Manage System Health

This section contains the following topics:

Monitor System and Application Health

The Crosswork Platform is built on an architecture consisting of microservices. Due to the nature of these microservices, there are dependencies across various services within the Crosswork system. The system and applications are considered Healthy if all services are up and running. If one or more services are down, then the health is considered Degraded. If all services are down, then the health status is Down.

From the main menu, choose **Crosswork Manager** to access the **Crosswork Summary** and **Crosswork Health** windows. Each window provides various views to monitor system and application health. It also supplies tools and information that, with support and guidance from your Cisco Customer Experience account team, you can use to identify, diagnose, and fix issues with the Cisco Crosswork cluster, Platform Infrastructure, and installed applications.

While both windows can give you access to the same type of information, the purpose of each summary and view is different.

Monitor Cluster Health

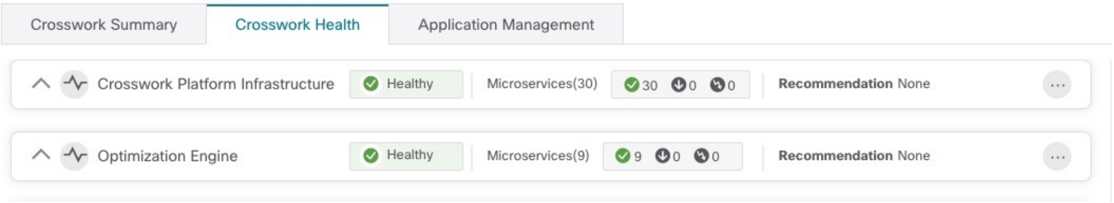
At a glance, the **Crosswork Summary** window (**Crosswork Manager** > **Crosswork Summary**) shows a summary of the overall system health. The main purpose of the **Crosswork Summary** window is to view Crosswork Cluster health in terms of hardware resources and VMs. For example, prior to installing or upgrading applications, you may want to check if the hardware resources are healthy and the VMs are running well. After clicking the **Crosswork Cluster** tile, you can visually see resource utilization and drill down on VMs to perform some VM or cluster-related activities. In another case, you may see degrading services or over utilization of hardware resources. At this point, from a hardware point of view, you might find that the number of VMs in the system is insufficient prompting you to add more VMs to scale the system further out. For more information, see Check Cluster Health.

In addition to accessing Crosswork Cluster health, you can click on the **Cisco Crosswork Platform Infrastructure** and application tiles to view more details such as microservices and alarms.

Monitor Platform Infrastructure and Application Health

The **Crosswork Health** window (**Crosswork Manager** > **Crosswork Health** tab) provides health summaries for the Cisco Crosswork Platform Infrastructure and installed applications with the addition of microservice status details.

Figure 1: Crosswork Health tab

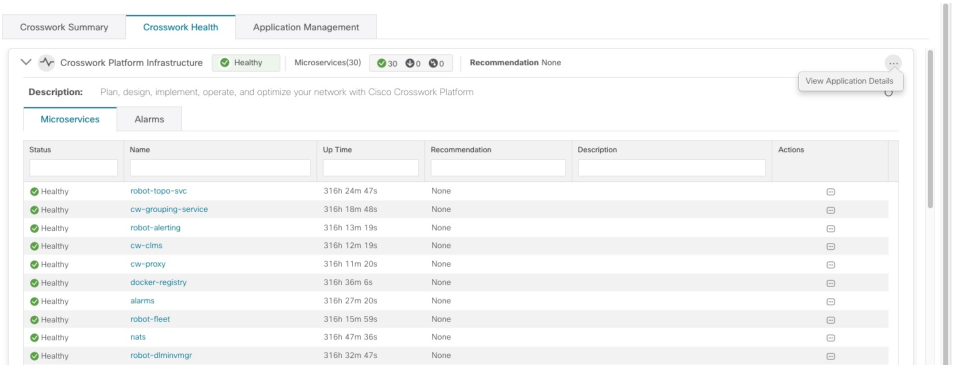


Crosswork Platform Infrastructure | Healthy | Microservices(30) | 30 0 0 | **Recommendation** None | ⋯

Optimization Engine | Healthy | Microservices(9) | 9 0 0 | **Recommendation** None | ⋯

Within this window, expand an application row to view Microservice and Alarm information.

Figure 2: Microservices Tab



Crosswork Platform Infrastructure | Healthy | Microservices(30) | 30 0 0 | **Recommendation** None

Description: Plan, design, implement, operate, and optimize your network with Cisco Crosswork Platform

Status	Name	Up Time	Recommendation	Description	Actions
Healthy	robot-topo-svc	316h 24m 47s	None		⊟
Healthy	cw-grouping-service	316h 18m 48s	None		⊟
Healthy	robot-alerting	316h 13m 19s	None		⊟
Healthy	cw-clms	316h 12m 19s	None		⊟
Healthy	cw-proxy	316h 11m 20s	None		⊟
Healthy	docker-registry	316h 36m 6s	None		⊟
Healthy	alarms	316h 27m 20s	None		⊟
Healthy	robot-fleet	316h 15m 59s	None		⊟
Healthy	nats	316h 47m 36s	None		⊟
Healthy	robot-dlminvmgr	316h 32m 47s	None		⊟

From the **Microservices** tab:

- View the list of microservices and, if applicable, associated microservices by clicking on the microservice name.
- Click ⋯ to restart or obtain Showtech data and logs per microservice.

Note Showtech logs must be collected separately for each application.

From the **Alarms** tab:

- Click the alarm description to drill down on alarm details.
- Change status of the alarms (Acknowledge, Unacknowledge, Clear)
- Add notes to alarms.

You can also download *all* of a Cisco Crosswork application or Cisco Crosswork Platform Showtech service logs and perform installation-related operations from the **Application Details** window. Click ⋯ to open the **Application Details** window.

Visually Monitor System Functions in Real Time

You can monitor the health of Cisco Crosswork and any of its functions in real time, using a set of monitoring dashboards you can access from the **Crosswork Manager** window.

Cisco Crosswork uses Grafana to create these dashboards. They give you a graphical view of the product's infrastructure, using metrics collected in its database. You can use these dashboards to diagnose problems you may encounter with individual Cisco Crosswork applications or their underlying services.

There are multiple monitor dashboards, categorized by the type of functionality they monitor and the metrics they provide. The following table lists some categories that may be available depending on whichCisco Crosswork applications are installed.

Table 1: Monitoring Dashboard Categories

This dashboard category...	Monitors...
Change Automation	Playbook functions. Metrics include the number of MOP jobs executed, response latency, API calls, database activity, and so on.
Optima	Feature pack, traffic, and SR-PCE dispatcher functions.
Collection - Manager	Device-data collection functions. Metrics include telemetry collection latencies, total collection operations, memory and database activity related to telemetry, delayed collections, and so on.
Health Insights	Key Performance Indicator functions. Metrics include the number of KPI alerts, API calls, and so on.
Infra	System infrastructure messaging and database activity.
Inventory	Inventory manager functions. These metrics include total numbers of inventory change activities.
Platform	System hardware and communications usage and performance. Metrics include disk and CPU usage, database size, network and disk operations, and client/server communications.
ZTP	Zero Touch Provisioning functions.

To conserve disk space, Cisco Crosswork maintains a maximum of 24 hours of collected metric data.

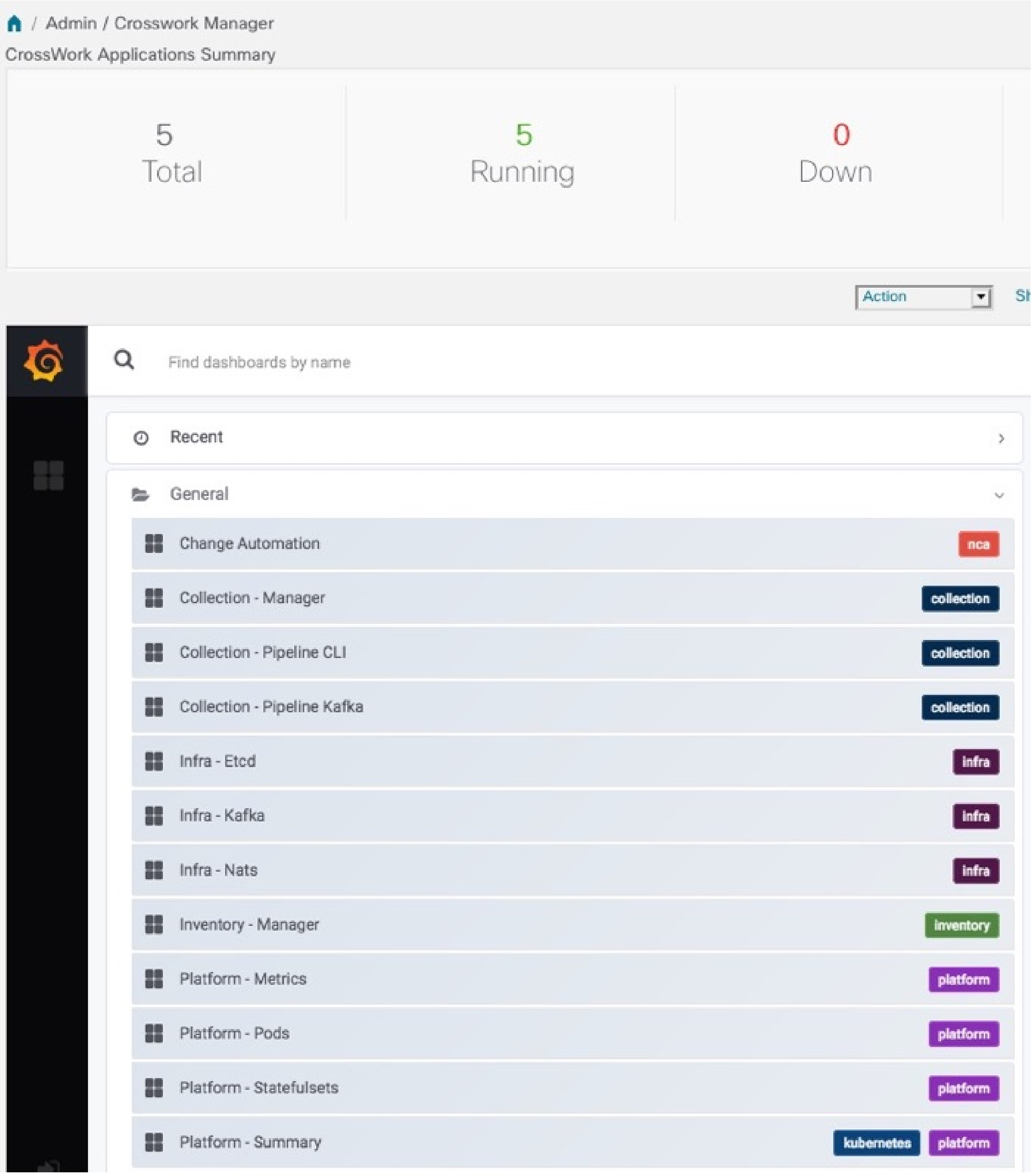
Grafana is an open-source visualization tool. The following provides general information about how to use the Cisco Crosswork implementation of Grafana. For more information about Grafana itself, see https://grafana.com and http://docs.grafana.org

Step 1 From the main menu, choose **Administration** > **Crosswork Manager** > **Crosswork Cluster**.

Step 2 At the top right, click **View more visualizations**.

The Grafana user interface appears.

Step 3 In the Grafana user interface, click **Home**. Grafana displays the list of monitoring dashboards and their categories, as shown in the following example.



/ Admin / Crosswork Manager

CrossWork Applications Summary

5 Total

5 Running

0 Down

Action

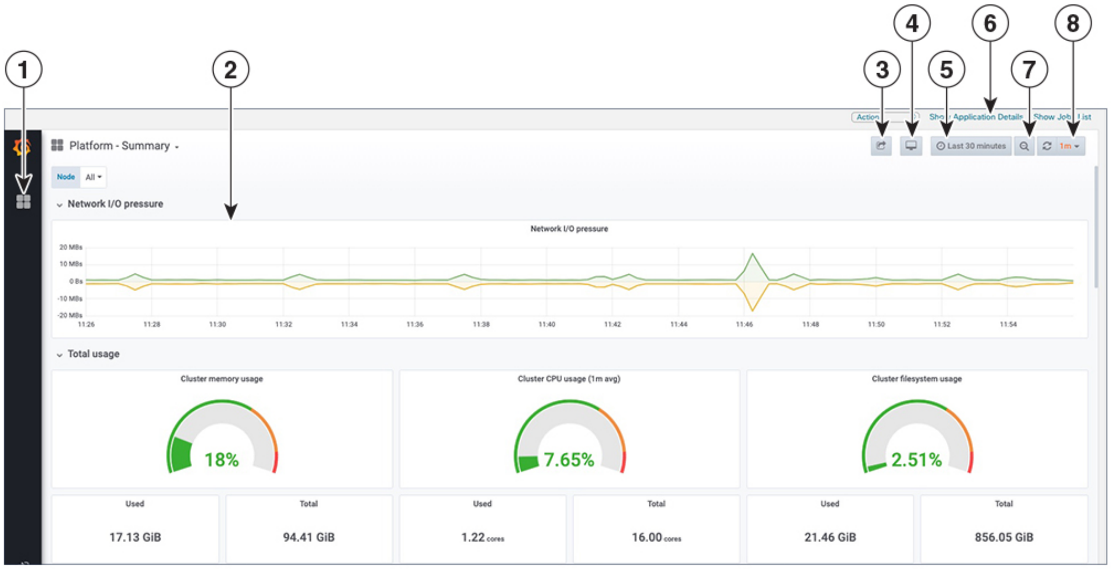
Find dashboards by name

Recent

General

Change Automation	nca
Collection - Manager	collection
Collection - Pipeline CLI	collection
Collection - Pipeline Kafka	collection
Infra - Etcd	infra
Infra - Kafka	infra
Infra - Nats	infra
Inventory - Manager	inventory
Platform - Metrics	platform
Platform - Pods	platform
Platform - Statefulsets	platform
Platform - Summary	kubernetes platform

Step 4 Click the the dashboard you want to view. For example: Clicking on **Platform - Summary** dashboard displays a view like the one shown in the following figure.



Step 5 Scroll the dashboard as needed to display all of the metrics it provides, or select any of the functions described in the following table.

Item	Description
1	**Dashboard Icon**: Click the icon to re-display the dashboard list and select a different dashboard.
2	**Time Series Graph Zoom**: You can zoom in on a specific time period within the graph of any time series data, as follows: **a.** Click a time-period starting point in the graph line and hold down the mouse. **b.** Drag the cursor to the endpoint. Light gray shading will appear in the block you are selecting. When you reach the endpoint, release the mouse. To reset a zoomed time series graph to the default, click the **Zoom Out icon**.
3	**Share Dashboard icon**: Click the icon to make the dashboard you are viewing shareable with other users. Clicking this icon displays a popup window with tabs and options to share the dashboard in your choice of these forms: • **URL Link**: Click the **Link** tab and then click **Copy** to copy the dashboard's URL to your clipboard. You can also choose whether to retain the current time and template settings with the URL. • **Local Snapshot File**: Click the **Snapshot** tab and then click **Local Snapshot**. Grafana creates a local snapshot of the dashboard on the server. When the snapshot is ready, click **Copy Link** to copy the URL of the snapshot to your clipboard. • **Export to JSON File**: Click the **Export** tab and then click **Save to file**. You will be prompted to save or open the exported JSON file. You can also choose to turn data source names in the file into templates by selecting the **Export for sharing externally** checkbox before clicking **Save to file**. • **View JSON File and Copy to Clipboard**: Click the **Export** tab and then click **View JSON** (you can choose to templatize data source names by selecting the **Export for sharing externally** checkbox before clicking **View JSON**). Grafana displays the exported JSON code in a popup window. Click **Copy to Clipboard** to copy the file to your clipboard.

Item	Description
4	**Cycle View Mode icon**: Click this icon to toggle between the default Grafana **TV** view mode and the **Kiosk** mode. The **Kiosk** view hides most of the Grafana menu. Press **Esc** to exit the **Kiosk** view.
5	**Time/Refresh Selector**: Indicates the time period for the metrics displayed in the dashboard and how often the metrics are refreshed. Click the selector to choose a different time range and refresh rate. You can specify a custom pair of time-range start and end points, or choose from one of several predefined ranges, such as **Today so far** or **Last three hours**. You can choose predefined refresh rates from **Off** to **2 Days**. When you have finished making changes, click **Apply**. When making selections, remember only 24 hours of data is stored. If you select time ranges or refresh rates beyond that limit, the dashboard may be blank.
6	**Zoom Out icon**: Click this icon to reset a zoomed time series graph back to the unzoomed state.
7	**Refresh icon**: Immediately or choose time interval to refresh the data shown.

Check System Health Example

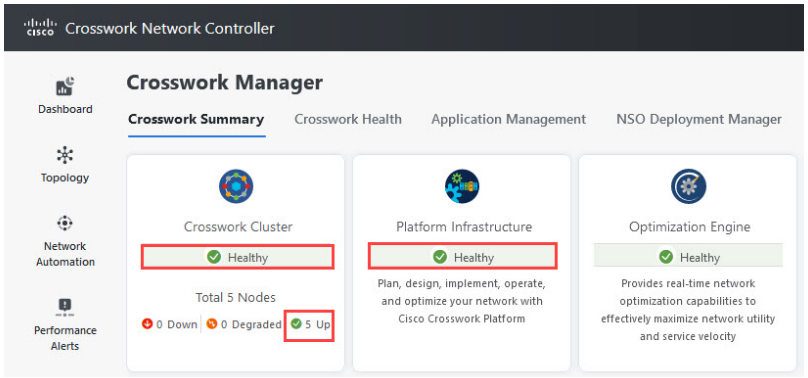
In this example, we navigate through the various windows and what areas should be checked for a healthy Crosswork system.

Step 1 Check overall system health.

a) From the main menu, choose **Administration** > **Crosswork Manager** > **Crosswork Summary** tab.

b) Check that all the nodes are in Operational state (Up) and that the Crosswork Cluster and Platform Infrastructure is Healthy.

Figure 3: Crosswork Summary



Plan, design, implement, operate, and optimize your network with Cisco Crosswork Platform

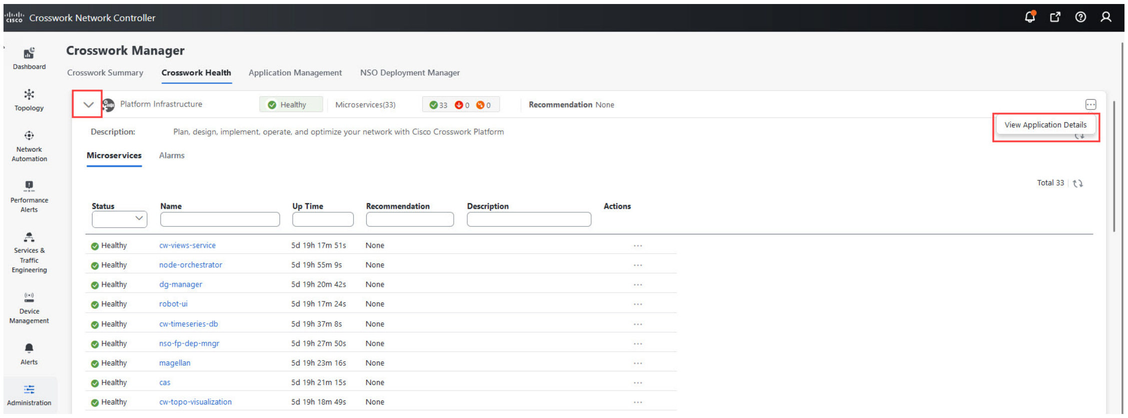
Provides real-time network optimization capabilities to effectively maximize network utility and service velocity

Step 2 Check and view detailed information about the microservices that are running as part of the Crosswork Platform Infrastructure.

a) Click the **Crosswork Health** tab.

b) Expand the Crosswork Platform Infrastructure row, click ⋯, and select **Application Details**.

Figure 4: Crosswork Health



Crosswork Manager

Platform Infrastructure | Healthy | Microservices(33) | 33 0 0 | Recommendation None

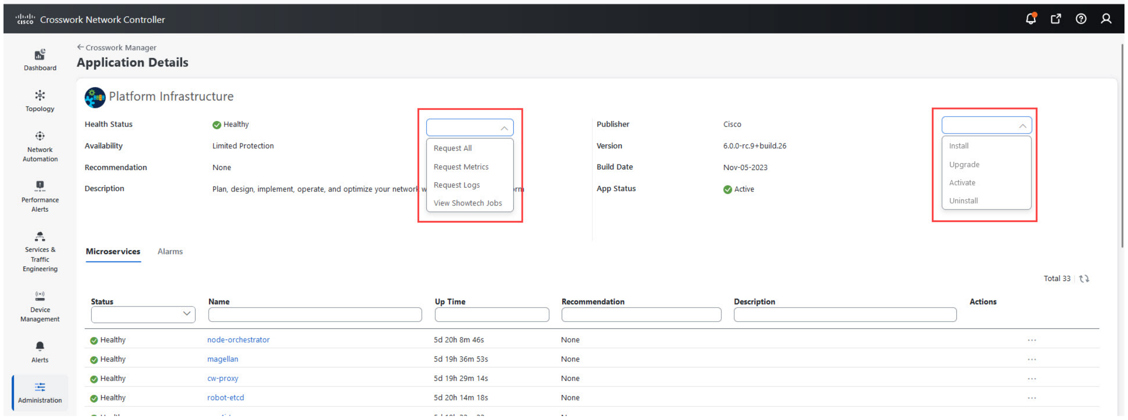
Description: Plan, design, implement, operate, and optimize your network with Cisco Crosswork Platform

Total 33

Status	Name	Up Time	Recommendation	Description	Actions
Healthy	cw-views-service	5d 19h 17m 51s	None		⋯
Healthy	node-orchestrator	5d 19h 55m 9s	None		⋯
Healthy	dg-manager	5d 19h 20m 42s	None		⋯
Healthy	robot-ui	5d 19h 17m 24s	None		⋯
Healthy	cw-timeseries-db	5d 19h 37m 8s	None		⋯
Healthy	nso-fp-dep-mngr	5d 19h 27m 50s	None		⋯
Healthy	magellan	5d 19h 23m 16s	None		⋯
Healthy	cas	5d 19h 21m 15s	None		⋯
Healthy	cw-topo-visualization	5d 19h 18m 49s	None		⋯

c) From the **Application Details** window, you can check and review microservice details, restart microservices, and collect showtech information. You can also perform installation-related tasks from this window.

Figure 5: Application Details



Application Details

Platform Infrastructure

Health Status: Healthy
Availability: Limited Protection
Recommendation: None
Description: Plan, design, implement, operate, and optimize your network w

Publisher: Cisco
Version: 6.0.0-rc.9+build.26
Build Date: Nov-05-2023
App Status: Active

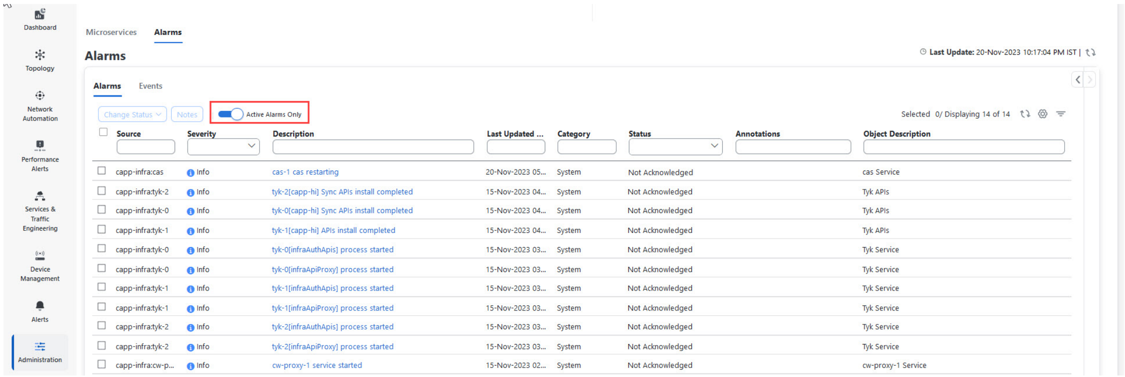
Total 33

Status	Name	Up Time	Recommendation	Description	Actions
Healthy	node-orchestrator	5d 20h 8m 46s	None		⋯
Healthy	magellan	5d 19h 36m 53s	None		⋯
Healthy	cw-proxy	5d 19h 29m 14s	None		⋯
Healthy	robot-etcd	5d 20h 14m 18s	None		⋯

Step 3 Check and view alarms related to the microservices.

a) Click the **Alarms** tab. The list only displays Crosswork Platform Infrastructure alarms. You can further filter the list by viewing only active alarms.

Figure 6: Alarms



Alarms

Last Update: 20-Nov-2023 10:17:04 PM IST |

Selected 0/ Displaying 14 of 14

□	Source	Severity	Description	Last Updated ...	Category	Status	Annotations	Object Description
□	capp-infra:cas	Info	cas-1 cas restarting	20-Nov-2023 05...	System	Not Acknowledged		cas Service
□	capp-infra:tyk-2	Info	tyk-2[capp-hi] Sync APIs install completed	15-Nov-2023 04...	System	Not Acknowledged		Tyk APIs
□	capp-infra:tyk-0	Info	tyk-0[capp-hi] Sync APIs install completed	15-Nov-2023 04...	System	Not Acknowledged		Tyk APIs
□	capp-infra:tyk-1	Info	tyk-1[capp-hi] APIs install completed	15-Nov-2023 04...	System	Not Acknowledged		Tyk APIs
□	capp-infra:tyk-0	Info	tyk-0[infraAuthApis] process started	15-Nov-2023 03...	System	Not Acknowledged		Tyk Service
□	capp-infra:tyk-0	Info	tyk-0[infraApiProxy] process started	15-Nov-2023 03...	System	Not Acknowledged		Tyk Service
□	capp-infra:tyk-1	Info	tyk-1[infraAuthApis] process started	15-Nov-2023 03...	System	Not Acknowledged		Tyk Service
□	capp-infra:tyk-1	Info	tyk-1[infraApiProxy] process started	15-Nov-2023 03...	System	Not Acknowledged		Tyk Service
□	capp-infra:tyk-2	Info	tyk-2[infraAuthApis] process started	15-Nov-2023 03...	System	Not Acknowledged		Tyk Service
□	capp-infra:tyk-2	Info	tyk-2[infraApiProxy] process started	15-Nov-2023 03...	System	Not Acknowledged		Tyk Service
□	capp-infra:cw-p...	Info	cw-proxy-1 service started	15-Nov-2023 02...	System	Not Acknowledged		cw-proxy-1 Service

Step 4 View which Crosswork applications are installed.

a) From the main menu, choose **Administration** > **Crosswork Manager** > **Application Management** tab and click **Applications**. This window displays all applications that have been installed. You can also click **Add File (.tar.gz)** to install more applications.

Step 5 View the status of jobs.

a) Click the **Job History** tab. This window provides the information regarding the status of jobs and the sequence of events that have been executed as part of the job process.

View System and Network Alarms

You can view alarms by navigating to one of the following:

- From the main Crosswork window, click 🔔.
- From the main menu, choose **Administration** > **Alarms**.
- For application specific alarms, choose **Administration** > **Crosswork Manager** > **Crosswork Health** tab. Expand one of the applications and select the **Alarms** tab.

From the **Alarms** tab:

- Click the alarm description to drill down on alarm details.
- Change status of the alarms (Acknowledge, Unacknowledge, Clear)
- Add notes to alarms.

System Events

To help an operator troubleshoot issues, Crosswork Infrastructure has a Syslog feature that forwards system-related events to an external server (see Configure a Syslog Server and Configure a Trap Server).

All the events related to the Crosswork platform are classified broadly into three categories: Day 0, Day 1, and Day 2. The following table lists the event categories (day 0, day 1, and day 2) and sample events or actions within that category:

Note See the Cisco Crosswork Network Controller Supported Alarms and Events document for the complete list of supported alarms and events.

Table 2: Event Classification

Event Classification	Sample Events and Actions
Day 0 – Events related only to Crosswork Infrastructure installation.	• Checking the status of the cluster • Adding a worker node • Slow disk or latency issues
Day 1 – Events related to Crosswork application installation.	• Restarting a microservice • Restarting a microservice fails • Installing an application successfully • Activating an application successfully • Application is still not healthy within 3 minutes of activation • Node drain fails • Activating an application fails • Removing a worker node

Event Classification	Sample Events and Actions
Day 2 – Events related to system operations and maintenance.	• Node eviction • Node eviction clean up fails • Deactivating an application fails • Uninstallation of an application fails • Slow disk or network • Node removal • Node insertion • Node drain fails • K8S ETCD clean up • Node removal fails • Node deletion fails • Deactivating an application successfully • Uninstalling an application successfully

Sample Day 0, Day 1, and Day 2 Events

The following tables list related information to various Day 0, Day 1, and Day 2 events in a functional system.

Day 0 Events

These checks can help determine whether the system is healthy.

Table 3: Adding a Worker Node

Severity	Major
Description	A VM node has been added. This event occurs when the K8 cluster detects a node.
Sample Alarm	None
Sample Syslog Message	`<time_stamp> <hosting_hybrid_node> <time_stamp> <crosswork_VIP> orchestrator-capp-infra - b54ec903-9e0f-49b8-aaf3-1d72cf644c28 vm4wkr-0 'Successfully added new VM into Inventory: vm4wkr'`
Recommendation	Monitor and confirm that the VM node appears in the UI with a healthy status.

Table 4: Slow Disk or Latency in Network Issues

Severity	Critical
Description	This event occurs when the Infrastructure Capp untar takes more than 1.5 minutes or if the Docker push takes more than 2 minutes to complete. This message can be found in the firstboot.log file.
Sample Alarm	Not applicable
Sample Syslog Message	Not applicable
Recommendation	This issue must be addressed before further operations can be made on the system. Do the following: • Check that disk storage and network SLA requirements are met. • Confirm that the observed bandwidth is the same as what is provisioned between the nodes. • If using RAID, confirm it is RAID 0.

Day 1 Events

Table 5: Removing a Worker Node

Severity	Major
Description	This event occurs when a VM node is erased.
Sample Alarm	None

Sample Syslog Message	`<time_stamp> <hosting_hybrid_node>`
	`<time_stamp> <crosswork_VIP>`
	`CLUSTER-CLUSTER -`
	`33a5ce0d-6cd0-4e4d-8438-85cfa8fb4ae9`
	`CLUSTER-99`
	`'user=admin,policyId=admin,backend=local,loginTime=2021-02-`
	`28T01:38:48Z,Category=VM`
	`Manager,RequestId=vm4wkr [Erase VM []]'`

Recommendation	Monitor and confirm that the VM node is no longer seen in the UI. If the erase operation fails, attempt to erase the node again.

Table 6: Adding an Application—Success

Severity	Information
Description	This event occurs when an application is added successfully.

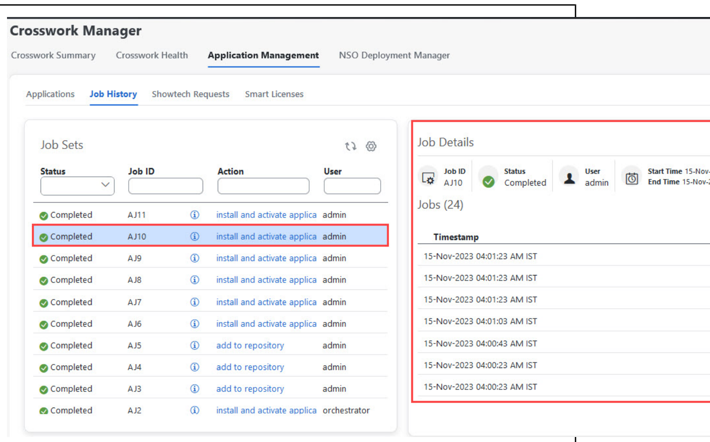
Alarm	 Crosswork Manager Crosswork Summary · Crosswork Health · Application Management · NSO Deployment Manager Applications · Job History · Showtech Requests · Smart Licenses Job Sets Status · Job ID · Action · User Completed · AJ11 · install and activate applica · admin Completed · AJ10 · install and activate applica · admin Completed · AJ9 · install and activate applica · admin Completed · AJ8 · install and activate applica · admin Completed · AJ7 · install and activate applica · admin Completed · AJ6 · install and activate applica · admin Completed · AJ5 · add to repository · admin Completed · AJ4 · add to repository · admin Completed · AJ3 · add to repository · admin Completed · AJ2 · install and activate applica · orchestrator Job Details Job ID AJ10 · Status Completed · User admin · Start Time 15-Nov- · End Time 15-Nov- Jobs (24) Timestamp 15-Nov-2023 04:01:23 AM IST 15-Nov-2023 04:01:23 AM IST 15-Nov-2023 04:01:23 AM IST 15-Nov-2023 04:01:03 AM IST 15-Nov-2023 04:00:43 AM IST 15-Nov-2023 04:00:23 AM IST 15-Nov-2023 04:00:23 AM IST
Syslog Message	*<time_stamp> <hosting_hybrid_node>* *<time_stamp> <crosswork_VIP>* CLUSTER-CLUSTER - 627b2140-a906-4a96-b59b-1af22f2af9f6 CLUSTER-99 'job_type=INSTALL_AND_ACTIVATE_APPLICATION,manager=app_manager: ,user=admin,policyId=admin,backend=local,loginTime=2021-02- 28T09:34:54Z,payload={"package_identifier":{"id":"cappztp"," version":"1.1.0-prerelease.259+build.260"}} [accepted]'
Recommendation	None

Table 7: Adding an Application—Failure

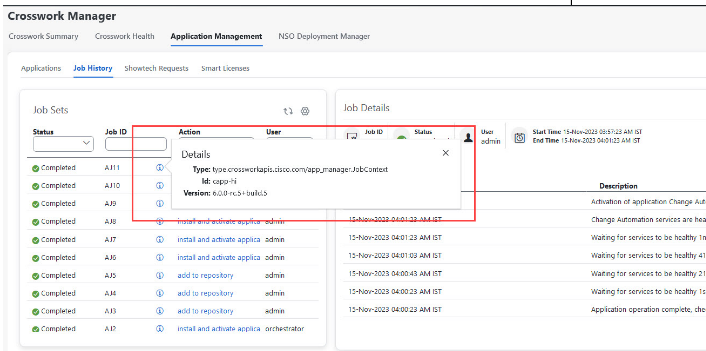
Severity	Information
Description	This event occurs when an application cannot be added.
Sample Alarm	 Crosswork Manager Crosswork Summary · Crosswork Health · Application Management · NSO Deployment Manager Applications · Job History · Showtech Requests · Smart Licenses Job Sets Status · Job ID · Action · User Completed · AJ11 Completed · AJ10 Completed · AJ9 Completed · AJ8 · install and activate applica · admin Completed · AJ7 · install and activate applica · admin Completed · AJ6 · install and activate applica · admin Completed · AJ5 · add to repository · admin Completed · AJ4 · add to repository · admin Completed · AJ3 · add to repository · admin Completed · AJ2 · install and activate applica · orchestrator Details Type: type.crossworkapis.cisco.com/app_manager.JobContext Id: capp-hi Version: 6.0.0-rc.5+build.5 Job Details Job ID · Status · User admin · Start Time 15-Nov-2023 03:57:23 AM IST · End Time 15-Nov-2023 04:01:23 AM IST Description Activation of application Change Aut 15-Nov-2023 04:01:23 AM IST · Change Automation services are hea 15-Nov-2023 04:01:23 AM IST · Waiting for services to be healthy 1n 15-Nov-2023 04:01:03 AM IST · Waiting for services to be healthy 41 15-Nov-2023 04:00:43 AM IST · Waiting for services to be healthy 21 15-Nov-2023 04:00:23 AM IST · Waiting for services to be healthy 1s 15-Nov-2023 04:00:23 AM IST · Application operation complete, che
Sample Syslog Message	None
Recommendation	After fixing the error, try adding the application again.

Table 8: Activating an Application—Success

Severity	Information

Description	This event occurs after an application is activated successfully.
Sample Alarm	None

Syslog Message	`<time_stamp> <hosting_hybrid_node>`
	`<time_stamp> <crosswork_VIP>`
	`orchestrator-Crosswork Health Manager -`
	`010689d1-8842-43c2-8ebd-`
	`5d91ded9d2d7 cw-ztp-service-0-0 '`
	`cw-ztp-service-0 is healthy.'`

Recommendation	Activate the application and license.

Table 9: Activating an Application—Failure

Severity	Critical
Description	This event occurs if an application cannot be activated. The activation may fail because microservices or pods do not come up in time.
Sample Alarm	None
Syslog Message	None
Recommendation	Do the following: • Look at the job history and identify where in the activation process it failed. If it fails at the start of one of the pods coming up, restart the pods. • Uninstall the application and then try installing the application again.

Table 10: Application Remains Unhealthy after 3 Minutes

Severity	Major
Description	This event occurs if the application was activated successfully but the components remain unhealthy after 3 minutes after application activation.
Sample Alarm	None
Sample Syslog Message	None
Recommendation	You can wait longer and if it becomes healthy, clear the alarm. Contact Cisco TAC if it still appears unhealthy after some time.

Day 2 Events

Table 11: Node Drain—Cleanup

Severity	Information
Description	A node drain occurs if you erase a VM node or if the node has been unresponsive for more than 5 minutes. During the drain operation, pods running on the node are moved (clustered pods may move or go pending, single instance pods will move to another node).
Sample Alarms	• Node Drain Failed • K8s ETCD Cleanup Failed on Node Removal • Node Delete
Syslog Message	`<time_stamp> <hosting_hybrid_node> <time_stamp> <crosswork_VIP> orchestrator-Crosswork Health Manager - b062232f-54dc-49b2-8283-506b7bf672a6 astackserver-0-0 ' astackserver-0 health is degraded.'`
Recommendation	Monitor the operation. If the drain is a result of eviction, erase the respective node and insert a new one.

Table 12: Node Drain—Failure

Severity	Major
Description	A node drain occurs if you erase a VM node or if the node has been unresponsive for more than 5 minutes. This event occurs if the node drain operation fails.
Sample Alarm	None
Sample Syslog Message	`<time_stamp> <hosting_hybrid_node> <time_stamp> <crosswork_VIP> orchestrator-Crosswork Health Manager - b062232f-54dc-49b2-8283-506b7bf672a6 astackserver-0-0 ' astackserver-0 health is degraded.'`
Recommendation	Try erasing the node again.

Table 13: Node Eviction—Failure

Severity	Critical

Description	In this scenario we assume that one of the hybrid nodes fails. This event occurs if the node has been down for more than 5 minutes and it is automatically taken out of service. This event can be triggered if someone stopped or deleted a VM without using Cisco Crosswork or if there is a network outage to that node. K8s automatically start evicting pods on that node (drain eviction operation). The VM node will be marked down during a successful cleanup.
Sample Alarm	• Node Eviction Cleanup Failure • K8S ETCD Cleanup Failed on Node Removal
Syslog Message	None
Recommendation	Erase the faulty node and insert a new VM.

Table 14: Node Eviction—Cleanup Failure

Severity	Critical
Description	This event occurs when the drain eviction fails. The node has been down for more than 5 minutes and K8s automatically start evicting pods on that node.
Sample Alarm	None
Sample Syslog Message	None
Recommendation	Erase the node and attempt another cleanup operation.

Table 15: Resource Footprint Shortage

Severity	Critical
Description	This event occurs when cluster node resources are being highly utilized and there is a lack of a resource footprint.
Sample Alarm	None
Sample Syslog Message	None
Recommendation	Add a new worker node.

Table 16: Deactivating an Application—Success

Severity	Minor

Description	This event occurs when an application is deactivated.
Sample Alarm	None
Sample Syslog Message	*<time_stamp> <hosting_hybrid_node>* *<time_stamp> <crosswork_VIP>* CLUSTER-CLUSTER - ade982ea-7f60-4d6b-b7e0-ebafc789edee CLUSTER-99 © 2021 Cisco and/or its affiliates. All rights reserved. Cisco Confidential - DRAFT version 1 'user=admin,policyId=admin,backend=local,loginTime=2021-02- 28T09:34:54Z,job_type=UNINSTALL_APPLICATION,manager=app_manager: ,payload={"application_id":"capp-ztp"} [accepted]'
Recommendation	None

Table 17: Deactivating an Application—Failure

Severity	Critical
Description	This event occurs when an application cannot be deactivated. This can occu if microservices or pods are still running.
Sample Alarm	None
Syslog Message	None
Recommendation	Do the following: • Look at the job history and identify where in the activation process it failed. If it fails at the start of one of the pods coming up, restart the pods. • Uninstall the application and then try installing the application again.

Table 18: Slow Disk or Latency in Network Issues

Severity	Critical
Description	This event occurs when the Infrastructure Capp untar takes more than 1.5 minutes or if the Docker push takes more than 2 minutes to complete. This message can be found in the firstboot.log file.
Sample Alarm	Not applicable
Sample Syslog Message	Not applicable

Recommendation	This issue must be addressed before further operations can be made on the system. Do the following: • Check that disk storage and network SLA requirements are met. • Confirm that the observed bandwidth is the same as what is provisioned between the nodes. • If using RAID, confirm it is RAID 0.

Note There a one-time check performed to ensure the hardware attempts to meet the Disk SLA. If this fails, a critical alarm is issued. User can address the alarm as needed and manually clear the alarm.

Table 19: ETCD Cleanup

Severity	Information
Description	This event occurs if someone erases a VM node and the ETCD clean membership cleanup operation begins.
Sample Alarms	If ETCD cleanup fails: • K8S ETCD Cleanup Failed on Node Removal • Alarm Node Delete
Syslog Message	None
Recommendation	Monitor operation.

Table 20: K8S ETCD Cleanup Failed on Node Removal

Severity	Major
Description	This event occurs if the ETCD cleanup operation fails.
Sample Alarm	None
Sample Syslog Message	None
Recommendation	Try erasing the node again.

Table 21: Restart Microservices—Failure

Severity	Warning
Description	This event occurs when someone restarts a microservice or pod and the operation fails.

Sample Alarm	None
Sample Syslog Message	None
Recommendation	Restart the microservices or pods. You may have to do this a few times to see if it recovers.

Enable Trap Handling

In addition to UI options, REST APIs, and Syslogs, Cisco Crosswork also provides the capability to generate SNMP traps for the events/alarms to notify the application and cluster health.

Crosswork supports using SNMPv2 to send the traps. The alarms and events are filtered based on the criteria set by user and converted to traps and sent to the trap server (see Configure a Trap Server) using the alarm model in CISCO-EPM-NOTIFICATION-MIB. For more information, see Cisco EPM Notification MIB.

Collect Audit Information

Audit logs map user information with all the critical user actions performed in the system. To view application Showtech logs, see Monitor Platform Infrastructure and Application Health, on page 2.

The audit log includes user actions related to the following operations:

- Device onboarding
- User creation, deletion, and configuration updates
- Crosswork Data Gateway management operations
- Collection job creation
- Administrative tasks (show-tech execution, topology updates, NSO-related actions)
- Cisco Crosswork Change Automation and Health Insights:
  - Manage playbooks (import, export, or delete) and playbook execution.

    Note When a playbook execution request is sent, Change Automation prints an audit log. The audit log includes details like the playbook name, user information, session details, and the execution ID of the job. When Change Automation executes a playbook maintenance task, it also prints an audit log. The maintenance audit log contains details such as the execution ID. If it performs the commit on NSO, the maintenance audit log details also include the commit label. You can use the audit log to identify all the commit labels associated with an execution ID. Use the commit labels to perform a lookup on the NCS CLI. The lookup shows the exact configuration changes that Change Automation pushed to the device.

  - KPIs, KPI Profiles, and Alert group creation, deletion, and configuration updates

  - Enabling and disabling of KPI Profiles

- Cisco Crosswork Optimization Engine:
  - SR-TE policy and RSVP TE tunnel creation, deletion, and configuration updates
  - Affinity mapping configuration
  - Bandwidth on Demand and Bandwidth Optimization function and configuration updates
  - RESTCONF API creation, deletion, and configuration updates

Sample Cisco Crosswork Change Automation and Health Insights Audit Log Entry

The following is a sample audit log entry created when a local admin user runs a playbook.

```
time="2020-06-09 21:24:31.103312" level=info msg="playbook scheduled for execution"
backend=local execution_id=1591737871096-a6699d03-8264-4ea8-8f6f-03e8a58f32a3
latency=11.330355ms loginTime="2020-06-09T20:27:11Z" method=POST
playbook="router_config_traffic_steering" policyId=admin
set_id=5405fdb1-6b37-41cb-94a3-32b180d3b773 set_name=static-acl-b180d3b773
tag="ROBOT_manager-nca-7689b-fdn8g" user=admin
```

Sample Cisco Crosswork Optimization Engine Audit Log Entries

Crosswork Optimization Engine UI Audit Log Entry Example

```
2020-06-12 02:48:07,990 INFO c.c.s.o.e.AuditLogger [http-nio-8080-exec-3] time=2020-06-12
02:48:07.000990 message=SR Policy created successfully. user=admin policyId=admin
backend=local loginTime=1591929794
{data={"headEnd":"192.168.0.2","endPoint":"192.168.0.6","color":"999","description":"","profileId":"","bindingSid":"333",
 "path":{"type":"dynamic","pathName":"Automation_validating_sr","metric":"IGP",
"affinity":[{"constraintType":"EXCLUDE_ANY","affinity":[31]}],"disjointness":{"disjointType":"",
 "associationGroup":"","subId":""}, "protectedSegment":"SEG_PROTECTED"}}}
```

Crosswork Optimization Engine RESTCONF API Audit Log Entry Example

```
time="2020-06-06 13:49:06,308"
message="action=/operations/cisco-crosswork-optimization-engine-sr-policy-operations:sr-policy-delete,
 input={\"input\": {\"sr-policies\": [{\"head-end\": \"192.168.0.2\", \"end-point\":
\"192.168.0.3\", \"color\": 301}]}},
output={\"cisco-crosswork-optimization-engine-sr-policy-operations:output\":{\"results\":
[{\"head-end\":\"192.168.0.2\",\"end-point\":\"192.168.0.3\",\"color\":301, \"message\":\"SR
 policy  not found in Config DB\",\"state\":\"failure\"}]}}" user=admin policyId=admin
backend=local loginTime=1591451346 method=POST
url=/operations/cisco-crosswork-optimization-engine-sr-policy-operations:sr-policy-delete
```

Table 22: Common Audit Log Entry Fields

Field	Description
time	The time that Crosswork created this audit log.
message	Message sent between applications.
msg	Message sent between applications.
user	Name of the user.
policyId	Role or permission of user (taken from local database, TACACS, or LDAP server).

Field	Description
backend	The server (local database, TACACS, or LDAP) authenticating users.
loginTime	The epoch time when the user has logged in. Epoch time is intentionally selected, as it shorter and independent of time zones.
Other fields	Individual applications use more fields specific to that application. For example: • In the sample audit log entry for Cisco Crosswork Change Automation and Health Insights, the **playbook** field refers to the playbook that Change Automation executed. • In the UI audit log entry for Crosswork Optimization Engine, **data** is a field that refers to the creation details of an SR-TE policy and its attributes.

Audit Log Location

Crosswork stores audit logs in `/var/log/audit/audit.log`, under the respective application pods. For example:

- The sample Change Automation audit log is in the `<robot-nca>` data directory under the pod.
- The sample Crosswork Optimization Engine UI audit log is in the `optima-uiservice` pod; the RESTCONF API audit log is under the `optima-restconf` pod.

In addition to the individual application audit logs, Cisco Crosswork collects all audit log files are once each hour. Crosswork stores them as separate gzipped tar files in the following data directory: `/mnt/robot_datafs/<app-name>/<instance>/auditlogs/auditlogs.tar.gz`

Crosswork collects audit log files based on the specified maximum size and number of backups for each application. For example: **`MaxSize:20 megabytes`** and **`MaxBackups: 5`**.

View Audit Log

The **Audit Log** window tracks the following AAA-related events:

- Create, update, and delete users
- Create, update, and delete roles
- User login activites - login, logout, login failure due to maximum active session limit, and account locked due to maximum login failures.
- Source IP - IP address of the machine from where the action was performed. This column appears only when you check the **Enable source IP for auditing** check box and relogin to Cisco Crosswork. This check box is available in the **Source IP** section of the **Administration** > **AAA** > **Settings** page.
- Password modification by user

To view the audit log, perform the following steps:

Step 1 From the main menu, choose **Administration** > **Audit Log**.

The **Audit Log** window is displayed.

Step 2 Click ▼ to filter the results based on your query.