Perform Administrative Tasks

This section contains the following topics:

Manage Users

From the main menu, select **Admin** > **Users** to display the **User Management** window. Using this window, you can add a new user, edit the settings for an existing user, delete a user from the network, and create user roles.

Note

Before you can create a new user that does *not* have admin-level access to Cisco Crosswork Optimization Engine functionality, you must first create a new role that limits the features they can access. See Create User Roles for more information.

Only a local admin user can add, update, and delete other local user accounts. A TACACS+ user, regardless of role assigned, will not be able to manage local users.

Administrative Users Created During Installation

During installation, Cisco Crosswork Optimization Engine creates two special administrative IDs:

1. The **virtual machine administrator**, with the username `cw-admin`, and the default password`cw-admin` . Data center administrators use this ID to log in to and troubleshoot the VM hosting the Cisco Crosswork Optimization Engine server.
2. The **Crosswork administrator**, with the username `admin` and the default password `admin`. Product administrators use this ID to log in to and configure the Cisco Crosswork Optimization Engine user interface, and to perform special operations, such as creating new user IDs.

The default password for both administrative user IDs must be changed the first time they are used. You can also change the Crosswork administrator password using the following methods:

- Log in as the admin user and edit the admin user password, as explained in Edit Users, on page 2.
- Enter the following command: `admin(config)# username admin <password>`

Add Users

Follow the steps below to create a new Cisco Crosswork Optimization Engine user ID.

The user ID's user name must be unique. You cannot create a new user ID with the same user name as an existing user ID.

The special administrative user names **`admin`** (for administering Cisco Crosswork Optimization Engine) and **`cw-admin`** (for administering the virtual machine hosting the product) are created during installation and are reserved for those purposes (see Administrative Users Created During Installation, on page 1).

Step 1 From the main menu, choose **Admin** > **Users**.

The **User Management** window opens.

If it is not already displayed, click the **User Management** tab.

Step 2 Click ⊞ to open the **Add New User** dialog box.

Step 3 Enter the following information for the user you are adding:

- **User Name**: Enter the name of the user ID. User Names cannot contain spaces or special characters.
- **First Name** and **Last Name**: Enter the first and last name of the person assigned to this user ID.
- **Password** and **Confirm Password**: Enter the default password for this user ID. The user will be required to change the default password the first time they attempt to log on using it.

Step 4 From the **Select Role** drop-down at the bottom of the dialog box, choose the role that you want to assign to the user.

See Create User Roles for more information.

Step 5 Click **Add**.

Edit Users

Users with administrator privileges can edit any user ID's User Name, First Name, Last Name, and Role.

Administrators cannot change a user's password by editing the user ID. Users can change their passwords by logging in, clicking 👤, and selecting **Change Password**.

Step 1 From the main menu, choose **Admin** > **Users**.

The **User Management** window opens.

If it is not already displayed, click the **User Management** tab.

Step 2 Click on the user ID whose settings you want to update, then click ✎ to open the **Edit User** dialog box.

Step 3 Make the necessary updates to the user ID.

Step 4 Click **Update** to save your changes.

Delete Users

Follow the steps below to delete an existing user ID.

The administrative user IDs **`admin`** and **`cw-admin`** created during installation cannot be deleted (see Administrative Users Created During Installation, on page 1).

Step 1 From the main menu, choose **Admin** > **Users**.

The **User Management** window opens.

If it is not already displayed, click the **User Management** tab.

Step 2 Click on the user ID you want to delete, then click 🗑. The**Delete** *Username* **User** dialog displays.

Step 3 Click **Delete** to confirm deletion.

Create User Roles

Local users with administrator privileges can create new users as needed (see Add Users, on page 2).

Users created in this way can perform only the functions or tasks that are associated with the user role they are assigned.

The local **admin** role enables access to all functionality. It is created during installation and cannot be changed or deleted. However, its privileges can be assigned to new local users. Only local users can create or update user roles; TACACS users cannot.

Follow the steps below to create a new user role.

Step 1 From the main menu, choose **Admin** > **Users**.

The **User Management** window opens.

If it is not already displayed, click the **Role Management** tab.

Step 2 Click + to display the **Add Role** dialog box.

Step 3 Enter a unique name for the new role and then click **Add**.

Step 4 Define the user role's privilege settings:

a) Check the check box for every API that users with this role can access.

b) For each API, define whether the user role has **Read**, **Write**, and **Delete** permission by checking the appropriate check box.

Step 5 When you are finished, click **Save** to create the new role.

To assign the new user role to one or more user IDs, edit the **Role** setting for the user IDs (see Edit Users, on page 2).

Edit User Roles

Users with administrator privileges can quickly change the privileges of any user role other than the default **admin** role.

Step 1 From the main menu, choose **Admin** > **Users**.

The **User Management** window opens.

If it is not already displayed, click the **Role Management** tab.

Step 2 Click on an existing role to select it. The **Role Management** tab displays the user role's settings.

Step 3 Define the role's settings:

a) Check the check box for every API that the role can access.

b) For each API, define whether the role has **Read**, **Write**, and **Delete** permission by checking the appropriate check box.

Step 4 When you are finished, click **Save** to save your changes.

Clone User Roles

Cloning an existing user role is the same as creating a new user role (see Create User Roles, on page 3), except that you need not set privileges for it. If you like, you can let the cloned user role inherit all the privileges of the original user role.

Cloning user roles is a handy way to create and assign many new user roles quickly. Following the steps below, you can clone an existing role multiple times. Defining the cloned user role's privileges is an optional step; you are only required to give the cloned role a new name. If you like, you can assign it a name that indicates the role you want a group of users to perform. You can then edit the user IDs of that group of users to assign them their new role (see Edit Users, on page 2). Later, you can edit the roles themselves to give users the privileges you want (see Edit User Roles).

Step 1 From the main menu, choose **Admin** > **Users**.

The **User Management** window opens.

If it is not already displayed, click the **Role Management** tab.

Step 2 Click on an existing role to select it.

Step 3 Click ⧉ to display the **Clone Role** dialog box.

Step 4 Enter a unique name for the cloned role and then click **Clone**.

Step 5 (Optional) Define the role's settings:

a) Check the check box for every API that the cloned role can access.

b) For each API, define whether the clone role has **Read**, **Write**, and **Delete** permission by checking the appropriate check box.

Step 6 Click **Save** to create the newly cloned role.

Delete User Roles

Users with administrator privileges can delete any user role that is not the default **admin** user role or that is not currently assigned to a user ID. If you want to delete a role that is currently assigned to one or more user IDs, you must first edit those user IDs to assign them to a different user role.

Step 1 From the main menu, choose **Admin** > **Users**.

The **User Management** window opens.

If it is not already displayed, click the **Role Management** tab.

Step 2 Click on the role you want to delete, to select it.

Step 3 Click 🗑 to display the **Delete Role** dialog box.

Step 4 Click **Delete** to confirm that you want to delete the user role.

Manage TACACS+ Servers

In addition to local database authentication, Cisco Crosswork Optimization Engine can use TACACS+ servers to authenticate users. TACACS+ is a security protocol that provides centralized validation of users attempting to access your network. It allows for a single access control server (the TACACS+ daemon) to provide authentication, authorization, and accounting (AAA) services independently of one another.

Local database authorization takes precedence over authorization by TACACS+ server. When adding the TACACS+ server, you can specify the priority value for each instance.

Please note that any operation you do following the instructions in this section will affect all new logins to the Cisco Crosswork Optimization Engine user interface. To minimize session interruption, Cisco recommends that you perform all your TACACS+ changes and submit them in a single session.

Add a TACACS+ Server

Before adding a TACACS+ server, you will need to know the server's IP address, port number, shared secret, and service name.

Step 1 From the main menu, choose **Admin** > **AAA**.

The **AAA** window opens.

Step 2 Click ＋ to open the **Add Server** dialog box.

Step 3 Enter the TACACS+ server's settings, then click **Add**.

Note Only the server's IP address, port number, shared secret, and service name are required. You can leave the other values blank, as needed.

Edit a TACACS+ Server

Step 1 From the main menu, choose **Admin** > **AAA**.

The **AAA** window opens.

Step 2 Click the check box next to the TACACS+ server whose settings you want to update, then click ✎.

The **Edit Server** dialog box opens.

Step 3 Make the necessary changes, then click **Update**.

Note You cannot change the value for the **Shared Secret** parameter.

Delete a TACACS+ Server

Step 1 From the main menu, choose **Admin** > **AAA**.

The **AAA** window opens.

Step 2 Click the check box next to the TACACS+ server you want to delete.

Note You can delete only one TACACS+ server at a time.

Step 3 Click 🗑. The **Delete** *server-IP-address* dialog box opens.

Step 4 Click **Delete** to confirm.

Define Network Topology Display Settings

Cisco Crosswork Optimization Engine administrator privileges are required to configure the display settings that are used by the Network Topology application.

For a description of how to configure these settings, see the following topics:

- Define Color Thresholds for Link Bandwidth Utilization
- Configure Geographical Map Settings

Manage Certificates

The Cisco Crosswork Optimization Engine VM-hosted server and its browser-based user interface communicate with each other using SSL certificates exchanged over HTTPS. For details about these protocols, see SSL Certificates, on page 19 and HTTPS, on page 18

When installed, Cisco Crosswork Optimization Engine secures these interactions using a self-signed TLS certificate. This certificate has a two-year lifespan, after which it expires. If you want to continue using the expired self-signed certificate to secure server/client communications, you will need to regenerate it by following the steps in Extend Self-Signed Certificate Expiration, on page 8

If you prefer to secure these communications with a user-provided certificate, either purchased from a Certificate Authority (CA) or self-signed by your organization, you can validate and upload it by following the steps in Substitute a User-Provided Certificate, on page 8.

The user-provided certificate must meet the following requirements:

- Cisco Crosswork Optimization Engine supports IP Subject Alternative Name (SAN) server certificates only. The IP address is the primary means to reach the user interface.
- The server will present your user-provided certificates to the browser, so the certificates you supply must be valid both for Cisco and for Cisco Crosswork Optimization Engine.
- It must also include the required fields and field values shown in the following table.

Table 1: Required User-Provided Certificate Fields and Values

Field	**Description**	**Value**
<NUMBER OF DAYS>	Number of days the certificate will be valid.	Must be greater than `30` days and less than `730` days (or two years)
<COUNTRY>	Country (`C=`)	**`US`**
<STATE>	State (`ST=`)	**`CALIFORNIA`**
<LOCATION>	Location (`L=`)	**`SAN JOSE`**
<ORGANIZATION>	Organization (`O=`)	**`CISCO SYSTEMS INC`**
<ORGANIZATIONAL UNIT NAME>	Organizational Unit (`OU=`)	**`CROSSWORK`**
<COMMON NAME>	Common Name (`CN=`)	The IP address of the Cisco Crosswork Optimization Engine server VM.

- The certificate must also have the SAN extension set, with both DNS and IP address keys. The following provides an example of how to generate a self-signed certificate using OpenSSL:

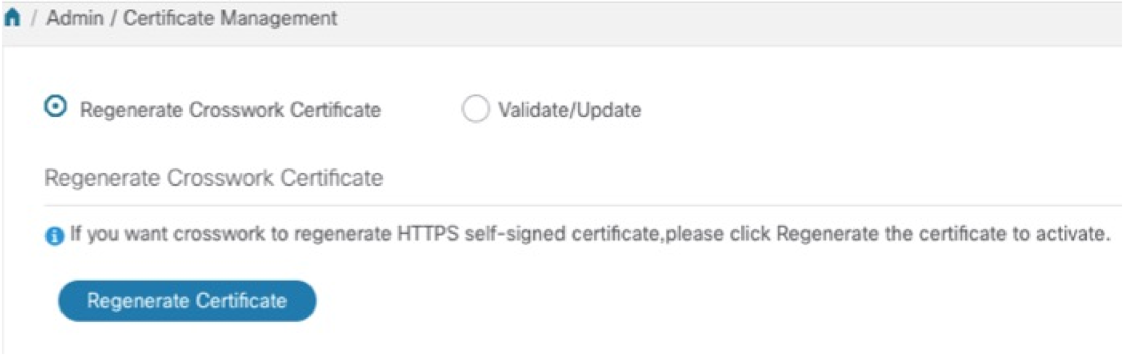
```
/usr/bin/openssl req \
                   -x509 \
                   -nodes \
                   -days 730 \
                   -newkey rsa:4096 \
                   -keyout "filename.key" \
                   -out "filename.crt" \
                   -subj "/C=US/ST=CALIFORNIA/L=SAN JOSE/O=CISCO SYSTEMS
INC/OU=CROSSWORK/CN=1.1.1.1" \
                   -extensions SAN \
                   -config <(cat /etc/ssl/openssl.cnf \
                    <(printf "\n[SAN]\nsubjectAltName=DNS:0.0.0.0,IP:1.1.1.1"))
```

Extend Self-Signed Certificate Expiration

Follow these steps to regenerate the self-signed certificate and extend its lifetime by two years.

Step 1 From the main menu, select **Admin** > **Certificate Management**. The **Certificate Management** window appears.

Step 2 Select the **Regenerate Crosswork Certificate** radio button.


Admin / Certificate Management
● Regenerate Crosswork Certificate
○ Validate/Update
Regenerate Crosswork Certificate
Regenerate Certificate

If you want crosswork to regenerate HTTPS self-signed certificate,please click Regenerate the certificate to activate.

Step 3 When you are ready, click **Regenerate Certificate**.

When Cisco Crosswork Optimization Engine has finished regenerating the certificate, it displays an alert message indicating that the regeneration operation is successful and you will be logged out. You must log in again to continue using Cisco Crosswork Optimization Engine.

Substitute a User-Provided Certificate

Follow the steps below to validate and upload a user-provided certificate. The certificate must meet the requirements explained in Manage Certificates, on page 7.

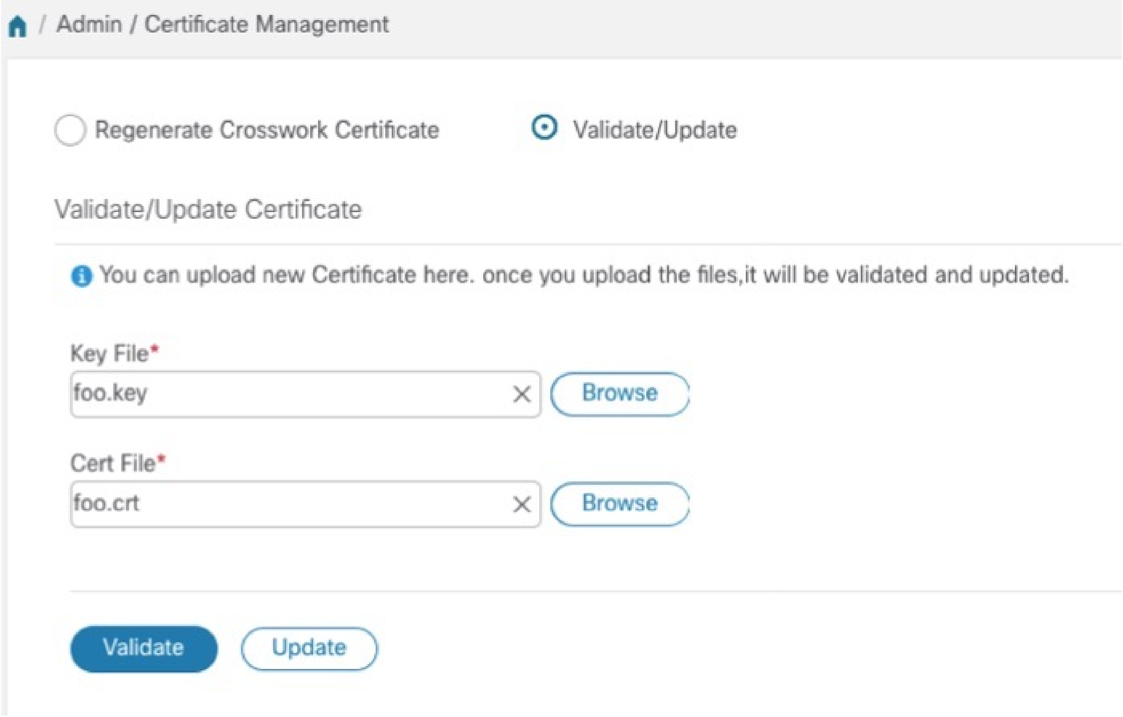
Before you begin

You must know the names of the user-provided certificate and key files and their locations in your local storage.

Step 1 From the main menu, select **Admin** > **Certificate Management**. The **Certificate Management** window appears.

Step 2 Select the **Validate/Update** radio button.

Step 3 Use the **Browse** button next to each field to browse to and select the key and certificate files you want to validate and use.



Admin / Certificate Management

○ Regenerate Crosswork Certificate ● Validate/Update

Validate/Update Certificate

You can upload new Certificate here. once you upload the files,it will be validated and updated.

Key File*: foo.key

Cert File*: foo.crt

Step 4 Click **Validate** to validate the certificate and key files.

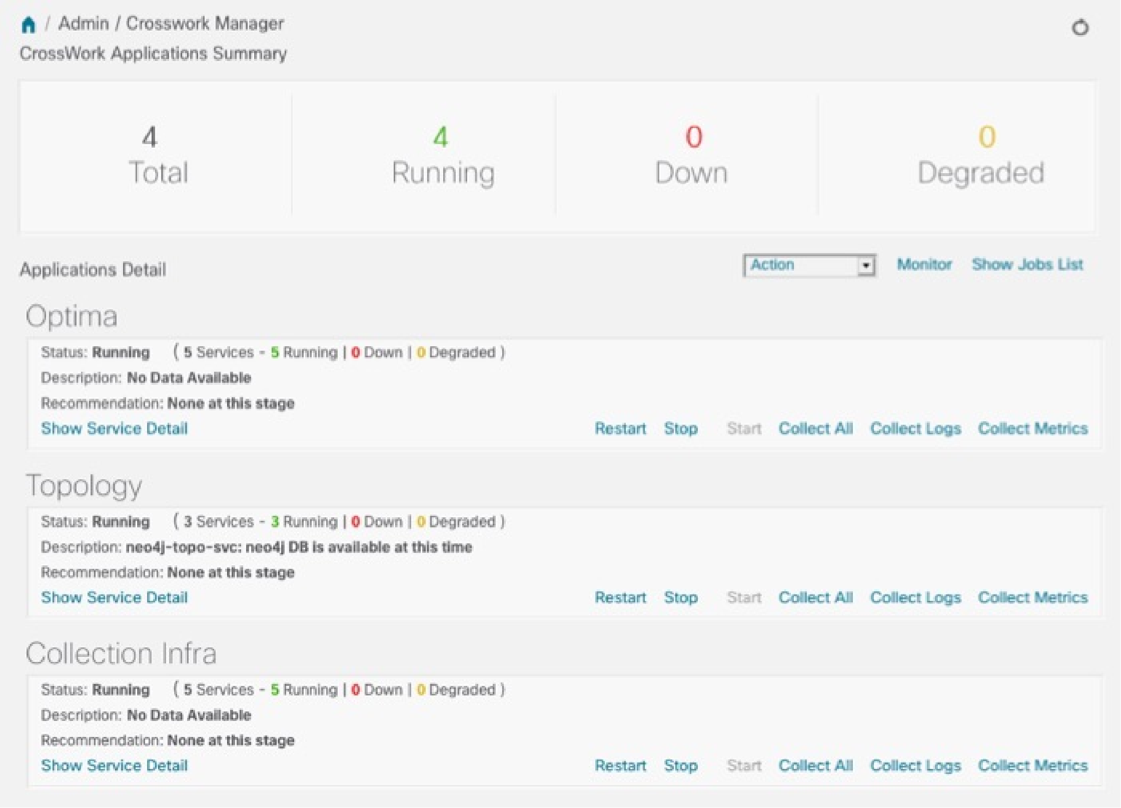
Step 5 Click **Update** to replace the existing certificate with the user-provided certificate you have validated.

Manage Cisco Crosswork Network Automation

The **Crosswork Manager** window gives you consolidated information about the current status of each installed Cisco Crosswork Optimization Engine application and its supporting services. 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 Cisco Crosswork Optimization Engine.

Select **Admin** > **Crosswork Manager** to display a **Crosswork Manager** window, with information like the window shown in the following example.

Figure 1: Crosswork Manager Window



Optima

Status: Running (5 Services - 5 Running | 0 Down | 0 Degraded)
Description: No Data Available
Recommendation: None at this stage

Topology

Status: Running (3 Services - 3 Running | 0 Down | 0 Degraded)
Description: neo4j-topo-svc: neo4j DB is available at this time
Recommendation: None at this stage

Collection Infra

Status: Running (5 Services - 5 Running | 0 Down | 0 Degraded)
Description: No Data Available
Recommendation: None at this stage

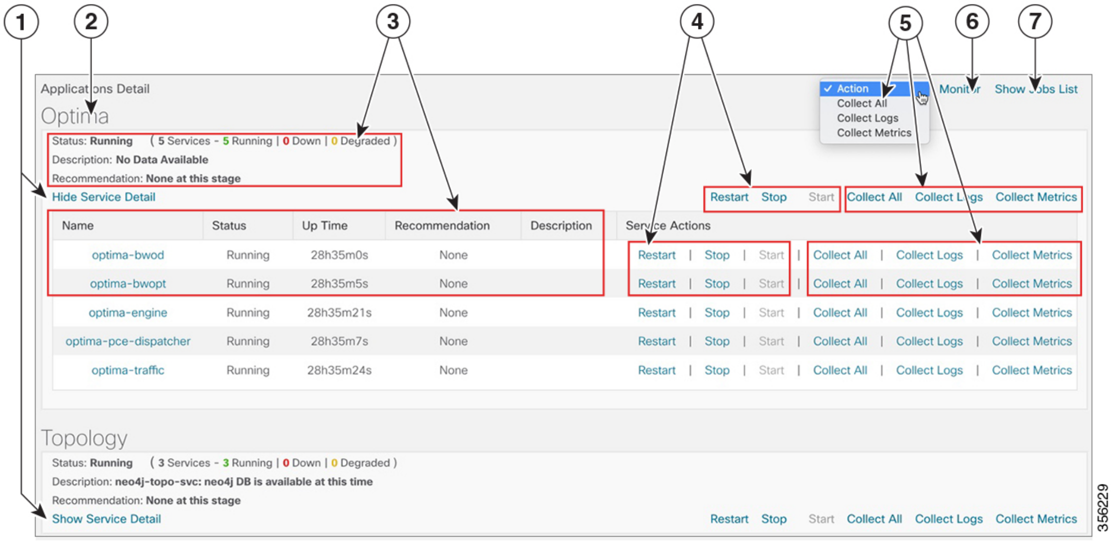
The **Crosswork Manager** window has two main views. The **Crosswork Applications Summary** view, at the top of the window, is a dashboard giving you a quick look at the overall health of the system. It displays the total number of Cisco Crosswork Optimization Engine applications currently installed in the system, and how many of that total are **Running**, **Down**, or **Degraded**.

The **Applications Detail** view, below the **Crosswork Applications Summary** view, allows you to:

- View the name and current runtime status of each installed application and its supporting services.
- Get advice about what to do when an application or one of its services has issues.
- Collect logs and metrics on any application or service, or for the system as a whole.
- Stop, start, or restart any application or service.

The **Applications Detail** view, shown in the following figure, is the best way to investigate any system health issues indicated in the **Crosswork Applications Summary**.

Figure 2: Applications Detail View



Applications Detail

Optima

Status: **Running** (5 Services - 5 Running | 0 Down | 0 Degraded)
Description: **No Data Available**
Recommendation: **None at this stage**

Hide Service Detail

Restart Stop Start Collect All Collect Logs Collect Metrics

Name	Status	Up Time	Recommendation	Description	Service Actions
optima-bwod	Running	28h35m0s	None		Restart | Stop | Start | Collect All | Collect Logs | Collect Metrics
optima-bwopt	Running	28h35m5s	None		Restart | Stop | Start | Collect All | Collect Logs | Collect Metrics
optima-engine	Running	28h35m21s	None		Restart | Stop | Start | Collect All | Collect Logs | Collect Metrics
optima-pce-dispatcher	Running	28h35m7s	None		Restart | Stop | Start | Collect All | Collect Logs | Collect Metrics
optima-traffic	Running	28h35m24s	None		Restart | Stop | Start | Collect All | Collect Logs | Collect Metrics

Topology

Status: **Running** (3 Services - 3 Running | 0 Down | 0 Degraded)
Description: **neo4j-topo-svc: neo4j DB is available at this time**
Recommendation: **None at this stage**

Show Service Detail

Restart Stop Start Collect All Collect Logs Collect Metrics

Figure 3: Applications Detail View

Item	Description
1	Click the **Show/Hide Service Detail** link in each application tile to view the detailed status of the underlying services for that application.
2	An **application tile** like this shows the current status of the named application and a summary of the status of that application's services. This includes the total number of services, and how many of those services are Running, Down, or Degraded.
3	Both the **application tile** and its **Service Detail** table provide the name, status, description and recommendation for the respective application or service. The Service Detail table also provides service uptime, and you can click on the link in the **Name** column to see more details about the service, such as its process ID and pod identifier.
4	To control an application or service, click on any of the links in this section of the application tile or Service Detail table. You can click: • **Restart** to restart the application or service. • **Stop** to stop the application or service. • **Start** to start the application or service. See Control Cisco Crosswork Network Automation Applications and Services, on page 17.

Item	Description
5	To gather logs and metrics for the entire system, or for any application or service, click on any of the "collect" links at the system (in the dropdown menu), application, or service level. You can choose: • **Collect All** to collect both logs and metrics. • **Collect Logs** to collect only logs. • **Collect Metrics** to collect only metrics. See Collect and Share Cisco Crosswork Network Automation Logs and Metrics, on page 16.
6	Click the **Monitor** link to monitor individual Cisco Crosswork Optimization Engine functions and features, using analytical dashboards and data gathered over the last 24 hours of run time. See Monitor Cisco Crosswork Network Automation Functions in Real Time, on page 12.
7	Choosing any of the control or collect actions at the system, application or service level will initiate a job. You can view each job's progress by clicking the **Show Jobs List**link at the top right corner of the window. You can also use the **Show Jobs List**to publish collected logs and metrics files, and check on the status of publish jobs you initiate.

Monitor Cisco Crosswork Network Automation Functions in Real Time

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

Cisco Crosswork Optimization Engine 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 Optimization Engine applications or their underlying services.

There are multiple monitor dashboards, categorized by the type of functionality they monitor and the metrics they provide, as shown in the following table.

Table 2: Monitoring Dashboard Categories

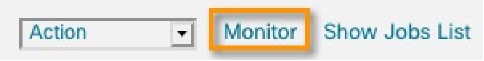
This dashboard category...	Monitors...
Optima	Cisco Crosswork Optimization Engine function pack, traffic, and SR-PCE dispatcher functions.
Topology	Topology service and database functions.
Collection Infra	Device-data collection functions. Metrics include telemetry collection latencies, total collection operations, memory and database activity related to telemetry, delayed collections, and so on.
Core Infra	System hardware and communications usage and performance. Metrics include disk and CPU usage, database size, network and disk operations, and client/server communications.

To conserve disk space, Cisco Crosswork Optimization Engine 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 Optimization Engine implementation of Grafana. For more information about Grafana itself, see https://grafana.com and http://docs.grafana.org

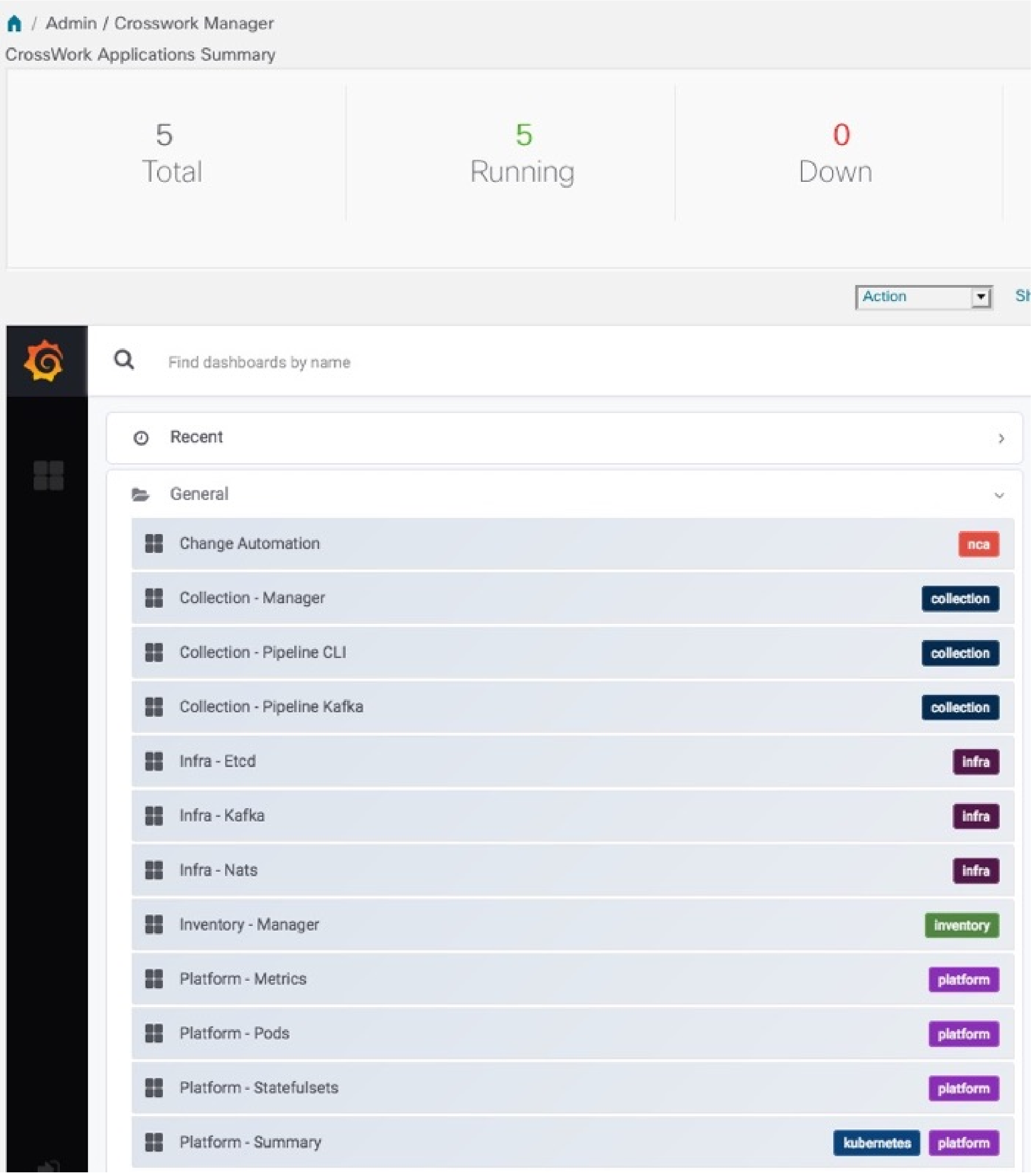
Step 1 From the main menu, choose **Admin** > **Crosswork Manager**.

Step 2 At the right, just below the **Crosswork Applications Summary** view, click the **Monitor** link, highlighted below.



The Grafana user interface appears within the **Crosswork Manager** window, replacing the **Applications Detail** view.

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.



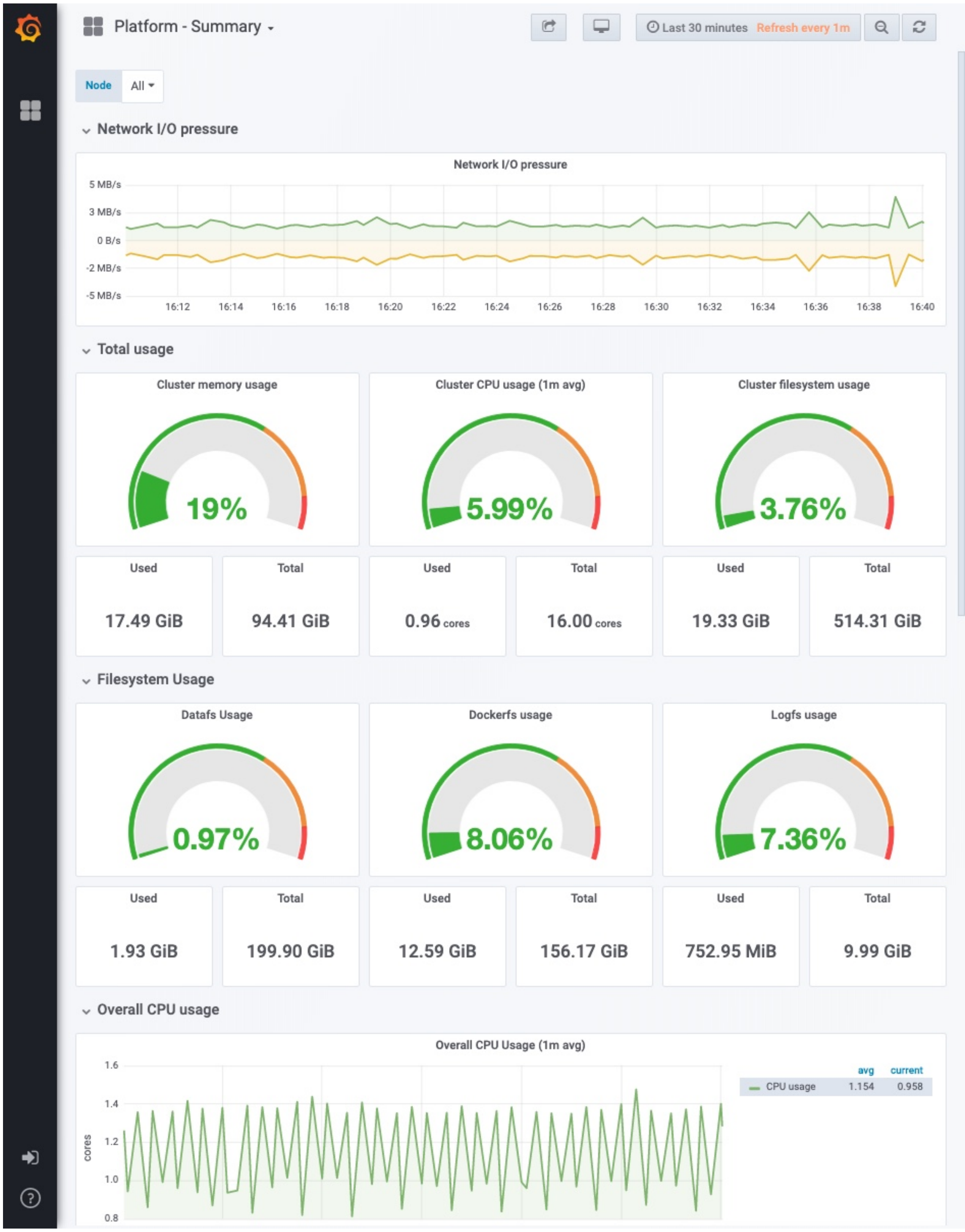
/ Admin / Crosswork Manager

CrossWork Applications Summary

5	5	0
Total	Running	Down

Dashboard	Tags
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 ▦ icon next to the dashboard you want to view. For example: Clicking on the **Platform - Summary** dashboard displays a view like the one shown in the following figure. For more information on how to use Grafana go to htttps://grafana.com.



Network I/O pressure

Network I/O pressure

Total usage

Cluster memory usage: 19%
Used 17.49 GiB
Total 94.41 GiB

Cluster CPU usage (1m avg): 5.99%
Used 0.96 cores
Total 16.00 cores

Cluster filesystem usage: 3.76%
Used 19.33 GiB
Total 514.31 GiB

Filesystem Usage

Datafs Usage: 0.97%
Used 1.93 GiB
Total 199.90 GiB

Dockerfs usage: 8.06%
Used 12.59 GiB
Total 156.17 GiB

Logfs usage: 7.36%
Used 752.95 MiB
Total 9.99 GiB

Overall CPU usage

Overall CPU Usage (1m avg)

	avg	current
CPU usage	1.154	0.958

Collect and Share Cisco Crosswork Network Automation Logs and Metrics

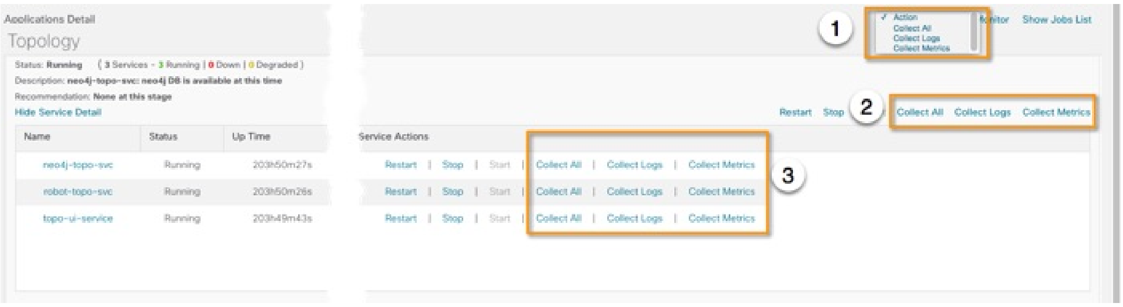
You can collect logs and metrics on multiple levels of Cisco Crosswork Optimization Engine. You can collect logs and metrics for the entire system, for any of its installed application, or for any service supporting an application. You can also choose to collect only logs, only the additional metrics, or both.

Collected logs and metrics are stored in gzipped tar archive files. You can publish these archives to an HTTP or HTTPS server of your choice.

Step 1 From the main menu, choose **Admin** > **Crosswork Manager**. The **Crosswork Manager** window displays, with the **Application Detail** section listing all the applications.

Step 2 Click the option for the collection level and target information you want, as follows:

- To collect for the entire system: From the **Action** drop down on the right, opposite the **Applications Detail** section title, choose **Collect All**, **Collect Logs**, or **Collect Metrics**. See item 1 in the following figure.
- To collect for an application: Scroll to the **Application Detail** tile for the application you want. Then click the **Collect All**, **Collect Logs**, or **Collect Metrics** link on the right, opposite the application's name. See item 2 in the following figure.
- To collect for a service: Scroll to the **Application Detail** tile for the application whose service you want to collect. Click the **Show Service Detail** link for that application. Then click the **Collect All**, **Collect Logs**, or **Collect Metrics** link on the right, opposite the service's name. See item 3 in the following figure.


Applications Detail

Topology

Status: Running (3 Services - 3 Running | 0 Down | 0 Degraded)

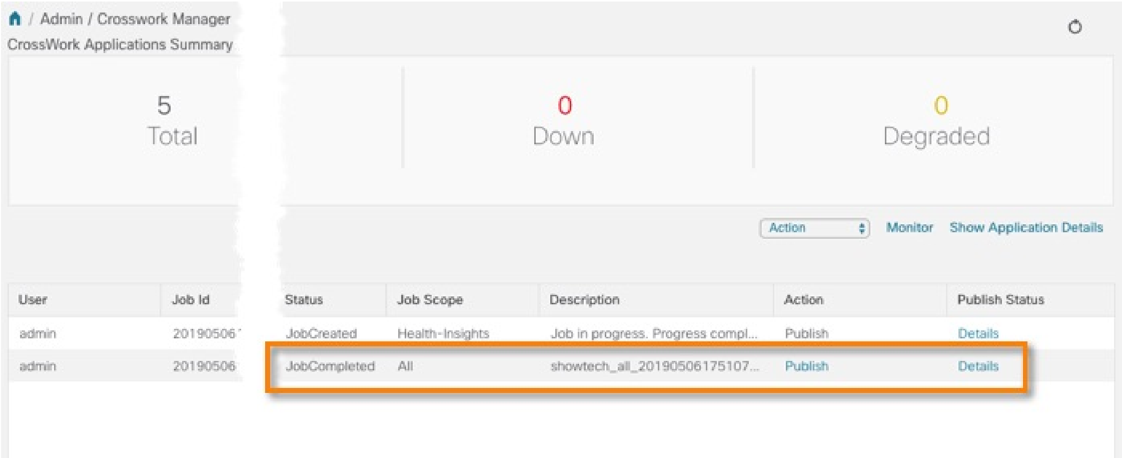
Description: neo4j-topo-svc: neo4j DB is available at this time

Recommendation: None at this stage

Name	Status	Up Time	Service Actions
neo4j-topo-svc	Running	203h50m27s	Restart | Stop | Start | Collect All | Collect Logs | Collect Metrics
robot-topo-svc	Running	203h50m26s	Restart | Stop | Start | Collect All | Collect Logs | Collect Metrics
topo-ui-service	Running	203h49m43s	Restart | Stop | Start | Collect All | Collect Logs | Collect Metrics

Step 3 When you click on the collection option you want, the **Crosswork Manager** window displays a popup message indicating that a job was successfully created and giving the job ID. Click on the **Show Jobs List** link at the right to view the job's progress in the **Crosswork Manager**window's **Jobs List** view, which replaces the **Applications Detail** view.

Step 4 Wait for the job to complete. When the **Jobs List** view's **Status** column for your job has changed to `JobCompleted`, the **Action** column for the job will show an enabled **Publish** link for the completed job, and the **Description** column will show the file name of the gzipped tar archive file containing the collected information.



/ Admin / Crosswork Manager

CrossWork Applications Summary

5 Total | 0 Down | 0 Degraded

User	Job Id	Status	Job Scope	Description	Action	Publish Status
admin	20190506	JobCreated	Health-Insights	Job in progress. Progress compl...	Publish	Details
admin	20190506	JobCompleted	All	showtech_all_20190506175107...	Publish	Details

Step 5 (Optional) Click on the **Publish** link to publish the collected information to an HTTP or HTTPS server, as follows:

a) A popup window will prompt you for the destination server host name, the storage path on the server, the port number, and the login user name and password for the server (if required). Enter the server information and click **Publish**.

b) The **Job List** view's **Publish Status** column for the job shows an enabled **Details** link. Click the **Details** link to view a popup window showing the status of the publish job.

Step 6 When you are finished, click the **Show Application Details** link to re-display the **Applications Detail** view.

Control Cisco Crosswork Network Automation Applications and Services

Users with administrator privileges can control the runtime status of any Cisco Crosswork Optimization Engine application or service. This can include:

- Stopping a running application or service
- Starting a stopped application or service
- Restarting a running or stopped application or service

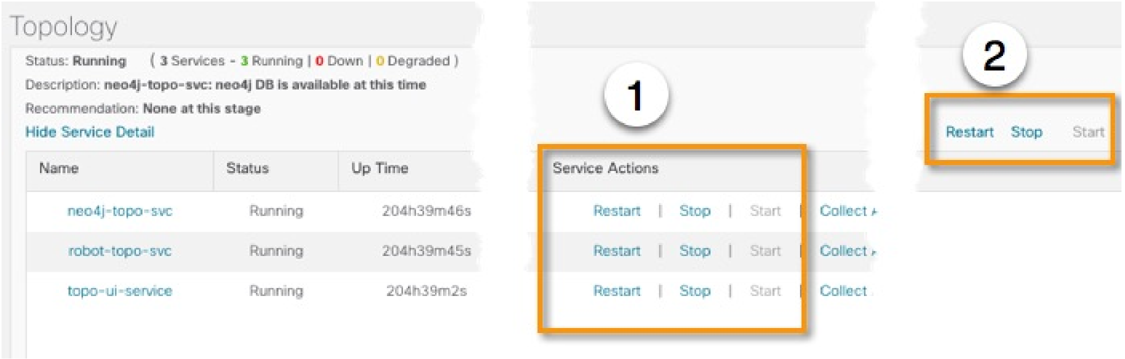
Please note that stopping, starting and restarting Cisco Crosswork Optimization Engine applications and services can result in anomalous system behavior and possible data loss. Use these functions only with the supervision of Cisco TAC staff.

Step 1 From the main menu, choose **Admin** > **Crosswork Manager**. The **Crosswork Manager** window displays, with the **Application Detail** view listing all the applications.

Step 2 Display the application or service whose runtime status you want to control:

- To control an application: Scroll to the **Application Detail** tile for the application you want.
- To control a service: Scroll to the **Application Detail** tile for the application whose service you want to control, then click the **Show Service Detail** link for that application to show its services.

Step 3 Click on the **Start**, **Stop**, or **Restart** link shown next to the service (item 1 in the following figure) or the application whose runtime status you want to control.



Topology

Status: Running (3 Services - 3 Running | 0 Down | 0 Degraded)

Description: neo4j-topo-svc: neo4j DB is available at this time

Recommendation: None at this stage

Hide Service Detail

Name	Status	Up Time	Service Actions
neo4j-topo-svc	Running	204h39m46s	Restart | Stop | Start | Collect
robot-topo-svc	Running	204h39m45s	Restart | Stop | Start | Collect
topo-ui-service	Running	204h39m2s	Restart | Stop | Start | Collect

Step 4 Click the **Show Jobs List** link at upper right to view the runtime control job's progress in the **Crosswork Manager**window's **Jobs List** view.

Step 5 When you are finished, click the **Show Application Details** link to re-display the **Applications Detail** view.

Security Hardening Overview

Security hardening entails making adjustments to ensure that the following components optimize their security mechanisms:

- infrastructure
- storage system (local or external)

Hardening security requires completion of the following tasks:

- Shutting down insecure and unused ports
- Configuring network firewalls
- Hardening the infrastructure, as needed

Although your primary source of information is your Cisco representative, who can provide server hardening guidance specific to your deployment, you can also follow the steps in this section to secure .

Core Security Concepts

If you are an administrator and are looking to optimize the security of your product, you should have a good understanding of the following security concepts.

HTTPS

Hypertext Transfer Protocol Secure (HTTPS) uses Secure Sockets Layer (SSL) or its subsequent standardization, Transport Layer Security (TLS), to encrypt the data transmitted over a channel. Several vulnerabilities have been found in SSL, so now supports TLS only.

Note TLS is loosely referred to as SSL often, so we will also follow this convention.

SSL employs a mix of privacy, authentication, and data integrity to secure the transmission of data between a client and a server. To enable these security mechanisms, SSL relies upon certificates, private-public key exchange pairs, and Diffie-Hellman key agreement parameters.

SSL Certificates

SSL certificates and private-public key pairs are a form of digital identification for user authentication and the verification of a communication partner’s identity. Certificate Authorities (CAs), such as VeriSign and Thawte, issue certificates to identify an entity (either a server or a client). A client or server certificate includes the name of the issuing authority and digital signature, the serial number, the name of the client or server that the certificate was issued for, the public key, and the certificate's expiration date. A CA uses one or more signing certificates to create SSL certificates. Each signing certificate has a matching private key that is used to create the CA signature. The CA makes signed certificates (with the public key embedded) readily available, enabling anyone to use them to verify that an SSL certificate was actually signed by a specific CA.

In general, setting up certificates in both High Availability (HA) and non-HA environments involves the following steps:

1. Generating an identity certificate for a server.
2. Installing the identity certificate on the server.
3. Installing the corresponding root certificate on your client or browser.

The specific tasks you need to complete will vary depending on your environment.

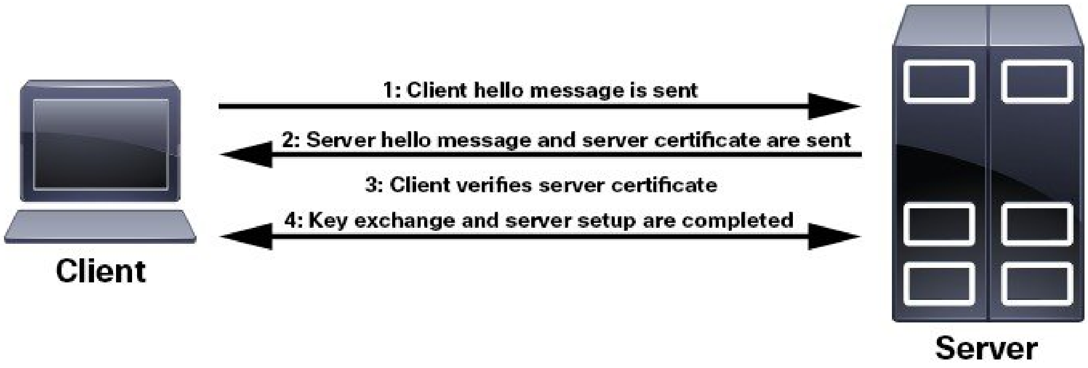
Note the following:

- The start-stop sequencing of servers needs to be done carefully in HA environments.
- Non-HA environments, where a virtual IP address is configured, require the completion of a more complicated certificate request process.

1-Way SSL Authentication

This authentication method is used when a client needs assurance that it is connecting to the right server (and not an intermediary server), making it suitable for public resources like online banking websites. Authentication begins when a client requests access to a resource on a server. The server on which the resource resides then sends its server certificate (also known as an SSL certificate) to the client in order to verify its identity. The client then verifies the server certificate against another trusted object: a server root certificate, which must be installed on the client or browser. After the server has been verified, an encrypted (and therefore secure) communication channel is established. At this point, the server prompts for the entry of a valid username and password in an HTML form. Entering user credentials after an SSL connection is established protects them from being intercepted by an unauthorized party. Finally, after the username and password have been accepted, access is granted to the resource residing on the server.

Note A client might need to store multiple server certificates to enable interaction with multiple servers.


1: Client hello message is sent
2: Server hello message and server certificate are sent
3: Client verifies server certificate
4: Key exchange and server setup are completed
Client
Server

To determine whether you need to install a root certificate on your client, look for a lock icon in your browser's URL field. If you see this icon, this generally indicates that the necessary root certificate has already been installed. This is usually the case for server certificates signed by one of the bigger Certifying Authorities (CAs), because root certificates from these CAs are included with popular browsers.

If your client does not recognize the CA that signed a server certificate, it will indicate that the connection is not secure. This is not necessarily a bad thing. It just indicates that the identity of the server you want to connect has not been verified. At this point, you can do one of two things: First, you can install the necessary root certificate on your client or browser. A lock icon in your browser's URL field will indicate the certificate was installed successfully. And second, you can install a self-signed certificate on your client. Unlike a root certificate, which is signed by a trusted CA, a self-signed certificate is signed by the person or entity that created it. While you can use a self-signed certificate to create an encrypted channel, understand that it carries an inherent amount of risk because the identity of the server you are connected with has not been verified.

Disable Insecure Ports and Services

As a general policy, any ports that are not needed should be disabled. You need to first know which ports are enabled, and then decide which of these ports can be safely disabled without disrupting the normal functioning of . You can do this by listing the ports that are open and comparing it with a list of ports needed for .

To view a list of all open listening ports:

Step 1 Log in as a Linux CLI admin user and enter the **netstat -aln** command.
The **netstat -aln** command displays the server's currently open (enabled) TCP/UDP ports, the status of other services the system is using, and other security-related configuration information. The command returns output similar to the following:

```
[root@vm ~]# netstat -aln
Active Internet connections (servers and established)
Proto  Recv-Q   Send-Q   Local Address            Foreign Address         State
tcp    0        0        0.0.0.0:111              0.0.0.0:*               LISTEN
tcp    0        0        127.0.0.1:8080           0.0.0.0:*               LISTEN
tcp    0        0        0.0.0.0:22               0.0.0.0:*               LISTEN
tcp    0        0        127.0.0.1:25             0.0.0.0:*               LISTEN
tcp    0        0        127.0.0.1:10248          0.0.0.0:*               LISTEN
tcp    0        0        127.0.0.1:10249          0.0.0.0:*               LISTEN
tcp    0        0        192.168.125.114:40764    192.168.125.114:2379    ESTABLISHED
tcp    0        0        192.168.125.114:48714    192.168.125.114:10250   CLOSE_WAIT
tcp    0        0        192.168.125.114:40798    192.168.125.114:2379    ESTABLISHED
tcp    0        0        127.0.0.1:33392          127.0.0.1:8080          TIME_WAIT
tcp    0        0        192.168.125.114:40814    192.168.125.114:2379    ESTABLISHED
tcp    0        0        192.168.125.114:40780    192.168.125.114:2379    ESTABLISHED
tcp    0        0        127.0.0.1:8080           127.0.0.1:44276         ESTABLISHED
tcp    0        0        192.168.125.114:40836    192.168.125.114:2379    ESTABLISHED
tcp    0        0        192.168.125.114:40768    192.168.125.114:2379    ESTABLISHED
tcp    0        0        127.0.0.1:59434          127.0.0.1:8080          ESTABLISHED
tcp    0        0        192.168.125.114:40818    192.168.125.114:2379    ESTABLISHED
tcp    0        0        192.168.125.114:22       192.168.125.1:45837     ESTABLISHED
tcp    0        0        127.0.0.1:8080           127.0.0.1:48174         ESTABLISHED
tcp    0        0        127.0.0.1:49150          127.0.0.1:8080          ESTABLISHED
tcp    0        0        192.168.125.114:40816    192.168.125.114:2379    ESTABLISHED
tcp    0        0        192.168.125.114:55444    192.168.125.114:2379    ESTABLISHED
```

Step 2 Check the *Cisco Crosswork Optimization Engine Installation Guide* for the table of ports used by Cisco Crosswork Optimization Engine, and see if your ports are listed in that table. That table will help you understand which services are using the ports, and which services you do not need—and thus can be safely disabled. In this case, *safe* means you can *safely disable the port without any adverse effects to the product*.

Note If you are not sure whether you should disable a port or service, contact your Cisco representative.

Step 3 If you have firewalls in your network, configure the firewalls to only allow traffic that is needed for Cisco Crosswork Optimization Engine to operate.

Harden Your Storage

We recommend that you secure all storage elements that will participate in your installation, such as the database, backup servers, and so on.

- If you are using external storage, contact your storage vendor and your Cisco representative.
- If you are using internal storage, contact your Cisco representative.
- If you ever uninstall or remove , make sure that all VM-related files that might contain sensitive data are digitally shredded (as opposed to simply deleted). Contact your Cisco representative for more information.