statsD, etc). Output plugins are used to send the collected metrics, events, and logs from the agent to Cloud Insights.

The current Telegraf version for Cloud Insights is **1.22.3**.



For accurate audit and data reporting, it is strongly recommended to synchronize the time on the Agent machine using **Network Time Protocol (NTP)** or **Simple Network Time Protocol (SNTP)**.



If you want to verify the installation files before installing the Agent, read about [Verifying Kubernetes Checksums](#).

## Installing the Agent

To install an agent, you must first do the following:

1. Log into the host you will use for your agent.
2. Log in to your Cloud Insights site and go to **Admin > Data Collectors**.
3. Click on **+Data Collector** and choose a data collector to install.
4. Choose the Kubernetes platform for your host
5. Follow the remaining steps.

To install an agent on Windows, Linux, or Mac, follow [these instructions](#).



Once you have installed an agent on a host, you do not need to install an agent again on that host.



Once you have installed an agent on a server/VM, Cloud Insights collects metrics from that system in addition to collecting from any data collectors you configure. These metrics are gathered as **"Node" metrics**.



If you are using a proxy, read the proxy instructions for your platform before installing the Telegraf agent.

## Installing an Agent on Kubernetes

Cloud Insights offers the **NetApp Kubernetes Monitoring Operator** for Kubernetes collection. When adding a data collector, simply choose the "Kubernetes" tile.

### Pre-requisites:

- NetApp Kubernetes Monitoring Operator installation is supported with Kubernetes version 1.20 or greater. When used with the Docker container runtime, Cloud Insights can display pod-to-PV-to-storage mappings for NFS and iSCSI; other runtimes only show iSCSI. Beginning August 2022, the NetApp Kubernetes Monitoring Operator includes support for Pod Security Policy (PSP). You must [upgrade](#) to the latest NetApp Kubernetes Monitoring Operator if your environment uses PSP.
- If you are running on OpenShift 4.6 - 4.8, you must follow the **OpenShift Instructions** below in addition to ensuring these pre-requisites are met.
- The NetApp Kubernetes Monitoring Operator and its dependencies (telegraf, kube-state-metrics, fluentbit, etc.) are not supported on nodes that are running with Arm64 architecture.
- The following commands must be available: *curl*, *sudo*, *openssl*, *sha256sum*, and *kubectl*. For best results, add these commands to the PATH.
- kube-state-metrics is essential, and is automatically installed with NetApp Kubernetes Monitoring Operator

installation.

- If you are behind a proxy, follow the instructions in the **Configuring Proxy Support for Kubernetes** section.
- You must have permissions to create Kubernetes cluster roles and role bindings.

## Monitoring is only installed on Linux nodes

Cloud Insights supports monitoring of Kubernetes nodes that are running Linux, by specifying a Kubernetes node selector that looks for the following Kubernetes labels on these platforms:

Platform	Label
Kubernetes v1.20 and above	Kubernetes.io/os = linux
Rancher + cattle.io as orchestration/Kubernetes platform	cattle.io/os = linux

## NetApp Kubernetes Monitoring Operator Installation



### Install Agent

Quickly install and configure a Kubernetes Operator to send cluster information to Cloud Insights.

Select an existing API Key or create a new one

10.197.120.70 (...RpTMJ4)

+ API Access Token

Production Best Practices

### Installation Instructions

[Need help?](#)

- 1 Supply a name for the Kubernetes cluster and identify a namespace to be used, or created, for the installation of monitoring components. Once entered, the code of the installation snippet is generated and becomes available for download. Monitoring is only installed on Linux nodes.

Cluster

clustername

Namespace

netapp-monitoring

- 2 [Copy Agent Installer Snippet](#)

This snippet has a unique key and it is valid for 24 hours.

Reveal agent installer snippet

- 3 Successful execution of the code snippet relies on the presence of `curl` and `kubectl`. The default configuration for `kubectl` should point to the Kubernetes cluster to be monitored. Paste the supplied code snippet and execute it at a bash prompt. For environments operating behind a proxy server, follow the [instructions to configure proxy support for the installed agent](#).

- 4 [Complete Setup](#)

### Steps to install NetApp Kubernetes Monitoring Operator agent on Kubernetes:

1. Enter the cluster name and namespace.
2. Once these are entered, you can copy the Agent Installer snippet
3. Click the button to copy this snippet to the clipboard.

4. Paste the snippet into a *bash* window and execute it.
5. The installation proceeds automatically. When it is complete, click the *Complete Setup* button.

## OpenShift Instructions

If you are running on OpenShift 4.6 - 4.8, you must change the "privileged-mode" setting. Run the following command to open the agent for editing. If you are using a namespace other than "netapp-monitoring", specify that namespace in the command line:

```
kubectl edit agent agent-monitoring-netapp -n netapp-monitoring
```

In the file, change *privileged-mode: false* to *privileged-mode: true*

## Configuring Proxy Support for NetApp Kubernetes Monitoring Operator

To configure a proxy for the monitoring operator, perform the following steps.

First, open the *agent-monitoring-netapp* file for editing:

```
kubectl -n netapp-monitoring edit agent agent-monitoring-netapp
```

In the *spec:* section of this file, add the following code block:

```
spec:
  proxy:
    isAuProxyEnabled: <true or false>
    isTelegrafProxyEnabled: <true or false>
    isFluentbitProxyEnabled: <true or false>
    password: <password for proxy, optional>
    port: <port for proxy>
    server: <server for proxy>
    username: <username for proxy, optional>
    noProxy: <comma separated list of IPs or resolvable hostnames that
should bypass a proxy>
```

## Using a custom/private docker repository

If using a custom docker repository, do the following:

Get the docker secret:

```
kubectl -n netapp-monitoring get secret docker -o yaml
```

Copy/paste the value of *.dockerconfigjson:* from the output of the above command.

Decode the docker secret:

```
echo <paste from __.dockerconfigjson:__ output above> | base64 -d
```

The output of this will be in the following json format:

```
{ "auths":  
  {"docker.<cluster>.cloudinsights.netapp.com" :  
    {"username":"<tenant id>",  
      "password":"<password which is the CI API key>",  
      "auth"      : "<encoded username:password basic auth key. This is  
internal to docker>"}  
    }  
  }  
}
```

Log in to the docker repository:

```
docker login docker.<cluster>.cloudinsights.netapp.com (from step #2) -u  
<username from step #2>  
password: <password from docker secret step above>
```

Pull the operator docker image from Cloud Insights:

```
docker pull docker.<cluster>.cloudinsights.netapp.com/netapp-  
monitoring:<version>
```

Find the <version> field using the following command:

```
kubectl -n netapp-monitoring get deployment monitoring-operator | grep  
"image:"
```

Push the operator docker image to your private/local/enterprise docker repository according to your corporate policies.

Download all open source dependencies to your private docker registry. Use the same directory structure as the public repositories. The following open source images need to be downloaded:

```
docker.io/telegraf: 1.22.3  
gcr.io/kubebuilder/kube-rbac-proxy: v0.11.0  
k8s.gcr.io/kube-state-metrics/kube-state-metrics: v2.4.2
```

If fluent-bit is enabled, also download:

```
docker.io/fluent-bit:1.9.3
docker.io/kubernetes-event-exporter:0.10
```

Edit the agent CR to reflect the new docker repo location, disable auto upgrade (if enabled).

```
kubectl -n netapp-monitoring edit agent agent-monitoring-netapp
```

```
enableAutoUpgrade: false
```

```
docker-repo: <docker repo of the enterprise/corp docker repo>
dockerRepoSecret: <optional: name of the docker secret of enterprise/corp
docker repo, this secret should be already created on the k8s cluster in
the same namespace>
```

In the *spec:* section, make the following changes:

```
spec:
  telegraf:
    - name: ksm
      substitutions:
        - key: k8s.gcr.io
          value: <same as "docker-repo" field above>
```

Edit the monitoring-operator deployment to reflect the new docker repo location:

```
kubectl -n netapp-monitoring edit deploy monitoring-operator
```

Replace the following line...

```
image: gcr.io/kubebuilder/kube-rbac-proxy:<kube-rbac-proxy-version>
```

...with:

```
image: <same as "docker-repo" field above>/kubebuilder/kube-rbac-
proxy:<kube-rbac-proxy-version>
```



## Upgrading from Script-based K8s monitoring to NetApp Kubernetes Monitoring Operator

If you are upgrading from a previously-installed script-based Kubernetes agent to the NetApp Kubernetes Monitoring Operator, follow these steps:

### Steps to upgrade

1. Preserve the ConfigMap from the script-based monitoring installation:

```
kubectl --namespace ci-monitoring get cm -o yaml > /tmp/telegraf-configs.yaml
```

2. Save the K8s cluster name for use during installation of the K8s operator-based monitoring solution to ensure data continuity.

If you do not remember the name of the K8s cluster in CI, it can be extracted from your saved configuration with the following command line:

```
cat /tmp/telegraf-configs.yaml | grep kubernetes_cluster | head -2
```

3. Remove the script-based monitoring

To uninstall the script-based agent on Kubernetes, do the following:

If the monitoring namespace is being used solely for Telegraf:

```
kubectl --namespace ci-monitoring delete  
ds,rs,cm,sa,clusterrole,clusterrolebinding -l app=ci-telegraf
```

```
kubectl delete ns ci-monitoring
```

If the monitoring namespace is being used for other purposes in addition to Telegraf:

```
kubectl --namespace ci-monitoring delete  
ds,rs,cm,sa,clusterrole,clusterrolebinding -l app=ci-telegraf
```

Install the K8s operator-based monitoring following the instructions in the install tile.



## Stopping and Starting the Netapp Kubernetes Monitoring Operator

To stop the Netapp Kubernetes Monitoring Operator:

```
kubectl -n netapp-monitoring scale deploy monitoring-operator --replicas=0
```

To start the Netapp Kubernetes Monitoring Operator:

```
kubectl -n netapp-monitoring scale deploy monitoring-operator --replicas=1
```

## Configuring the Agent to Collect Data from Kubernetes

Note: The default namespace for NetApp Kubernetes Monitoring Operator-based installation is *netapp-monitoring*. In commands involving namespace, be sure to specify the correct namespace for your installation.

The pods in which the agents run need to have access to the following:

- hostPath
- configMap
- secrets

These Kubernetes objects are automatically created as part of the Kubernetes agent install command provided in the Cloud Insights UI. Some variants of Kubernetes, such as OpenShift, implement an added level of security that may block access to these components. The *SecurityContextConstraint* is not created as part of the Kubernetes agent install command provided in the Cloud Insights UI, and must be created manually. Once created, restart the Telegraf pod(s).

```

apiVersion: v1
kind: SecurityContextConstraints
metadata:
  name: telegraf-hostaccess
  creationTimestamp:
  annotations:
    kubernetes.io/description: telegraf-hostaccess allows hostpath
volume mounts for restricted SAs.
  labels:
    app: ci-telegraf
priority: 10
allowPrivilegedContainer: true
defaultAddCapabilities: []
requiredDropCapabilities: []
allowedCapabilities: []
allowedFlexVolumes: []
allowHostDirVolumePlugin: true
volumes:
- hostPath
- configMap
- secret
allowHostNetwork: false
allowHostPorts: false
allowHostPID: false
allowHostIPC: false
seLinuxContext:
  type: MustRunAs
runAsUser:
  type: RunAsAny
supplementalGroups:
  type: RunAsAny
fsGroup:
  type: RunAsAny
readOnlyRootFilesystem: false
users:
- system:serviceaccount:ci-monitoring:monitoring-operator
groups: []

```

## About Kube-state-metrics

The NetApp Kubernetes Monitoring Operator installs kube-state-metrics automatically; no user interaction is needed and this section of the documentation may be skipped. It is included here to provide reference information for the curious:

## Installing the kube-state-metrics server



Operator-based install handles the installation of kube-state-metrics. Skip this section if you are performing Operator-based installation.

Use the following steps to install the kube-state-metrics server (required if you are performing script-based installation):

### Steps

1. Create a temporary folder (for example, `/tmp/kube-state-yaml-files/`) and copy the .yaml files from <https://github.com/kubernetes/kube-state-metrics/tree/master/examples/standard> to this folder.
2. Run the following command to apply the .yaml files needed for installing kube-state-metrics:

```
kubectl apply -f /tmp/kube-state-yaml-files/
```

## kube-state-metrics Counters

Use the following links to access information for the kube state metrics counters:

1. [ConfigMap Metrics](#)
2. [DaemonSet Metrics](#)
3. [Deployment Metrics](#)
4. [Ingress Metrics](#)
5. [Namespace Metrics](#)
6. [Node Metrics](#)
7. [Persistent Volume Metrics](#)
8. [Persistant Volume Claim Metrics](#)
9. [Pod Metrics](#)
10. [ReplicaSet metrics](#)
11. [Secret metrics](#)
12. [Service metrics](#)
13. [StatefulSet metrics](#)

## Uninstalling the Agent

If you are running on a previously-installed script-based Kubernetes agent, you must [upgrade](#) to the NetApp Kubernetes Monitoring Operator.

### To remove script-based agent

Note that these commands are using the default namespace "ci-monitoring". If you have set your own namespace, substitute that namespace in these and all subsequent commands and files.

To uninstall the script-based agent on Kubernetes (for example, when upgrading to the NetApp Kubernetes Monitoring Operator), do the following:

If the monitoring namespace is being used solely for Telegraf:

```
kubectl --namespace ci-monitoring delete  
ds,rs,cm,sa,clusterrole,clusterrolebinding -l app=ci-telegraf
```

```
kubectl delete ns ci-monitoring
```

If the monitoring namespace is being used for other purposes in addition to Telegraf:

```
kubectl --namespace ci-monitoring delete  
ds,rs,cm,sa,clusterrole,clusterrolebinding -l app=ci-telegraf
```

## To remove NetApp Kubernetes Monitoring Operator

Note that these commands are using the default namespace "netapp-monitoring". If you have set your own namespace, substitute that namespace in these and all subsequent commands and files.

```
kubectl delete ns netapp-monitoring  
kubectl delete clusterrole <name-space>-agent-manager-role <name-space>-  
agent-proxy-role  
kubectl delete clusterrolebinding <name-space>-agent-manager-rolebinding  
<name-space>-agent-proxy-rolebinding  
kubectl delete crd agents.monitoring.netapp.com  
kubectl delete psp <name-space>-psp-nkmo
```

If a Security Context Constraint was previously-created manually for a script-based Telegraf installation:

```
kubectl delete scc telegraf-hostaccess
```

## Upgrading the Agent



If you have previously installed the script-based agent, you must upgrade to the NetApp Kubernetes Monitoring Operator.

### Upgrading from script-based agent to NetApp Kubernetes Monitoring Operator

Note that these commands are using the default namespace "ci-monitoring". If you have set your own namespace, substitute that namespace in these and all subsequent commands and files.

To upgrade the telegraf agent, do the following:

- Make note of your cluster name. You can view the cluster name by running one of the following collands:

For operator:

```
kubectl -n netapp-monitoring get agent -o  
jsonpath='{.items[0].spec.cluster-name}'
```

For script-based:

```
kubectl -n ci-monitoring get cm telegraf-conf -o jsonpath='{.data}' |grep  
"kubernetes_cluster ="
```

- Back up the existing configurations:

```
kubectl --namespace ci-monitoring get cm -o yaml > /tmp/telegraf-  
configs.yaml
```

- [Uninstall](#) the existing agent
- [Install](#) the new agent].

## Upgrading the NetApp Kubernetes Monitoring Operator

For Operator-based installation run the following commands:

```
kubectl delete ns netapp-monitoring  
kubectl delete crd agents.monitoring.netapp.com  
kubectl delete clusterrole agent-manager-role agent-proxy-role agent-  
metrics-reader  
kubectl delete clusterrolebinding agent-manager-rolebinding agent-proxy-  
rolebinding agent-cluster-admin-rolebinding
```

## Verifying Kubernetes Checksums

The Cloud Insights agent installer performs integrity checks, but some users may want to perform their own verifications before installing or applying downloaded artifacts. To perform a download-only operation (as opposed to the default download-and-install), these users can edit the agent installation command obtained from the UI and remove the trailing “install” option.

Follow these steps:

1. Copy the Agent Installer snippet as directed.
2. Instead of pasting the snippet into a command window, paste it into a text editor.
3. Remove the trailing “--install” (Linux/Mac) or “-install” (Windows) from the command.
4. Copy the entire command from the text editor.
5. Now paste it into your command window (in a working directory) and run it.

Non-Windows (these examples are for Kubernetes; actual script names may vary):

- Download and install (default):

```
installerName=cloudinsights-kubernetes.sh ... && sudo -E -H  
./$installerName --download --install
```

- Download-only:

```
installerName=cloudinsights-kubernetes.sh ... && sudo -E -H  
./$installerName --download
```

The download-only command will download all required artifacts from Cloud Insights to the working directory. The artifacts include, but may not be limited to:

- an installation script
- an environment file
- YAML files
- a signed checksum file (sha256.signed)
- a PEM file (netapp\_cert.pem) for signature verification

The installation script, environment file, and YAML files can be verified using visual inspection.

The PEM file can be verified by confirming its fingerprint to be the following:

```
E5:FB:7B:68:C0:8B:1C:A9:02:70:85:84:C2:74:F8:EF:C7:BE:8A:BC
```

More specifically,

- Non-Windows:

```
openssl x509 -fingerprint -sha1 -noout -inform pem -in netapp_cert.pem
```

- Windows:

```
Import-Certificate -Filepath .\netapp_cert.pem -CertStoreLocation  
Cert:\CurrentUser\Root
```

The signed checksum file can be verified using the PEM file:

- Non-Windows:

```
openssl smime -verify -in sha256.signed -CAfile netapp_cert.pem -purpose any
```

- Windows (after installing the certificate via Import-Certificate above):

```
Get-AuthenticodeSignature -FilePath .\sha256.ps1 $result = Get-AuthenticodeSignature -FilePath .\sha256.ps1 $signer = $result.SignerCertificate Add-Type -Assembly System.Security [Security.Cryptography.X509Certificates.X509Certificate2UI]::DisplayCertificate($signer)
```

Once all of the artifacts have been satisfactorily verified, the agent installation can be initiated by running:

Non-Windows:

```
sudo -E -H ./<installation_script_name> --install
```

Windows:

```
.\cloudinsights-windows.ps1 -install
```

## Troubleshooting Kubernetes Agent Installation

Some things to try if you encounter problems setting up an agent:

Problem:	Try this:
For clusters where <i>etcd</i> is not the Kubernetes cluster datastore, You will see the following message in the telegraf RS pod:  [inputs.prometheus] Error in plugin: could not load keypair /etc/kubernetes/pki/etcd/server.crt:/etc/kubernetes/pki/etcd/server.key: open /etc/kubernetes/pki/etcd/server.crt: no such file or directory	Cloud Insights only supports monitoring of <i>etcd</i> as the K8s datastore. You can modify the agent to avoid collecting etcd data by changing the configuration with the following instructions:  kubectrl -n netapp-monitoring edit agent agent-monitoring-netapp  In that file, delete the following section:  - name: prometheus_etcd run-mode: - ReplicaSet
I already installed an agent using Cloud Insights	If you have already installed an agent on your host/VM, you do not need to install the agent again. In this case, simply choose the appropriate Platform and Key in the Agent Installation screen, and click on <b>Continue</b> or <b>Finish</b> .



Problem:	Try this:
I already have an agent installed but not by using the Cloud Insights installer	Remove the previous agent and run the Cloud Insights Agent installation, to ensure proper default configuration file settings. When complete, click on <b>Continue</b> or <b>Finish</b> .
I do not see a hyperlink/connection between my Kubernetes Persistent Volume and the corresponding back-end storage device. My Kubernetes Persistent Volume is configured using the hostname of the storage server.	Follow the steps to uninstall the existing Telegraf agent, then re-install the latest Telegraf agent. You must be using Telegraf version 2.0 or later.

Problem:	Try this:
<p>I'm seeing messages in the logs resembling the following:</p> <pre>E0901 15:21:39.962145 1 reflector.go:178] k8s.io/kube-state-metrics/internal/store/builder.go:352: Failed to list *v1.MutatingWebhookConfiguration: the server could not find the requested resource E0901 15:21:43.168161 1 reflector.go:178] k8s.io/kube-state-metrics/internal/store/builder.go:352: Failed to list *v1.Lease: the server could not find the requested resource (get leases.coordination.k8s.io) etc.</pre>	<p>These messages may occur if you are running kube-state-metrics version 2.0.0 or above with Kubernetes version 1.17 or below.</p> <p>To get the Kubernetes version:</p> <pre>kubectl version</pre> <p>To get the kube-state-metrics version:</p> <pre>kubectl get deploy/kube-state-metrics -o jsonpath='{..image}'</pre> <p>To prevent these messages from happening, users can modify their kube-state-metrics deployment to disable the following Leases:</p> <pre>mutatingwebhookconfigurations validatingwebhookconfigurations volumeattachments resources</pre> <p>More specifically, they can use the following CLI argument:</p> <pre>resources=certificatesigningrequests,configmaps,cron jobs,daemonsets, deployments,endpoints,horizontalpodautoscalers,ingr esses,jobs,limitranges, namespaces,networkpolicies,nodes,persistentvolume claims,persistentvolumes, poddisruptionbudgets,pods,replicasets,replicationcont rollers,resourcequotas, secrets,services,statefulsets,storageclasses</pre> <p>The default resource list is:</p> <pre>"certificatesigningrequests,configmaps,cronjobs,daem onsets,deployments, endpoints,horizontalpodautoscalers,ingresses,jobs,lea ses,limitranges, mutatingwebhookconfigurations,namespaces,network policies,nodes, persistentvolumeclaims,persistentvolumes,poddisrupti onbudgets,pods,replicasets, replicationcontrollers,resourcequotas,secrets,services, statefulsets,storageclasses, validatingwebhookconfigurations,volumeattachments"</pre>

Problem:	Try this:
<p>I installed or upgraded Telegraf on Kubernetes, but the Telegraf pods are not starting up. The Telegraf ReplicaSet or DaemonSet is reporting a failure resembling the following:</p> <p>Error creating: pods "telegraf-rs-" is forbidden": unable to validate against any security context constraint: [spec.volumes[2]: Invalid value: "hostPath": hostPath volumes are not allowed to be used]</p>	<p>Create a Security Context Constraint (refer to the <a href="#">Configuring the Agent to Collect Data from Kubernetes</a> section above) if one does not already exist.</p> <p>Ensure the namespace and service account specified for the Security Context Constraint matches the namespace and service account for the Telegraf ReplicaSet and DaemonSet.</p> <pre>kubectl describe scc telegraf-hostaccess  grep serviceaccount kubectl -n ci-monitoring --describe rs telegraf-rs   grep -i "Namespace:" kubectl -n ci-monitoring describe rs telegraf-rs   grep -i "Service Account:" kubectl -n ci-monitoring --describe ds telegraf-ds   grep -i "Namespace:" kubectl -n ci-monitoring describe ds telegraf-ds   grep -i "Service Account:"</pre>
<p>I see error messages from Telegraf resembling the following, but Telegraf does start up and run:</p> <pre>Oct 11 14:23:41 ip-172-31-39-47 systemd[1]: Started The plugin-driven server agent for reporting metrics into InfluxDB. Oct 11 14:23:41 ip-172-31-39-47 telegraf[1827]: time="2021-10-11T14:23:41Z" level=error msg="failed to create cache directory. /etc/telegraf/.cache/snowflake, err: mkdir /etc/telegraf/.cache: permission denied. ignored\n" func="gosnowflake.(*defaultLogger).Errorf" file="log.go:120" Oct 11 14:23:41 ip-172-31-39-47 telegraf[1827]: time="2021-10-11T14:23:41Z" level=error msg="failed to open. Ignored. open /etc/telegraf/.cache/snowflake/ocsp_response_cache.json: no such file or directory\n" func="gosnowflake.(*defaultLogger).Errorf" file="log.go:120" Oct 11 14:23:41 ip-172-31-39-47 telegraf[1827]: 2021-10-11T14:23:41Z !! Starting Telegraf 1.19.3</pre>	<p>This is a known issue. Refer to <a href="#">This GitHub article</a> for more details. As long as Telegraf is up and running, users can ignore these error messages.</p>

Problem:	Try this:
<p>On Kubernetes, my Telegraf pod(s) are reporting the following error:            "Error in processing mountstats info: failed to open mountstats file: /hostfs/proc/1/mountstats, error: open /hostfs/proc/1/mountstats: permission denied"</p>	<p>If SELinux is enabled and enforcing, it is likely preventing the Telegraf pod(s) from accessing the /proc/1/mountstats file on the Kubernetes nodes. To relax this restriction, do ONE of the following:</p> <ul style="list-style-type: none"> <li>• Edit the agent (<code>kubectl edit agent agent-monitoring-netapp</code>), and change "privileged-mode: false" to "privileged-mode: true"</li> </ul>
<p>On Kubernetes, my Telegraf ReplicaSet pod is reporting the following error:</p> <p>[inputs.prometheus] Error in plugin: could not load keypair            /etc/kubernetes/pki/etcd/server.crt:/etc/kubernetes/pki/etcd/server.key: open            /etc/kubernetes/pki/etcd/server.crt: no such file or directory</p>	<p>The Telegraf ReplicaSet pod is intended to run on a node designated as a master or for etcd. If the ReplicaSet pod is not running on one of these nodes, you will get these errors. Check to see if your master/etcd nodes have taints on them. If they do, add the necessary tolerations to the Telegraf ReplicaSet, telegraf-rs.</p> <p>For example, edit the ReplicaSet...</p> <pre>kubectl edit rs telegraf-rs</pre> <p>...and add the appropriate tolerations to the spec. Then, restart the ReplicaSet pod.</p>
<p>I have a PSP environment. Does this affect my monitoring operator?</p>	<p>If your Kubernetes cluster is running with Pod Security Policy (PSP) in place, you must upgrade to the latest NetApp Kubernetes Monitoring Operator. Follow these steps to upgrade to the current NKMO with support for PSP:</p> <ol style="list-style-type: none"> <li>1. Uninstall the previous monitoring operator:</li> </ol> <pre>kubectl delete agent agent-monitoring-netapp -n netapp-monitoring kubectl delete ns netapp-monitoring kubectl delete crd agents.monitoring.netapp.com kubectl delete clusterrole agent-manager-role agent-proxy-role agent-metrics-reader kubectl delete clusterrolebinding agent-manager-rolebinding agent-proxy-rolebinding agent-cluster-admin-rolebinding</pre> <ol style="list-style-type: none"> <li>2. Deploy the latest version of the monitoring operator.</li> </ol>

Problem:	Try this:
I ran into issues trying to deploy the NKMO, and I have PSP in use.	<p>1. Edit the agent using the following command:</p> <pre>kubectrl -n &lt;name-space&gt; edit agent</pre> <p>2. Mark 'security-policy-enabled' as 'false'. This will disable Pos Security Policies and allow the NKMO to deploy. Confirm by using the following commands:</p> <pre>kubectrl get psp (should show Pod Security Policy removed) kubectrl get all -n &lt;name-space&gt;</pre>
<p>I'm seeing the following in my logs immediately after installing the NetApp Kubernetes Monitoring Operator:</p> <pre>[inputs.prometheus] Error in plugin: error making HTTP request to http://kube-state-metrics.&lt;namespace&gt;.svc.cluster.local:8080/metrics: Get http://kube-state-metrics.&lt;namespace&gt;.svc.cluster.local:8080/metrics: dial tcp: lookup kube-state-metrics.&lt;namespace&gt;.svc.cluster.local: no such host</pre>	<p>This message is typically only seen when a new operator is installed and the <i>telegraf-rs</i> pod is up before the <i>ksm</i> pod is up. These messages should stop once all pods are running.</p>
I ran the command to install a CI agent to collect Kubernetes information, but I do not see any of my Kubernetes information in the UI.	<p>Run the following commands, collect the outputs, and contact NetApp Support.</p> <p>Note that these commands are using the default namespace. If you have set your own namespace, substitute that namespace in these and all subsequent commands.</p> <pre>kubectrl -n netapp-monitoring describe deploy,agent,rs,ds,pods kubectrl -n netapp-monitoring describe deploy</pre> <pre>kubectrl -n netapp-monitoring logs &lt;monitoring-operator pod&gt; -c manager kubectrl -n netapp-monitoring logs &lt;telegraf-ds pods&gt; kubectrl -n netapp-monitoring logs &lt;telegraf-rs pod&gt; kubectrl -n netapp-monitoring logs &lt;kube-state-metrics pod&gt;</pre>

Additional information may be found from the [Support](#) page or in the [Data Collector Support Matrix](#).

## Configuring Data Collectors

You configure Data Collectors in your Cloud Insights environment to collect data from devices in the data center.

### Before you begin

- You must have configured an Acquisition Unit before you can start collecting data.

- You need credentials for the devices from which you are collecting Data.
- Device network addresses, account information, and passwords are required for all devices you are collecting data from.

## Steps

1. From the Cloud Insights menu, click **Admin > Data Collectors**

The system displays the available Data Collectors arranged by vendor.

2. Click **+ Collector** on the required vendor and select the data collector to configure.

In the dialog box you can configure the data collector and add an Acquisition Unit.

3. Enter a name for the data collector.

Names can contain letters (a-z), numbers (0-9), dashes (-), underscores (\_), apostrophes ('), and periods (.).

4. Enter the Acquisition Unit to associate with this data collector.
5. Enter the required fields in the Configuration screen.
6. When prompted to configure notifications, choose to alert by Email, Webhook, or both, and choose the alert types on which to notify (Critical, Warning, Informational, and/or Resolved). You can choose to notify to the Global Monitor Recipient list (configured in **Admin > Notifications**), or specify additional recipients. When ready to continue, click **Complete Setup**.

### Customize notifications for this collector

ONTAP Default monitors are preconfigured to send email notifications to **"Global Monitor Recipient List"**, you can add additional email addresses for this data collector.

☒ By Email

Notify team on  
 Critical, Warning, Informa... ▼

Send to  
☒ Global Monitor Recipient List  
☐ Other Email Recipients

☐ By Webhook

Enable webhook notification to add recipients

When viewing an **ONTAP data collector** landing page, you can modify the notifications by clicking the pencil icon in the "Notifications" field of the data collector summary section.



ONTAP Data Collector notifications take precedence over any specific Monitor notifications that are relevant to the cluster/data collector. The recipient list you set for the Data Collector itself will receive the data collector alerts. If there are no active data collector alerts, then monitor-generated alerts will be sent to specific monitor recipients.

## Summary

Name testtorny	Notifications Global Monitor Recipient List	Type NetApp ONTAP Data Management Software	Inventory Recent Status  Error, Message ID: 6D441563	Note
Acquisition Unit WIN2K19IMAGE installed by eugene		Types of Data Collected Inventory, Performance	Performance Recent Status Stand-by	

1. Click **Advanced Configuration** to add additional configuration fields. (Not all data collectors require advanced configuration.)
2. Click **Test Configuration** to verify that the data collector is properly configured.
3. Click **Add Collector** to save the configuration and add the data collector to your Cloud Insights tenant.

After adding a new data collector, Cloud Insights initiates three polls:

- 1st inventory poll: immediately
- 1st performance data poll to establish a baseline: immediately after inventory poll
- 2nd performance poll: within 15 seconds after completion of 1st performance poll

Polling then proceeds according to the configured inventory and performance poll intervals.

## Determining data collector acquisition status

Because data collectors are the primary source of information for Cloud Insights, it is imperative that you ensure that they remain in a running state.

Data collector status is displayed in the upper right corner of any asset page as the message "Acquired N minutes ago", where N indicates the most recent acquisition time of the asset's data collector(s). The acquisition time/date is also displayed.

Clicking on the message displays a table with data collector name, status, and last successful acquisition time. If you are signed in as an Administrator, clicking on the data collector name link in the table takes you to detail page for that data collector.

## Managing configured data collectors

The Installed Data Collectors page provides access to the data collectors that have been configured for Cloud Insights. You can use this page to modify existing data collectors.

### Steps

1. In the Cloud Insights menu, click **Admin > Data Collectors**

The Available Data Collectors screen is displayed.

2. Click **Installed Data Collectors**

A list of all of the installed Data Collectors is displayed. The list provides collector name, status, the IP address the collector is accessing, and when data was last acquired from the a device. Action that can be performed on this screen include:

- Control polling

- Change data collector credentials
- Clone data collectors

## Controlling Data Collector polling

After making a change to a data collector, you might want it to poll immediately to check your changes, or you might want to postpone the data collection on a data collector for one, three, or five days while you work on a problem.

### Steps

1. In the Cloud Insights menu, click **Admin > Data Collectors**
2. Click **Installed Data Collectors**
3. Select the check box to the left of the Data Collector you want to change
4. Click **Bulk Actions** and select the polling action you want to take.

Bulk actions can be performed simultaneously on multiple Data Collectors. Select the data collectors, and chose the action to perform from the **Bulk Action** menu.

## Editing data collector information

You can edit existing data collector setup information.

### To edit a single data collector:

1. In the Cloud Insights menu, click **Admin > Data Collectors** to open the list of installed Data Collectors.
2. In the options menu to the right of the data collector you want to modify, click **Edit**.

The Edit Collector dialog is opened.

3. Enter the changes and click **Test Configuration** to test the new configuration or click **Save** to save the configuration.

You can also edit multiple data collectors:

1. Select the check box to the left of each data collector you want to change.
2. Click the **Bulk Actions** button and choose **Edit** to open the Edit data Collector dialog.
3. Modify the fields as above.



The data collectors selected must be the same vendor and model, and reside on the same Acquisition Unit.

When editing multiple data collectors, the Data Collector Name field shows “Mixed” and cannot be edited. Other fields such as user name and password show “Mixed” and can be edited. Fields that share the same value across the selected data collectors show the current values and can be edited.

When editing multiple data collectors, the **Test Configuration** button is not available.



## Cloning data collectors

Using the clone facility, you can quickly add a data source that has the same credentials and attributes as another data source. Cloning allows you to easily configure multiple instances of the same device type.

### Steps

1. In the Cloud Insights menu, click **Admin > Data Collectors**.
2. Click **Installed Data Collectors**.
3. Click the check box to the left of the data collector you want to copy.
4. In the options menu to the right of the selected data collector, click **Clone**.

The Clone Data Collector dialog is displayed.

5. Enter new information in the required fields.
6. Click **Save**.

### After you finish

The clone operation copies all other attributes and settings to create the new data collector.

## Performing bulk actions on data collectors

You can simultaneously edit some information for multiple data collectors. This feature allows you to initiate a poll, postpone polling, and resume polling on multiple data collectors. In addition, you can delete multiple data collectors.

### Steps

1. In the Cloud Insights menu, click **Admin > Data Collectors**
2. Click **Installed Data Collectors**
3. Click the check box to the left of the data collectors you want to modify.
4. In the options menu to the right, click the option you want to perform.

### After you finish

The operation you selected is performed on the data collectors. When you chose to delete data collectors, a dialog is displayed requiring you to conform the action.

## Researching a failed data collector

If a data collector has failure message and a High or Medium Impact, you need to research this problem using the data collector summary page with its linked information.

Use the following steps to determine the cause of failed data collectors. Data collector failure messages are displayed on the **Admin** menu and on the **Installed Data Collectors** page.

### Steps

1. Click **Admin > Data Collectors > Installed Data Collectors**.
2. Click the linked Name of the failing data collector to open the Summary page.
3. On the Summary page, check the Comments area to read any notes that might have been left by another

engineer who might also be investigating this failure.

4. Note any performance messages.
5. Move your mouse pointer over the segments of the Event Timeline graph to display additional information.
6. Select an error message for a Device and displayed below the Event Timeline and click the Error details icon that displays to the right of the message.

The Error details include the text of the error message, most likely causes, information in use, and suggestions of what can be tried to correct the problem.

7. In the Devices Reported By This Data Collector area, you might filter the list to display only devices of interest, and you can click the linked **Name** of a device to display the asset page for that device.
8. When you return to the data collector summary page, check the **Show Recent Changes** area at the bottom of the page to see if recent changes could have caused the problem.

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