Cisco Crosswork Planning 7.1 Installation Guide

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C O N T E N T S

CHAPTER 1

Overview

This guide explains the requirements and processes to install and upgrade Cisco Crosswork Planning. For detailed information on how to use the Cisco Crosswork Planning Design and Cisco Crosswork Planning Collector applications, see the *Cisco Crosswork Planning Design 7.1 User Guide* and *Cisco Crosswork Planning 7.1 Collection Setup and Administration*.

This section contains the following topics:

Audience

This guide is for experienced network users and operators who want to install Cisco Crosswork Planning in their network. This guide assumes that you are familiar with

- using a Docker container

- running scripts in Python

- deploying OVF templates using VMware vCenter, and

- deploying using OVF tool.

Core capabilities of Cisco Crosswork Planning

Cisco Crosswork Planning runs on the Cisco Crosswork infrastructure and is part of the Cisco Crosswork Network Automation suite of products.

Cisco Crosswork Planning provides tools to create a model of the existing network by continuously monitoring the network and its traffic demands. At a given time, this network model contains all relevant information about a network, including topology, configuration, and traffic information. You can use this information as a basis for analyzing the impact on the network due to changes in traffic demands, paths, node and link failures, network optimizations, or other changes.

Key features

These are some of the important features of Cisco Crosswork Planning:

- **Traffic engineering and network optimization**: Compute TE LSP configuration to meet service level requirements, perform capacity management, and perform local or global optimization in order to maximize efficiency of deployed network resources.

- **Demand engineering**: Examine the impact on network traffic flow of adding, removing, or modifying traffic demands on the network.

- **Topology and predictive analysis**: Observe the impact to network performance of changes in the network topology, which is driven either by design or by network failures.

- **TE tunnel programming**: Examine the impact of modifying tunnel parameters, such as the tunnel path and reserved bandwidth.

- **Class of service (CoS)-aware bandwidth on demand**: Examine existing network traffic and demands, and admit a set of service-class-specific demands between routers.

Cisco Crosswork Planning applications

Cisco Crosswork Planning comprises two components. These components run independently of each other and you can enable/disable them based on your requirements.

- **Cisco Crosswork Planning Collector**

  Cisco Crosswork Planning Collector consists of a set of services that create, maintain, and archive a model of the current network. It achieves this through continual monitoring and analysis of the network and the traffic demands placed on it. For more information, see *Cisco Crosswork Planning 7.1 Collection Setup and Administration*.

- **Cisco Crosswork Planning Design**

  Cisco Crosswork Planning Design is a network design and planning tool that helps network engineers and operators predict growth in their network, simulate failures, and optimize design to meet performance objectives while minimizing cost. For more information, see *Cisco Crosswork Planning Design 7.1 User Guide*.

CHAPTER 2

Installation Requirements

This section contains the following topics:

Profile specifications

This table provides an overview of the scale support for various features and the hardware specifications for each profile in Cisco Crosswork Planning.

Table 1: Profile specifications

Parameters	Profile 1	Profile 2	Profile 3
Scale support			
Total number of network devices	1000	3000	6000
Total number of interfaces	10000	25000	50000
Total number of collected interfaces	30000	75000	150000
Total number of demands	50000	100000	500000
Total number of policies (SR and RSVP)	2000	5000	10000
Total number of VPNs	4 Endpoints per VPN service: 30	4 Endpoints per VPN service: 60	8 Endpoints per VPN service: 60

Parameters	Profile 1	Profile 2	Profile 3
Hardware requirements			
Number of VMs	1	2	2
CPU	16 vCPU	16 vCPU	24 vCPU
Memory	125 GB	125 GB	256 GB
Disk space	1 TB	1 TB	2 TB

Note

- For Profile 2 and Profile 3, two VMs are necessary: one operates exclusively as the Collector application, and the other functions as the Design application.

- There is no provision to tune the resource usage settings for individual services.

VMware settings

If your vCenter data center does not meet these requirements, the Virtual Machine (VMs) has to be deployed individually. For more information on manual installation, see Install Cisco Crosswork Planning using the vCenter vSphere UI, on page 20.

- Supported Hypervisor and vCenter versions:

  - VMware vCenter Server 8.0 (U2c or later) and ESXi 8.0 (U2b or later)

  - VMware vCenter Server 7.0 (U3p or later) and ESXi 7.0 (U3p or later)

- The machine where you run the installer must have high speed network connectivity to the vCenter data center where you plan to install Cisco Crosswork Planning.

- Cisco Crosswork Planning VM must be hosted on hardware with Hyper Threading disabled.

- Ensure that profile-driven storage is enabled by the vCenter admin user. Query permissions for the vCenter user at the root level (for all resources) of the vCenter.

- The networks required for the Crosswork Management and Data networks need to be built and configured in the data centers, and must allow low latency L2 communication (latency with RTT <= 10 ms).

- Ensure the user account you use for accessing vCenter has the following privileges:

  - VM (Provisioning): Clone VM on the VM you are cloning.

  - VM (Provisioning): Customize on the VM or VM folder if you are customizing the guest operating system.

  - VM (Inventory): Create from the existing VM on the data center or VM folder.

  - VM (Configuration): Add new disk on the data center or VM folder.

  - Resource: Assign a VM to resource pool on the destination host or resource pool.

- Datastore: Allocate space on the destination datastore or datastore folder.

- Network: Assign the network to which the VM will be assigned.

- Profile-driven storage (Query): This permission setting needs to be allowed at the root of the data center tree level.

- We also recommend you to enable vCenter storage control.

Cisco Crosswork Planning VM requirements

This table explains the resource requirements per VM to deploy Cisco Crosswork Planning.

Table 2: Network requirements

Requirement	Description
Network connections	For production deployments, we recommend that you use dual interfaces, one for the Management network and one for the Data network.
	For optimal performance, the Management and Data networks should use links configured at a minimum of 10 Gbps with a latency of less than 10 milliseconds.
IP addresses	**Four IPv4 addresses**: A management and data IP address for the Cisco Crosswork Planning node being deployed and two additional IP addresses to be used as the Virtual IP (VIP) address (one for the Management network and one for the Data network).
	Note
	- Cisco Crosswork Planning does not support dual-stack and IPv6 configurations. Therefore, all addresses for the environment must be IPv4.
	- The IP addresses must be able to reach the gateway address for the network, or the installation will fail.
	- At this time, your IP allocation is permanent and cannot be changed without re-deployment. For more information, contact the Cisco Customer Experience team.
Interfaces	Cisco Crosswork Planning is deployed on a single VM with **two interfaces**.
	- **No. of NICs**: 2
	- **vNIC0**: Management Traffic (for accessing the interactive console and passing the Control/Data information between servers).
	- **vNIC1**: Device Access Traffic (for device access and data collection).

Requirement	Description
NTP server	The IPv4 addresses or host names of the NTP server you plan to use. If you want to enter multiple NTP servers, separate them with spaces. These should be the same NTP servers you use to synchronize the Cisco Crosswork Planning VM clock, devices, clients, and servers across your network. Ensure that the NTP servers are reachable on the network before attempting installation. The installation will fail if the servers cannot be reached.
DNS servers	The IPv4 addresses of the DNS servers you plan to use. These should be the same DNS servers you use to resolve host names across your network. Ensure that the DNS servers are reachable on the network before attempting installation. The installation will fail if the servers cannot be reached.
DNS search domain	The search domain you want to use with the DNS servers, for example, cisco.com. You can have only one search domain.
Backup server	Cisco Crosswork Planning will back up the configuration of the system to an external server using SCP. The SCP server storage requirements will vary slightly but you must have at least 25 GB of storage.
FQDN (Optional)	The installation process supports using either a VIP (Virtual IP address) or an FQDN (Fully Qualified Domain Name) to access the VM. If you choose to use the FQDN, you will need one for the Management and one for the Data network. Cisco Crosswork Planning deployed on a single VM does not support dual-stack and IPv6 configurations. Therefore, all FQDN addresses configured for the deployment environment must be IPv4. **Note** If you choose to supply the FQDNs during the initial installation, the DNS server must be populated with them before the VM is powered on; otherwise, the installation script will fail to complete the environment setup.

KVM host bare metal requirements

This section presents the host bare metal requirements for deploying Cisco Crosswork Planning on KVM.

Table 3: Host bare metal requirements (per bare metal server)

Component	Minimum requirement per node (Large profile)
Processor	Intel(R) Xeon(R) CPU E5-2699 v4 @ 2.20GHz or latest
NIC	2 x 10 Gbps NICs.
OS	Red Hat Enterprise Linux 9.4

Component	Minimum requirement per node (Large profile)

RAM	You can calculate the total RAM needed using this formula:
	
	`Number of VMs: [Enter number]`
	`RAM per VM (GB): [Enter number]`
	
	`Total RAM = (Number of VMs) * (RAM per VM)`
	`Buffer (e.g., 20%): Total RAM * 0.20`
	
	`Estimated Total RAM Needed (GB) = Total RAM + Buffer`
	
	Example:
	
	`Number of VMs: 1`
	`RAM per VM (GB): 98 (Large profile)`
	
	`Total RAM(GB) needed for VMs: 1 * 98 = 98`
	
	`Buffer(GB): 98 * 0.20 = 19.6`
	
	`Estimated Total RAM Needed(GB): 98 + 19.6 = 117.6`

CPU	You can calculate the number of vCPUs needed using this formula:
	
	`Number of VMs: [Enter number]`
	`vCPUs per VM: [Enter number]`
	
	`Total vCPUs = (Number of VMs) * (vCPUs per VM)`
	`Buffer (e.g., 20%): Total vCPUs * 0.20`
	
	`Estimated Total vCPUs Needed = Total vCPUs + Buffer`
	
	Example:
	
	`Number of VMs: 1`
	`vCPUs per VM: 12 (Large profile)`
	
	`Total vCPUs needed for VMs :  1 * 12 = 12`
	
	`Buffer: 36 * 0.20 = 2.4`
	
	`Estimated Total vCPUS Needed: 12 + 2.4 = 14.4`

Storage	You can calculate the storage required using this formula:
	
	`Number of VMs: [Enter number]`
	`Storage per VM (GB): [Enter number]`
	
	`Total Storage = (Number of VMs) * (Storage per VM)`
	`Buffer (e.g., 20%): Total Storage * 0.20`
	
	`Estimated Total Storage Needed (GB) = Total Storage + Buffer`
	
	Example:
	
	`Number of VMs: 1`
	`Storage per VM (GB): 1000`
	
	`Total Storage Needed for VMs: 1000 * 1 = 1000`
	
	`Buffer (GB):  300 (General ask to have additional 100 GB on the node`
	` for each vm)`
	
	`Estimated Total Storage Needed (GB): 1000 + 300 = 1300 (GB)`

Note

- Ensure the networks required for the Crosswork Management and Data networks are built and configured in the data centers. These networks must allow low-latency L2 communication with a round-trip time (RTT) of 10 ms or less.

- The same network name must be used and configured on the RHEL bare metal host machine that is hosting the Cisco Crosswork Planning VM.

IOS XR and IOS XE version support

Cisco Crosswork Planning supports these Cisco IOS XR and IOS XE software versions.

Table 4: IOS XR/XE version support

Device	Tested with version
SR-PCE	25.2.1
XRv 9000	25.2.1, 25.1.1, 24.4.2
ASR 9000	25.2.1, 25.1.1, 24.4.2
NCS 5500	25.2.1, 25.1.1, 24.4.2
Cisco 8000	25.2.1, 25.1.1, 24.4.2
IOS-XE	17.16.1

Supported web browsers

This table lists the supported browser versions for Cisco Crosswork Planning.

Browser	Version
Google Chrome	131 or later
Mozilla Firefox	136 or later

Port requirements

Table 5: Ports used by Cisco Crosswork Planning deployment on the management network

Port	Protocol	Used for	Direction
30602	TCP	Monitoring the installation (Cisco Crosswork Planning)	Inbound
30603	TCP	Cisco Crosswork Planning Web user interface (NGINX server listens for secure connections on port 443)	Inbound
7	TCP/UDP	Discovering endpoints using ICMP	Outbound
22	TCP	Initiating SSH connections with managed devices	Outbound
22	TCP	Remote SSH connection	Inbound
53	TCP/UDP	Connecting to DNS	Outbound
123	UDP	Network Time Protocol (NTP)	Outbound
179	TCP	NetFlow BGP	Inbound
830	TCP	Initiating NETCONF	Outbound
30742	TCP	WAE Modeling Daemon (WMD)	Inbound
30744	TCP	OPM/RPC	Inbound
31210	UDP	NetFlow packets	Inbound

Install Cisco Crosswork Planning

This chapter explains the processes to install Cisco Crosswork Planning on a single VM or node. In a single VM-based solution, the Cisco Crosswork Platform Infrastructure, Cisco Crosswork Planning infrastructure, and Cisco Crosswork Planning Design and Cisco Crosswork Planning Collector applications are bundled together in a single OVA image. Once you complete the installation procedure, all these components are installed on your machine by default.

- The Cisco Crosswork Platform Infrastructure is a microservices-based platform and is the foundation required for running Crosswork applications.

- Cisco Crosswork Planning Collector provides a set of microservices to create, maintain, and archive a model of the current network.

- Cisco Crosswork Planning Design provides a set of microservices for network planning, designing, and visualization.

- Cisco Crosswork Planning Infrastructure provides a set of microservices to manage Smart Licensing and Archive services.

This section contains the following topics:

Installation overview

Cisco Crosswork Planning can be installed using these methods:

- vCenter vSphere UI—For details, see Install Cisco Crosswork Planning using the vCenter vSphere UI, on page 20.

- OVF tool—For details, see Install Cisco Crosswork Planning via the OVF tool, on page 25.

- Docker installer tool—For details, see Install Cisco Crosswork Planning using the Docker installer tool, on page 28.

Note This method is less recommended compared to using the vCenter UI or the OVF tool for installation.

Installation parameters

This section explains the important parameters that you must specify while installing Cisco Crosswork Planning. Ensure that you have relevant information to provide for each of the parameters mentioned in the table.

Attention Use the latest template file that comes with the Cisco Crosswork Planning build file.

Table 6: General parameters

Parameter	Description
Cw_VM_Image	The name of Crosswork VM image in vCenter. This value is set as an option when running the installer tool and does not need to be set in the template file.
ClusterIPStack	The IP stack protocol: IPv4

vm_sizes	Create a custom profile as per your requirement. These two profiles are supported in Cisco Crosswork Planning:
	
	```vm_sizes = {```
	``` "large" = {```
	``` vcpus = 16,```
	``` cpu_reservation = 24000,```
	``` memory = 128000```
	``` },```
	``` "xlarge" = {```
	``` vcpus = 24,```
	``` cpu_reservation = 32000,```
	``` memory = 256000```
	``` }```
	```}```

vcpus	The number of virtual CPU instances allocated for virtual machine.
cpu_reservation	The guaranteed minimum CPU resource allocation for virtual machine.
memory	The amount of memory allocation for virtual machine.
ManagementIPAddress	The Management IP address of the VM (IPv4).
ManagementIPNetmask	The Management IP subnet in dotted decimal format (IPv4).

Parameter	Description
ManagementIPGateway	The Gateway IP on the Management Network (IPv4). The address must be reachable, otherwise the installation will fail.
ManagementVIP	The Management Virtual IP for the Crosswork VM.
DataIPAddress	The Data IP address of the VM (IPv4).
DataIPNetmask	The Data IP subnet in dotted decimal format (IPv4).
DataIPGateway	The Gateway IP on the Data Network (IPv4). The address must be reachable, otherwise the installation will fail.
DataVIP	The Data Virtual IP for the Crosswork VM.
DNS	The IP address of the DNS server (IPv4). The address must be reachable, otherwise the installation will fail.
NTP	NTP server address or name. The address must be reachable, otherwise the installation will fail.
DomainName	The domain name used for the VM.
CWPassword	Password to log into Cisco Crosswork. When setting up a VM, ensure the password is strong and meets the following criteria: • It must be at least eight characters long, and include uppercase and lowercase letters, numbers, and at least one special character. • These special characters are not allowed: backslash (\), single quote ('), or double quote ("). • Avoid using passwords that resemble dictionary words (for example, "Pa55w0rd!") or relatable words. While such passwords may meet the specified criteria, they are considered weak and will be rejected, resulting in a failure to set up the VM.
VMSize	VM size. Cisco Crosswork Planning supports the Large and XLarge profiles. For more information, see Profile specifications, on page 3.
VMName	Name of the VM.
NodeType	Type of VM. Choose "Hybrid".
IsSeed	Set to "True".
InitNodeCount	Set the value to 1.
InitMasterCount	Set the value to 1.

Parameter	Description
bckup_min_percent	Minimum percentage of the data disk space to be used for the size of the backup partition. The default value is 35 (valid range is from 1 to 80). Please use the default value unless recommended otherwise. **Note** The final backup partition size will be calculated dynamically. This parameter defines the minimum.
ThinProvisioned	Set to "false" for production deployments.
SchemaVersion	The configuration Manifest schema version. This indicates the version of the installer to use with this template. Schema version should map to the version packaged with the sample template in the installer tool on cisco.com. You should always build a new template from the default template provided with the release you are deploying, as template requirements may change from one release to the next.
EnableSkipAutoInstallFeature	Any pods marked as skip auto install will not be brought up until a dependent application/pod explicitly asks for it. Set to "True".
EnforcePodReservations	Enforces minimum resource reservations for the pod. If left blank, the default value ("True") is selected.
K8sServiceNetwork	The network address for the kubernetes service network. By default, the CIDR range is fixed to '/16'.
K8sPodNetwork	The network address for the kubernetes pod network. By default, the CIDR range is fixed to '/16'.
IgnoreDiagnosticsCheckFailure	Used to set the system response in case of a diagnostic check failure. If set to "false" (default value), the installation will terminate if the diagnostic check reports an error. If set to "true", the diagnostic check will be ignored, and the installation will continue. You are recommended to select the default value.
ManagementVIPName	Name of the Management Virtual IP for the Crosswork VM. This is an optional parameter used to reach Crosswork Management VIP via DNS name. If this parameter is used, the corresponding DNS record must exist in the DNS server.
DataVIPName	Name of the Data Virtual IP for the Crosswork VM. This is an optional parameter used to reach Crosswork Data VIP via DNS name. If this parameter is used, the corresponding DNS record must exist in the DNS server.

Parameter	Description
EnableHardReservations	Determines the enforcement of VM CPU and Memory profile reservations. This is an optional parameter and the default value is true, if not explicitly specified.
	If set as true, the VM's resources are provided exclusively. In this state, the installation will fail if there are insufficient CPU cores, memory or CPU cycles.
	If set as false (only set for lab installations), the VM's resources are provided on best efforts. In this state, insufficient CPU cores can impact performance or cause installation failure.
corefs	Core partition size (in Giga Bytes). Default value is 18 GB and Maximum value is 1000 GB. You are recommended to use the default value.
ddatafs	Data disk size for the nodes (in Giga Bytes). This is an optional parameter and the default value is 485 (valid range is from 450 to 8000), if not explicitly specified.
	Please use the default value unless recommended otherwise.
logfs	Log partition size (in Giga Bytes). Default value is 20 GB and Maximum value is 1000 GB. You are recommended to use the default value.
RamDiskSize	Size of the RAM disk.
	This parameter is only used for lab installations (value must be at least 2). When a non-zero value is provided for RamDiskSize, the HSDatastore value is not used.
Timezone	Enter the timezone. Input is a standard IANA time zone (for example, "America/Chicago").
	If left blank, the default value (UTC) is selected.
	This is an optional parameter.
UseNonDefaultCalicoBgpPort	Determines whether Calico should use the default port 179 for BGP or an alternative port. Set to "True".

Table 7: VMware template parameters

Parameter	Description
VCenterAddress	The vCenter IP or host name.
VCenterUser	The username needed to log into vCenter.
VCenterPassword	The password needed to log into vCenter.
DCname	The name of the Data Center resource to use.
	Example: DCname = "cp"

Parameter	Description
MgmtNetworkName	The name of the vCenter network to attach to the VM's Management interface.
	This network must already exist in VMware or the installation will fail.
DataNetworkName	The name of the vCenter network to attach to the VM's Data interface.
	This network must already exist in VMware or the installation will fail. However, if this is a single NIC installation using only the Management interface, then you need to specify DataNetworkName = "".
HostedCwVMs	The ID of the VM to be hosted by the ESXi host or resource.
Host	The ESXi host, or ONLY the vCenter VM/resource group name where the VM is to be deployed.
	The primary option is to use the host IP or name (all the hosts should be under the data center). If the hosts are under a VM in the data center, only provide the VM name (all hosts within the VM will be picked up).
	The subsequent option is to use a resource group. In this case, a full path should be provided.
	Example: Host = "Main infrastructure/Resources/00_trial"
Datastore	The datastore name available to be used by this host or resource group.
	The primary option is to use host IP or name. The subsequent option is to use a resource group.
	Example: Datastore = "SDRS-DCNSOL-prodexsi/bru-netapp-01_FC_Prodesx_ds_15"
HSDatastore	The high speed datastore available for this host or resource group.
	If the vCenter server has a separate high-speed datastore, then this should be set to the name of that high-speed data store. If the vCenter server uses only a high-speed datastore, then both Datatore and HSDatastore can be set to the same name.
	Note: The use of high-speed datastore is mandatory for Cisco Crosswork Planning.

Table 8: Parameters used in KVM deployment

Parameter	Description
AdminIPv4Address	The Admin IP address of the VM (IPv4).
AdminIPv4Netmask	The Admin IP subnet in dotted decimal format (IPv4).
AwsIamRole	The Amazon Web Services IAM role name for the VIP update.

Parameter	Description
CWPassword	Password to log into Cisco Crosswork.
	Use a strong VM Password (8 characters long, including upper and lower case letters, numbers, and at least one special character). Avoid using passwords similar to dictionary words (for example, "Pa55w0rd!") or relatable words (for example, C!sco123 or Cwork321!). While they satisfy the criteria, such passwords are weak and will be rejected resulting in failure to setup the VM.
CWUsername	Username to log into Cisco Crosswork.
ClusterCaKey	The CA private key. Use the default value (Empty).
ClusterCaPubKey	The CA public key. Use the default value (Empty).
CwInstaller	Set as "False".
DNSv4	The IP address of the DNS server (IPv4). The address must be reachable, otherwise the installation will fail.
DataIPv4Address	The Data IP address of the VM (IPv4).
DataIPv4Gateway	The Gateway IP on the Data Network (IPv4). The address must be reachable, otherwise the installation will fail.
DataIPv4Netmask	The Data IP subnet in dotted decimal format (IPv4).
DataPeerIPs	The Data peer IP addresses (IPv4) for the VM.
DataVIP	The Data Virtual IP for the Crosswork VM.
DataVIPName	Name of the Data Virtual IP for the Crosswork VM. This is an optional parameter used to reach Crosswork Data VIP via DNS name. If this parameter is used, the corresponding DNS record must exist in the DNS server.
Deployment	Enter the deployment type.
Disclaimer	Enter the disclaimer message.
Domain	The domain name used for the VM.
EnableSkipAutoInstallFeature	Any pods marked as skip auto install will not be brought up until a dependent application/pod explicitly asks for it.
	Set to "True".
EnforcePodReservations	Enforces minimum resource reservations for the pod. If left blank, the default value ("True") is selected.
InitNodeCount	Set the value to 1.
InitMasterCount	Set the value to 1.

Parameter	Description
IsSeed	Set to "True".
K8Orch	Enforces minimum resource reservations for the pod. If left blank, the default value ("True") is selected.
K8sPodNetwork	The network address for the kubernetes pod network. By default, the CIDR range is fixed to '/16'.
K8sServiceNetwork	The network address for the kubernetes service network. By default, the CIDR range is fixed to '/16'.
ManagementIPv4Address	The Management IP address of the VM (IPv4).
ManagementIPv4Gateway	The Gateway IP on the Management Network (IPv4). The address must be reachable, otherwise the installation will fail.
ManagementIPv4Netmask	The Management IP subnet in dotted decimal format (IPv4).
ManagementVIP	The Management Virtual IP for the Crosswork VM.
ManagementVIPName	Name of the Management Virtual IP for the Crosswork VM. This is an optional parameter used to reach Crosswork Management VIP via DNS name. If this parameter is used, the corresponding DNS record must exist in the DNS server.
ManagementPeerIPs	The Management peer IP addresses (IPv4) for the VM.
NBIIPv4Address	The NBI IP address of the VM (IPv4).
NBIIPv4Gateway	The Gateway IP on the NBI Network (IPv4). The address must be reachable, otherwise the installation will fail.
NBIIPv4Netmask	The NBI IP subnet in dotted decimal format (IPv4).
NBIVIP	The NBI Virtual IP address (IPv4) for the VM.
NTP	NTP server address or name. The address must be reachable, otherwise the installation will fail.
Timezone	Enter the timezone. Input is a standard IANA time zone (for example, "America/Chicago"). If left blank, the default value (UTC) is selected. This is an optional parameter.
VMLocation	Location of the VM.
VMType	Type of VM. Choose "Hybrid".

Parameter	Description
bckup_min_percent	Minimum percentage of the data disk space to be used for the size of the backup partition. The default value is 35 (valid range is from 1 to 80).
	Please use the default value unless recommended otherwise.
	Note The final backup partition size will be calculated dynamically. This parameter defines the minimum.
corefs	Core partition size (in Giga Bytes). Default value is 18 GB and Maximum value is 1000 GB. You are recommended to use the default value.
ddatafs	Data disk size for the nodes (in Giga Bytes). This is an optional parameter and the default value is 485 (valid range is from 450 to 8000), if not explicitly specified.
	Please use the default value unless recommended otherwise.
logfs	Log partition size (in Giga Bytes). Default value is 20 GB and Maximum value is 1000 GB. You are recommended to use the default value.
ramdisk	Size of the RAM disk.
	This parameter is only used for lab installations (value must be at least 2). When a non-zero value is provided for RamDiskSize, the HSDatastore value is not used.
ssd	SSD disk size. This is an optional parameter and the default value is 15.
	Please use the default value unless recommended otherwise.
ThinProvisioned	Set to "false" for production deployments.
UseNonDefaultCalicoBgpPort	Determines whether Calico should use the default port 179 for BGP or an alternative port. Set to "True".
bootOptions.efiSecureBootEnabled	Default value is "False".

Guidelines for custom profiles

Ensure that the vm_sizes parameter is set in accordance with your deployment profile. These two profiles are supported in Cisco Crosswork Planning:

```
vm_sizes = {
  "large" = {
    vcpus = 16,
    cpu_reservation = 24000,
    memory = 128000
  },
  "xlarge" = {
```

```
        vcpus = 24,
        cpu_reservation = 32000,
        memory = 256000
    }
}
```

Install Cisco Crosswork Planning using the vCenter vSphere UI

This topic explains how to deploy Cisco Crosswork Planning on a single VM using the vCenter user interface.

This is the recommended method for installing Cisco Crosswork Planning on a single VM.

Procedure

Step 1   Download the latest available Cisco Crosswork Planning image file (*.ova) to your system.

Step 2   With VMware ESXi running, log in to the VMware vSphere Web Client. On the left navigation pane, choose the ESXi host where you want to deploy the VM.

Step 3   In the vSphere UI, go to **Host** > **Configure** > **Networking** > **Virtual Switches** and select the virtual switch for the Management Network that will be used to access the UI of the VM. In the virtual switch, select **Edit** > **Security**, and configure the following DVS port group properties:

- Set **Promiscuous mode** as *Reject*

- Set **MAC address changes** as *Reject*

Confirm the settings and repeat the process for the virtual switch that will be used for the Data Network.

Step 4   Review and confirm that your network settings meet the requirements.

Ensure that the networks that you plan to use for Management network and Data network are connected to the host. Contact your Cisco Experience team for assistance.

Step 5   Choose **Actions** > **Deploy OVF Template**.

Caution
The default VMware vCenter deployment timeout is 15 minutes. If vCenter times out during deployment, the resulting VM will not be bootable. To prevent this, we recommend that you document the choices (such as IP address, gateway, DNS server, etc.) so that you can enter the information quickly and avoid any issues with the VMware configuration.

Step 6   The VMware **Deploy OVF Template** window appears, with the first step, **1 - Select an OVF template**, highlighted. Click **Choose Files** to navigate to the location where you downloaded the OVA image file and select it. Once selected, the file name is displayed in the window.

Step 7   Click **Next**. The **Deploy OVF Template** window is refreshed, with **2 - Select a name and folder** now highlighted. Enter a name and select the respective data center for the Cisco Crosswork Planning VM you are creating.

We recommend that you include the Cisco Crosswork Planning version and build number in the name, for example: Cisco Crosswork Planning 7.1 Build 152.

Step 8   Click **Next**. The **Deploy OVF Template** window is refreshed, with **3 - Select a compute resource** highlighted. Select the host for your Cisco Crosswork Planning VM.

Step 9   Click **Next**. The VMware vCenter Server validates the OVA. Network speed will determine how long validation takes. After the validation is complete, the **Deploy OVF Template** window is refreshed, with **4 - Review details** highlighted.

Step 10   Review the OVF template that you are deploying. Note that this information is gathered from the OVF, and cannot be modified.

> **Note**
> Even though the **Product** field displays as "Cisco Crosswork Network Automation", once the installation procedure completes, the product name is displayed as "Cisco Crosswork Planning" in the application UI. The term "Cisco Crosswork Network Automation" is used universally for all the products under Crosswork portfolio.

> **Note**
> You may see alerts regarding the OVF package containing advanced configuration options and/or about trusted certificates. These are common and you can safely select the "Ignore" option.

Step 11   Click **Next**. The **Deploy OVF Template** window is refreshed, with **5 - License agreements** highlighted. Review the End User License Agreement and if you agree, click the **I accept all license agreements** checkbox. Otherwise, contact your Cisco Experience team for assistance.

Step 12   Click **Next** The **Deploy OVF Template** window is refreshed, with **6 - Configuration** highlighted. Choose the desired deployment configuration.

> **Important**
> For Cisco Crosswork Planning deployment, the supported configuration is **IPv4 Network** using two NICs.

Figure 1: Select a deployment configuration

Step 13   Click **Next**. The **Deploy OVF Template** window is refreshed, with **7 - Select Storage** highlighted. Choose the relevant option from the **Select virtual disk format** drop-down list. From the table, choose the datastore you want to use, and review its properties to ensure there is enough available storage.

Figure 2: Select storage

Note

For production deployment, choose the **Thick Provision Eager Zeroed** option because this will preallocate disk space and provide the best performance. For lab purposes, we recommend the **Thin Provision** option because it saves disk space.

Step 14 Click **Next**. The **Deploy OVF Template** window is refreshed, with **8 - Select networks** highlighted. From the **Destination Network** drop-down list, select the proper networks for the Management Network and the Data Network.

Figure 3: Select networks

Step 15   Click **Next**. The **Deploy OVF Template** window is refreshed, with **9 - Customize template** highlighted.

a) Expand the **Management Network** settings. Provide information for the deployment, such as IP address, IP netmask, IP gateway, virtual IP address, and virtual IP DNS name.

b) Expand the **Data Network** settings. Provide information for the deployment, such as IP address, IP netmask, IP gateway, virtual IP address, and virtual IP DNS name.

c) Expand the **Deployment Credentials** settings. Enter relevant values for the VM Username and Password.

Note

Avoid using passwords that resemble dictionary words (for example, 'Pa55w0rd!') or easily guessable patterns. While such passwords might meet the initial criteria, they are considered weak and could cause the VM setup to fail without a clear explanation. To ensure a successful installation, use a complex password with a minimum of 8 characters that combines uppercase and lowercase letters, numbers, and special characters in a non-predictable sequence.

d) Expand the **DNS and NTP Servers** settings. Provide information in these three fields:

• **DNS IP Address**: The IP addresses of the DNS servers you want the Cisco Crosswork server to use. Separate multiple IP addresses with spaces.

• **NTP Servers**: The IP addresses or host names of the NTP servers you want to use. Separate multiple IPs or host names with spaces.

• **DNS Search Domain**: The name of the DNS search domain.

• **Timezone**: Enter the timezone details. Default value is UTC.

Note

The DNS and NTP servers must be reachable using the network interfaces you have mapped on the host. Otherwise, the configuration of the VM will fail.

e) Expand **Disk Configuration** settings. Provide relevant values for these fields:

- **Logfs Disk Size**

- **Datafs Disk Size**

- **Corefs Partition Size**

- **High Speed Disk Size**

- **Minium backup partition size**

The default disk configuration settings should work for most environments. Change the settings only if you are instructed to by the Cisco Customer Experience team.

f) Expand **Crosswork Configuration** and enter your legal disclaimer text (you will see this text if you log into the CLI).

g) Expand **Crosswork Cluster Configuration**. Provide relevant values for these fields:

- **VM Type**: Choose **Hybrid**.

- **Cluster Seed node**: Choose **True**.

- **Crosswork Management Cluster Virtual IP**: Enter virtual IP of the management network.

- **Crosswork Management Cluster Virtual IP Name**: Enter DNS hostname of virtual IP interface of the management network.

- **Crosswork Data Cluster Virtual IP**: Enter virtual IP of the data network.

- **Crosswork Data Cluster Virtual IP Name**: Enter DNS hostname of virtual IP interface of the data network.

- **Initial hybrid node count**: Set to 1.

- **Initial total node count**: Set to 1.

- **Location of VM**: Enter the location of VM.

- **Disclaimer**: Enter your legal disclaimer text (you will see this text if you log into the CLI).

- **Installation type**: Not applicable to single VM deployment. Do not select any checkbox.

- **Enable Skip Auto Install Feature**: Set to **True**.

- **Auto Action Manifest Definition**: Use the default value (Empty).

- **Product specific definition**: Enter the product specific definition.

- **Ignore Diagnostics Failure?**: Use the default value (False).

Step 16 Click **Next**. The **Deploy OVF Template** window is refreshed, with **10 - Ready to Complete** highlighted.

Step 17 Review your settings and then click **Finish** if you are ready to begin deployment. Wait for the deployment to finish before continuing. To check the deployment status:

a) Open a VMware vCenter client.

b) In the **Recent Tasks** tab of the host VM, view the status of the **Deploy OVF template** and **Import OVF package** jobs.

Step 18 Once the deployment is completed, right-click on the VM and select **Edit Settings**. The **Edit Settings** dialog box is displayed. Under the **Virtual Hardware** tab, update these attributes based on your profile requirement.

　　　　　　　　• **CPU:** change to **16** (for Large profile) or **24** (for XLarge profile)

　　　　　　　　• **Memory:** change to **125 GB** (for Large profile) or **256 GB** (for XLarge profile)

　　　　　For more information, see Profile specifications, on page 3.

　　　　　Click **OK** to save the changes.

Step 19　　　Power on the Cisco Crosswork Planning VM. To power on, expand the host's entry, click the Cisco Crosswork Planning VM, and then choose **Actions** > **Power** > **Power On**.

　　　　　The time taken to create the VM can vary based on the size of your deployment profile and the performance characteristics of your hardware.

Install Cisco Crosswork Planning via the OVF tool

　　　　　This topic explains how to deploy Cisco Crosswork Planning on a single VM using the OVF tool. You must modify the list of mandatory and optional parameters in the script as per your requirements and run the OVF tool.

　　　　　Follow these steps to log in to the Cisco Crosswork Planning VM from SSH.

Before you begin

　　　　　• In your vCenter data center, go to **Host** > **Configure** > **Networking** > **Virtual Switches** and select the virtual switch. In the virtual switch, select **Edit** > **Security**, and ensure that these DVS port group properties are as shown.

　　　　　　　　• Set **Promiscuous mode** as Reject

　　　　　　　　• Set **MAC address changes** as Reject

　　　　　Confirm the settings and repeat the process for each virtual switch used by Cisco Crosswork Planning.

　　　　　• Ensure you are using the OVF tool version 4.4 or higher.

Procedure

Step 1　　　On the machine where you have the OVF tool installed, use this command to confirm that you have OVF tool version 4.4.

```
ovftool --version
```

Step 2　　　Create the script file (see the example in this step) and provide relevant information as per your target environment, such as IP addresses, gateway, netmask, password, and VCENTER_PATH, and so on.

　　　　　Note
　　　　　The file names mentioned in this topic are sample names and may differ from the actual file names on cisco.com.

　　　　　Important

This is a sample script for deploying an `XLarge` VM profile. If you need to deploy a `Large` VM profile, replace the `XLarge` values with corresponding values for the `Large` profile.

- **XLarge profile**:

```
--numberOfCpus:"*"=24 --viCpuResource=:32000: \
--memorySize:"*"=256000 --viMemoryResource=:256000: \
```

- **Large profile**:

```
--numberOfCpus:"*"=16 --viCpuResource=:24000: \
--memorySize:"*"=128000 --viMemoryResource=:128000: \
```

```
cat cp_install.sh
#!/usr/bin/env bash
Host="X.X.X.X"
DM="thick"
DS="DS36"
Deployment="cw_ipv4"
DNSv4="10.10.0.99"
NTP="<NTP-Server>"
Timezone="US/Pacific"
EnforcePodReservations="True"
EnableSkipAutoInstallFeature="True"
Domain="cisco.com"
Disclaimer="ACCESS IS MONITORED"
VM_NAME="cp"
DataNetwork="DataNet"
ManagementNetwork="MgmtNet"
DataIPv4Address="x.x.x.x"
DataIPv4Gateway="x.x.x.x"
DataIPv4Netmask="x.x.x.x"
ManagementIPv4Address="x.x.x.x"
ManagementIPv4Gateway="x.x.x.x"
ManagementIPv4Netmask="x.x.x.x"
K8sServiceNetworkV4="10.75.0.0"
K8sPodNetworkV4="10.225.0.0"
Password="CLI Password"
Username="cw-admin"
ManagementVIP="x.x.x.x"
DataVIP="x.x.x.x"
VMType="Hybrid"
IsSeed="True"
InitNodeCount="1"
InitMasterCount="1"

CP_OVA_PATH=$1

VCENTER_LOGIN="Administrator%40vsphere%2Elocal:Password%40123%21@x.x.x.x"
VCENTER_PATH="DC1/host"

ovftool --version
ovftool --acceptAllEulas --skipManifestCheck --X:injectOvfEnv -ds=$DS \
--numberOfCpus:"*"=24 --viCpuResource=:32000: \
--memorySize:"*"=256000 --viMemoryResource=:256000: \
--diskMode=$DM --overwrite --powerOffTarget --powerOn --noSSLVerify \
--allowExtraConfig \
--deploymentOption=$Deployment \
--prop:"DNSv4=${DNSv4}" \
--prop:"NTP=${NTP}" \
--prop:"Timezone=${Timezone}" \
--prop:"EnforcePodReservations=${EnforcePodReservations}" \
--prop:"EnableSkipAutoInstallFeature=${EnableSkipAutoInstallFeature}" \
--prop:"Domain=${Domain}" \
```

```
--prop:"Disclaimer=${Disclaimer}" \
--name=$VM_NAME \
--net:"Data Network=${DataNetwork}" \
--net:"Management Network=${ManagementNetwork}" \
--prop:"DataIPv4Address=${DataIPv4Address}" \
--prop:"DataIPv4Gateway=${DataIPv4Gateway}" \
--prop:"DataIPv4Netmask=${DataIPv4Netmask}" \
--prop:"ManagementIPv4Address=${ManagementIPv4Address}" \
--prop:"ManagementIPv4Gateway=${ManagementIPv4Gateway}" \
--prop:"ManagementIPv4Netmask=${ManagementIPv4Netmask}" \
--prop:"K8sServiceNetworkV4=${K8sServiceNetworkV4}" \
--prop:"K8sPodNetworkV4=${K8sPodNetworkV4}" \
--prop:"CWPassword=${Password}" \
--prop:"CWUsername=${Username}" \
--prop:"ManagementVIP=${ManagementVIP}" \
--prop:"DataVIP=${DataVIP}" \
--prop:"VMType=${VMType}" \
--prop:"IsSeed=${IsSeed}" \
--prop:"InitNodeCount=${InitNodeCount}" \
--prop:"InitMasterCount=${InitMasterCount}" \
$CP_OVA_PATH \
vi://$VCENTER_LOGIN/$VCENTER_PATH/$Host
```

Step 3   Download the OVA and install scripts from cisco.com. For the purpose of these instructions, we use the file name as **crosswork-planning-single-node-deployment-7.1.0-48**.

Use this command to extract the files from the tar bundle.

```
tar -xvzf crosswork-planning-single-node-deployment-7.1.0-48.ova
```

The OVA is extracted.

```
cp]# ls -al
-rw-r--r--   1 root root 15416145920 Mar 28 11:12 crosswork-planning-single-node-deployment-7.1.0-48.ova
-rwxr-xr-x   1 root root        2324 Apr  2 14:06 cp_install.sh
```

Step 4   Use this command to make the scripts executable.

```
chmod +x {filename}
```

For example:

```
chmod +x cp_install.sh
```

Step 5   Execute the script with the OVA file name as parameter.

```
cp]# ./cp_install.sh crosswork-planning-single-node-deployment-7.1.0-48.ova
VMware ovftool 4.4.0 (build-16360108)
Opening OVA source: crosswork-planning-single-node-deployment-7.1.0-48.ova
<Removed some output >
Completed successfully
```

The time taken to create the VM can vary based on the size of your deployment profile and the performance characteristics of your hardware.

Install Cisco Crosswork Planning using the Docker installer tool

This section explains the procedure to install Cisco Crosswork Planning on a single VM using the docker installer tool. This method is less recommended compared to using the vCenter UI or the OVF tool for installation.

Before you begin

- Make sure that your environment meets all the vCenter requirements specified in VMware settings, on page 4.

- The edited template in the `/data` directory contains sensitive information (VM passwords and the vCenter password). The operator needs to manage access to this content. Store the templates used for your install in a secure environment or edit them to remove the passwords.

- The `install.log`, `install_tf.log`, and `.tfstate` files will be created during the install and stored in the `/data` directory. If you encounter any trouble with the installation, provide these files to the Cisco Customer Experience team when opening a case.

- The install script is safe to run multiple times. Upon error, input parameters can be corrected and re-run. You must remove the `install.log`, `install_tf.log`, and `tfstate` files before each re-run. Running the installer tool multiple times may result in the deletion and re-creation of VMs.

- In case you are using the same installer tool for multiple Cisco Crosswork Planning installations, it is important to run the tool from different local directories, allowing for the deployment state files to be independent. The simplest way for doing so is to create a local directory for each deployment on the host machine and map each one to the container accordingly.

- Docker version 19 or higher is required while using the installer tool. For more information on Docker, see https://docs.docker.com/get-docker/.

- To change the install parameters or to correct the parameters following the installation errors, it is important to distinguish whether the installation has managed to deploy the VM or not. Deployed VM is evidenced by the output of the installer similar to:

```
vsphere_virtual_machine.crosswork-IPv4-vm["1"]: Creation complete after 2m50s
[id=4214a520-c53f-f29c-80b3-25916e6c297f]
```

- If you do not have Python installed, go to python.org and download the version of Python that is appropriate for your workstation.

Known limitations:

- The vCenter host VMs defined must use the same network names (vSwitch) across all hosts in the data center.

- The vCenter storage folders or datastores organized under a virtual folder structure, are not supported currently. Ensure that the datastores referenced are not grouped under a folder.

Procedure

Step 1 In your Docker capable machine, create a directory where you will store everything you will use during this installation.

Note
If you are using a Mac, ensure that the directory name is in lower case.

Step 2 Download the installer bundle (.tar.gz file) and the OVA file from cisco.com to the directory you created previously. For the purpose of these instructions, we will use the file name as **crosswork-planning-single-node-docker-deployment-7.1.0-48.tar.gz** and **crosswork-planning-single-node-deployment-7.1.0-48.ova**.

Attention
The file names mentioned in this topic are sample names and may differ from the actual file names on cisco.com.

Step 3 Use the following command to unzip the installer bundle:

```
tar -xvf crosswork-planning-single-node-docker-deployment-7.1.0-48.tar.gz
```

The contents of the installer bundle is unzipped to a new directory. This new directory will contain the installer image (**cw-na-planning-installer-7.1.0-48-releasecnc710-250606.tar.gz**) and files necessary to validate the image.

Step 4 Review the contents of the README file to understand everything that is in the package and how it will be validated in the following steps.

Step 5 Use the following command to verify the signature of the installer image:

Note
Use `python --version` to find out the version of python on your machine.

If you are using Python 2.x, use the following command to validate the file:

```
python cisco_x509_verify_release.py -e <.cer file> -i <.tar.gz file> -s
<.tar.gz.signature file> -v dgst -sha512
```

If you are using Python 3.x, use the following command to validate the file:

```
python3 cisco_x509_verify_release.py3 -e <.cer file> -i <.tar.gz file> -s
<.tar.gz.signature file> -v dgst -sha512
```

Step 6 Use the following command to load the installer image file into your Docker environment.

```
docker load -i <.tar.gz file>
```

For example:

```
docker load -i cw-na-planning-installer-7.1.0-48-releasecnc710-250606.tar.gz
```

Step 7 Run the `docker image list` or `docker images` command to get the "image ID" (which is needed in the next step).

For example:

```
docker images
```

The result will be similar to the following: (section we will need is underlined for clarity)

```
My Machine% docker images
REPOSITORY                      TAG                       IMAGE ID     CREATED    SIZE
dockerhub.cisco.com/cw-installer  cw-na-planning-7.1.0-48-
                                  releasecnc710-250606      4b99cf7d0684 7 days ago 280MB
```

Note

Pay attention to the "CREATED" time stamp in the table presented when you run `docker images`, as you might have other images present from the installation of prior releases. If you wish to remove these, the `docker image rm {image id}` command can be used.

Step 8 Launch the Docker container using the following command:

```
docker run --rm -it -v `pwd`:/data {image id of the installer container}
```

To run the image loaded in our example, use the following command:

```
docker run --rm -it -v `pwd`:/data 4b99cf7d0684
```

Note

- You do not have to enter that full value. In this case, `docker run --rm -it -v `pwd`:/data 4b9` was adequate. Docker requires enough of the image ID to uniquely identify the image you want to use for the installation.

- In the above command, we are using the backtick (`). Do not use the single quote or apostrophe (') as the meaning to the shell is very different. By using the backtick (recommended), the template file and OVA will be stored in the directory where you are on your local disk when you run the commands, instead of inside the container.

- Centos/RHEL hosts, by default, enforce a strict SELinux policy which does not allow the installer container to read from or write to the mounted data volume. On such hosts, run the Docker volume command with the Z option as shown below:

```
docker run --rm -it -v `pwd`:/data:Z <remainder of docker options>
```

Note

The Docker command provided will use the current directory to read the template and the ova files, and to write the log files used during the install. If you encounter either of the following errors you should move the files to a directory where the path is in lowercase (all lowercase, no spaces or other special characters). Then navigate to that directory and rerun the installer.

Error 1:

```
% docker run --rm -it -v `pwd`:/data 4b9
docker: invalid reference format: repository name must be lowercase.
See 'docker run --help'
```

Error 2:

```
docker: Error response from daemon: Mounts denied: approving /Users/Desktop:
file does not exist
ERRO[0000] error waiting for container: context canceled
```

Step 9 Navigate to the directory with the VMware template.

```
cd /opt/installer/deployments/7.1.0/vcentre
```

Step 10 Copy the template file found under `/opt/installer/deployments/7.1.0/vcentre/deployment_template_tfvars` to the `/data` folder using a different name.

For example, `cp deployment_template_tfvars /data/deployment.tfvars`

For the rest of this procedure, we will use `deployment.tfvars` in all the examples.

Step 11 Edit the template file located in the `/data` directory in a text editor, to match your planned deployment (for reference, see Sample manifest template, on page 31). The <sample manifest template> includes an example that you can reference for proper formatting. The example is more compact due to the removal of descriptive comments.

Step 12   From the `/opt/installer` directory, run the installer.

```
./cw-installer.sh install -m /data/<template file name> -o /data/<.ova file>
```

For example:

```
./cw-installer.sh install -m /data/deployment.tfvars -o /data/crosswork-planning-single-
node-deployment-7.1.0-48.ova
```

Step 13   Read, and then enter "yes" if you accept the End User License Agreement (EULA). Otherwise, exit the installer and contact your Cisco representative.

Step 14   Enter "yes" when prompted to confirm the operation.

Note

It is not uncommon to see some warnings like the following during the install:

```
Warning: Line 119: No space left for device '8' on parent controller '3'.
Warning: Line 114: Unable to parse 'enableMPTSupport' for attribute 'key' on element
'Config'.
```

If the install process proceeds to a successful conclusion (see sample output below), these warnings can be ignored.

Sample output:

```
cw_vms = <sensitive>
INFO: Copying day 0 state inventory to CW
INFO: Waiting for deployment status server to startup on 10.90.147.66.
Elapsed time 0s, retrying in 30s
Crosswork deployment status available at http://{VIP}:30602/d/NK1bwVxGk/crosswork-
deployment-readiness?orgId=1&refresh=10s&theme=dark
Once deployment is complete login to Crosswork via: https://{VIP}:30603/#/
logincontroller
INFO: Cw Installer operation complete.
```

Note

If the installation fails, open a case with Cisco and provide the .log files that were created in the /data directory (and the local directory where you launched the installer Docker container), to Cisco for review. The two most common reasons for the install to fail are: (a) password that is not adequately complex, and (b) errors in the template file. If the installer fails for any errors in the template (for example, mistyped IP address), correct the error and rerun the install script.

Sample manifest template

This section presents the manifest template example for deploying Cisco Crosswork Planning on a single VM.

```
Cw_VM_Image = "crosswork-planning-single-node-deployment-7.1.0-48"  # Line added automatically
 by installer.
ClusterIPStack = "IPv4"
ManagementVIP = "172.20.118.86"
ManagementIPNetmask = "255.255.255.0"
ManagementIPGateway = "172.20.118.1"
DataVIP = "172.20.118.87"
DataIPNetmask = "255.255.255.0"
DataIPGateway = "172.20.118.1"
DNS = "172.24.97.250"
DomainName = "cisco.com"
CWPassword = "*****!"
VMSize = "Large"
```

```
NTP = "ntp.esl.cisco.com"
Timezone = "Asia/Calcutta"
ThinProvisioned = true
EnableHardReservations = false
EnableSkipAutoInstallFeature = "True"
ManagementVIPName = "CP-svm"
EnforcePodReservations = "True"
ThinProvisioned = "true"
ManagerDataFsSize = "2000"
bckup_min_percent = "35"

CwVMs = {
    "0" = {
        VMName = "vm1",
        ManagementIPAddress = "172.20.118.88",
        DataIPAddress = "172.20.118.89",
        NodeType = "Hybrid"
    }
}

VCentreDC = {
    VCentreAddress = "172.20.118.84",
    VCentreUser = "<your-username>",
    VCentrePassword = "******",
    DCname = "cp",
    MgmtNetworkName = "VM Network",
    DataNetworkName = "vlan101",
    VMs = [
        {
            HostedCwVMs = ["0"],
            Host = "172.20.118.81",
            Datastore = "datastore1 (2)",
            HSDatastore = "datastore1 (2)"
        }
    ]
}
# VM size definitions
UseNonDefaultCalicoBgpPort = "true"
vm_sizes = {
    "large" = {
        vcpus = 16,
        cpu_reservation = 32000,
        memory = 128000
    }
}
SchemaVersion = "7.1.0"
```

Installing Cisco Crosswork Planning on KVM manually

This section provides the high-level workflow for installing Cisco Crosswork Planning on KVM manually using CLI.

Installation workflow

Follow these steps to complete the installation process.

Table 9: Installation workflow

Step	Action
1. Ensure that your KVM host meets all the requirements.	See KVM host bare metal requirements, on page 6.
2. Ensure that your environments all the installation prerequisites.	See Preliminary checks, on page 33
3. Set up and validate the KVM environment.	See Set up and validate KVM on RHEL, on page 33.
4. Configure network bridges and SRIOV.	See Configure network bridges and SRIOV, on page 34.
5. Install Cisco Crosswork Planning on KVM.	See Install Cisco Crosswork Planning on KVM using CLI, on page 36.

Preliminary checks

This section describes the preliminary checks required for installing Cisco Crosswork Planning on KVM.

- **Virtualization**: Ensure that your system supports virtualization. This is typically enabled in the BIOS. To check, use these commands:

    - For Intel CPUs: `grep -wo 'vmx' /proc/cpuinfo`

    - For AMD CPUs: `grep -wo 'svm' /proc/cpuinfo`

- **KVM modules**: Ensure that the KVM modules are loaded: `lsmod | grep kvm`

Set up and validate KVM on RHEL

Follow these steps to set up KVM on RHEL.

Procedure

Step 1 Refresh repositories and install updates. This command updates all the packages on your system to their latest versions.

```
sudo dnf update -y
```

Step 2 Reboot the system after all the updates are installed successfully.

```
sudo reboot
```

Step 3 Install virtualization tools.

a) Install virt-install and virt-viewer.

```
sudo dnf install virt-install virt-viewer -y
```

virt-install is a command-line tool for creating virtual machines.

virt-viewer is a Lightweight UI for interacting with VMs.

b) Install libvirt virtualization daemon, which is necessary for managing VMs.

```
sudo dnf install -y libvirt
```

c) Install virt-manager, a graphical interface for managing VMs.

```
sudo dnf install virt-manager -y
```

d) Install additional virtualization tools for managing VMs.

```
sudo dnf install -y virt-top libguestfs-tools
```

Step 4 Start and enable libvirtd virtualization daemon.

a) Start the libvirtd daemon.

```
sudo systemctl start libvirtd
```

b) Enable the libvertd daemon.

```
sudo systemctl enable libvirtd
```

c) Verify that the Daemon is running.

```
sudo systemctl status libvirtd
```

Step 5 Add users to the required groups, for example, libvert and qemu. In the following commands, replace *your_username* with the actual username.

```
sudo usermod --append --groups libvirt your_username
sudo usermod --append --groups qemu your_username
```

Step 6 Ensure that IOMMU is enabled. If it is not enabled, run this command to enable it.

```
grubby --update-kernel=ALL --args=intel_iommu=on
dmesg | grep -I IOMMU
```

Step 7 Check IOMMU and validate the setup. Ensure that all checks show as PASS.

```
virt-host-validate
```

If the IOMMU check is not PASS, then use the following commands to enable it.

```
sudo grubby --update-kernel=ALL --args=intel_iommu=on
sudo reboot
```

Configure network bridges and SRIOV

Crosswork needs the 10G interface for all the data layer communications to support functionality at a scale. You may choose any networking configuration which can provide 10G throughput.

The following sections explain how to enable bridging and SRIOV network configuration.

> **Note** For KVM deployment, configure either network bridges or SRIOV, but not both.

Configure network bridges

A network bridge acts like a virtual network switch, allowing multiple network interfaces to communicate as if they are on the same physical network.

Follow these steps to configure network bridges.

Procedure

Step 1 Create a new network connection of type "bridge" with the interface name `intMgmt` and assign it the connection name `intMgmt`.

```
nmcli connection add type bridge ifname intMgmt con-name intMgmt
```

Step 2 Add a new bridge-port connection, associating the physical network interface `<interface1>` with the previously created bridge `intMgmt`.

```
nmcli connection add type bridge-port ifname <interface1> controller intMgmt
```

Step 3 Assign IP address to the bridge.

```
nmcli connection modify intMgmt ipv4.addresses <IPv4-address>/<subnet-mask>
```

Step 4 Bring up the `intMgmt` network connection.

```
nmcli connection up intMgmt
```

Step 5 Create another network bridge connection with the interface name `intData` and assign it the connection name `intData`.

```
nmcli connection add type bridge ifname intData con-name intData
```

Step 6 Add a bridge-port connection, associating the physical network interface `<interface2>` with the previously created bridge `intData`.

```
nmcli connection add type bridge-port ifname <interface2> controller intData
```

Step 7 Assign IP address to `intData`.

```
nmcli connection modify intData ipv4.addresses <IPv4-address>/<subnet-mask>
```

Step 8 Bring up the `intData` network connection.

```
nmcli connection up intData
```

Configure SRIOV

SRIOV allows a single physical network interface to be shared among multiple VMs by creating multiple Virtual Functions (VFs).

Follow these steps to configure SRIOV.

Procedure

Step 1 Open the `rc.local` file in the vi editor.

```
vi /etc/rc.d/rc.local
```

Step 2   Set the number of VFs for the network interfaces based on your requirement. For instance, in a Cisco Crosswork Planning single VM installation, you need a minimum of two network interfaces—one for management and the other for data. Two VFs are configured for each interface by default. You may also configure additional VFs for future scalability needs.

For example, to set the number of VFs to 2 for each `<interface1>` and `<interface2>`, use these commands. In this example, `<interface1>` refers to the management interface and `<interface2>` refers to the data interface.

```
echo 2 > /sys/class/net/<interface1>/device/sriov_numvfs
echo 2 > /sys/class/net/<interface2>/device/sriov_numvfs
```

Step 3   Change the permissions of the `rc.local` file to make it executable.

```
chmod +x /etc/rc.d/rc.local
```

Step 4   If any of the interfaces are configured over the VLAN, set the VLAN IDs to the interfaces.

```
ip link set <interface1> vf 0 vlan <vlanid>
ip link set <interface2> vf 1 vlan <vlanid>
```

Step 5   Save the changes and reboot the system.

Step 6   List all the PCI devices for all the virtual functions in a tree format. This is useful for verifying the setup and ensuring that the VFs are correctly recognized by the KVM hypervisor.

```
virsh nodedev-list --tree
```

```
|+- pci_0000_17_00_0
|||
||+- net_ens1f0_40_a6_b7_ce_04_c8
||
|+- pci_0000_17_00_1
|||
||+- net_ens1f1_40_a6_b7_ce_04_c9
||
|+- pci_0000_17_00_2
|||
||+- net_ens1f2_40_a6_b7_ce_04_ca
||
|+- pci_0000_17_00_3
|||
||+- net_ens1f3_40_a6_b7_ce_04_cb
```

In this procedure, since we set the number of VFs as 2 in Step 2, two VFs for each management interface and data interface are created. As a result, a total of four PCI devices are generated: two for management and two for data.

This PCI device information is used during the installation process with SRIOV (Step 4 of Install Cisco Crosswork Planning on KVM using CLI, on page 36).

Install Cisco Crosswork Planning on KVM using CLI

Follow these steps to install Cisco Crosswork Planning on KVM manually using CLI.

Before you begin

Ensure that

- the KVM host meets all the requirements specified in KVM host bare metal requirements, on page 6

• your KVM environment is set up (see Preliminary checks, on page 33 and Set up and validate KVM on RHEL, on page 33), and

• the network bridge or SRIOV is configured (see Configure network bridges and SRIOV, on page 34).

Procedure

Step 1 As a first step, prepare the config IOS file for Cisco Crosswork Planning.

a) Update the `ovf-env.xml` file as per your needs. For reference, see Sample configuration file, on page 38. For description of installation parameters, see Installation parameters, on page 12.

```
$ cat ovf-env.xml
```

b) Generate the IOS file.

```
$ mkisofs -R -relaxed-filenames -joliet-long -iso-level 3 -l -o cp1.iso ovf-env.xml
```

Note
In the above command, "cp1" is the host name of the Cisco Crosswork Planning VM.

Step 2 Download the installer bundle (.tar.gz file) from cisco.com and extract it.

```
tar -xvf crosswork-planning-single-node-deployment-7.1.0-48-qcow2.tar.gz
```

Step 3 Extract the Cisco Crosswork Planning qcow2 tar file.

```
tar -xvf cw-na-planning-7.1.0-48-releasecnc710-250606-qcow2.tar.gz
```

This command creates three qcow2 files:

• cw-na-planning-7.1.0-48-releasecnc710-250606_rootfs.qcow2

• cw-na-planning-7.1.0-48-releasecnc710-250606_dockerfs.qcow2

• cw-na-planning-7.1.0-48-releasecnc710-250606_extrafs.qcow2

Step 4 Navigate to the required installation folder and create three disks.

```
cd cp1/
qemu-img create -f qcow2 disk3 20G
qemu-img create -f qcow2 disk4 485G
qemu-img create -f qcow2 disk6 15G
```

Step 5 Install Cisco Crosswork Planning using network bridge or SRIOV.

• Using network bridges:

```
virt-install --boot uefi --boot hd,cdrom --connect qemu:///system --virt-type kvm --name cp1
--ram 128000 --vcpus 16 --os-type linux --disk
path=cw-na-planning-7.1.0-48-releasecnc710-250606_rootfs.qcow2,format=qcow2,bus=scsi --disk
path=cw-na-planning-7.1.0-48-releasecnc710-250606_dockerfs.qcow2,format=qcow2,bus=scsi --disk
path=disk3,format=qcow2,bus=scsi --disk path=disk4,format=qcow2,bus=scsi --disk
path=cw-na-planning-7.1.0-48-releasecnc710-250606_extrafs.qcow2,format=qcow2,bus=scsi --disk
path=disk6,format=qcow2,bus=scsi --disk=cp1.iso,device=cdrom,bus=scsi --import --network
bridge=intMgmt,model=virtio --network bridge=intData,model=virtio --noautoconsole --os-variant
ubuntu22.04 --graphics vnc,listen=0.0.0.0
```

• Using SRIOV:

```
virt-install --boot uefi --boot hd,cdrom --connect qemu:///system --virt-type kvm --name cp1
--ram 128000 --vcpus 16 --cpu host-passthrough --disk
path=cw_rootfs.vmdk.qcow2,format=qcow2,bus=scsi --disk
path=cw_dockerfs.vmdk.qcow2,format=qcow2,bus=scsi --disk path=disk3,format=qcow2,bus=scsi --disk
 path=disk4,format=qcow2,bus=scsi --disk path=cw_extrafs.vmdk.qcow2,format=qcow2,bus=scsi --disk
 path=disk6,format=qcow2,bus=scsi --disk=cp1.iso,device=cdrom,bus=scsi --import --network none
--host-device=pci_0000_17_00_0 --host-device=pci_0000_17_00_2 --os-variant ubuntu-lts-latest &
```

Sample configuration file

This section provides the sample `ovf-env.xml` file for installing Cisco Crosswork Planning on KVM.

```
<Environment
    xmlns="http://schemas.dmtf.org/ovf/environment/1"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xmlns:oe="http://schemas.dmtf.org/ovf/environment/1"
    xmlns:ve="http://www.vmware.com/schema/ovfenv"
    oe:id="">
  <PlatformSection>
    <Kind>KVM</Kind>
    <Locale>en</Locale>
  </PlatformSection>
  <PropertySection>
      <Property oe:key="AdminIPv4Address" oe:value="0.0.0.0"/>
      <Property oe:key="AdminIPv4Netmask" oe:value="0.0.0.0"/>
      <Property oe:key="AwsIamRole" oe:value=""/>
      <Property oe:key="CWPassword" oe:value="Cwork123!"/>
      <Property oe:key="CWUsername" oe:value="cw-admin"/>
      <Property oe:key="ClusterCaKey" oe:value=""/>
      <Property oe:key="ClusterCaPubKey" oe:value=""/>
      <Property oe:key="CwInstaller" oe:value="False"/>
      <Property oe:key="DNSv4" oe:value="72.163.128.140"/>
      <Property oe:key="DataIPv4Address" oe:value="10.225.120.180"/>
      <Property oe:key="DataIPv4Gateway" oe:value="10.225.120.129"/>
      <Property oe:key="DataIPv4Netmask" oe:value="255.255.255.128"/>
      <Property oe:key="DataPeerIPs" oe:value=""/>
      <Property oe:key="DataVIP" oe:value="10.225.120.179"/>
      <Property oe:key="DataVIPName" oe:value=""/>
      <Property oe:key="Deployment" oe:value="cw_ipv4"/>
      <Property oe:key="Disclaimer" oe:value="Cisco Crosswork"/>
      <Property oe:key="Domain" oe:value="cisco.com"/>
      <Property oe:key="EnableSkipAutoInstallFeature" oe:value="True"/>
      <Property oe:key="EnforcePodReservations" oe:value="True"/>
      <Property oe:key="InitMasterCount" oe:value="1"/>
      <Property oe:key="InitNodeCount" oe:value="1"/>
      <Property oe:key="IsSeed" oe:value="True"/>
      <Property oe:key="K8Orch" oe:value=""/>
      <Property oe:key="K8sPodNetworkV4" oe:value="10.244.0.0"/>
      <Property oe:key="K8sServiceNetworkV4" oe:value="10.96.0.0"/>
      <Property oe:key="ManagementIPv4Address" oe:value="10.225.120.111"/>
      <Property oe:key="ManagementIPv4Gateway" oe:value="10.225.120.1"/>
      <Property oe:key="ManagementIPv4Netmask" oe:value="255.255.255.128"/>
      <Property oe:key="ManagementVIP" oe:value="10.225.120.56"/>
      <Property oe:key="ManagementVIPName" oe:value=""/>
      <Property oe:key="ManagerPeerIPs" oe:value=""/>
      <Property oe:key="NBIIPv4Address" oe:value="0.0.0.0"/>
      <Property oe:key="NBIIPv4Gateway" oe:value="0.0.0.0"/>
      <Property oe:key="NBIIPv4Netmask" oe:value="0.0.0.0"/>
      <Property oe:key="NBIVIP" oe:value="NBI VIP address"/>
      <Property oe:key="NTP" oe:value="ntp.esl.cisco.com"/>
```

```
            <Property oe:key="Timezone" oe:value="US/Pacific"/>
            <Property oe:key="VMLocation" oe:value="default"/>
            <Property oe:key="VMType" oe:value="Hybrid"/>
            <Property oe:key="bckup_min_percent" oe:value="35"/>
            <Property oe:key="corefs" oe:value="18"/>
            <Property oe:key="ddatafs" oe:value="485"/>
            <Property oe:key="logfs" oe:value="20"/>
            <Property oe:key="ramdisk" oe:value="0"/>
            <Property oe:key="ssd" oe:value="15"/>
            <Property oe:key="ThinProvisioned" oe:value="true"/>
            <Property oe:key="UseNonDefaultCalicoBgpPort" oe:value="True"/>
            <Property oe:key="bootOptions.efiSecureBootEnabled" oe:value="False"/>
        </PropertySection>
    </Environment>
```

Manage Cisco Crosswork Planning VM on KVM

This section provides the commands to manage the Cisco Crosswork Planning VM on KVM. In these examples, "cp1" is the host name of Cisco Crosswork Planning VM.

- To access the Cisco Crosswork Planning VM console from KVM:

```
[root@KVM-41 cp1]# virsh console cp1
```

- To see the current status of Cisco Crosswork Planning in KVM:

```
[root@KVM-41 cp1]# virsh list --all
Id   Name   State
----------------------
2    cp1    running
```

- To shutdown the Cisco Crosswork Planning VM:

```
[root@KVM-41 cp1]# virsh shutdown cp1
Domain 'cp1' is being shutdown

[root@KVM-41 cp1]# virsh list --all
Id   Name      State
-------------------------
-    cp1    shut off
```

- To restart the Cisco Crosswork Planning VM:

```
[root@KVM-41 ~]# virsh start cp1
Domain 'cp1' started

[root@KVM-41 cp1]# virsh list --all
Id   Name   State
----------------------
1    cp1    running
```

- To set the Cisco Crosswork Planning VM to auto-start, that is, to boot up automatically in case of power-reset of KVM:

```
[root@KVM-41 ~]# virsh autostart cp1

Domain 'cp1' marked as autostarted
```

Uninstall the Cisco Crosswork Planning VM in KVM deployment

This section describes how to uninstall the Cisco Crosswork Planning VM in KVM deployment.

Procedure

Step 1 Use the **virsh destroy** command to stop the Cisco Crosswork Planning VM forcefully.

Example:

```
[root@KVM-41 cp1]# virsh destroy cp1
Domain 'cp1' destroyed
```

Step 2 Use the **virsh undefine** command to remove the configuration of the Cisco Crosswork Planning VM.

Example:

```
[root@KVM-41 cp1]# virsh undefine --nvram cp1
Domain 'cp1' has been undefined
```

Log in to Cisco Crosswork Planning UI

After installing Cisco Crosswork Planning, you can access the Cisco Crosswork Planning UI by using the following steps.

Cisco Crosswork Planning is a browser-based application. For the supported browser versions, see Supported web browsers, on page 8.

Procedure

Step 1 Open a web browser and enter:

```
https://<Crosswork Management Network Virtual IP (IPv4)>:30603/
```

When you access Cisco Crosswork Planning from your browser for the first time, some browsers display a warning that the site is untrusted. When this happens, follow the prompts to add a security exception and download the self-signed certificate from the server. After you do this, the browser accepts the Cisco Crosswork Planning server as a trusted site in all subsequent logins.

Step 2 The Cisco Crosswork Planning browser-based user interface displays the login window. Enter your username and password. The default administrator user name and password is **admin**. This account is created automatically at installation. The initial password for this account must be changed during installation verification. Cisco strongly recommends that you keep the default administrator credential secure, and never use it for routine logins. Instead, create new user roles with appropriate privileges and assign new users to those roles. At least one of the users you create should be assigned the "administrator" role.

Step 3 Click **Login**.

CHAPTER 4

Upgrade Cisco Crosswork Planning

This section contains the following topics:

Upgrade overview

This section provides the high-level overview for upgrading Cisco Crosswork Planning to the latest version. This includes upgrading Cisco Crosswork Platform and Cisco Crosswork Planning Applications within a single maintenance window.

Note The supported upgrade scenario in Cisco Crosswork Planning 7.1 is from Cisco Crosswork Planning 7.0 (IPv4 stack) to Cisco Crosswork Planning 7.1 (IPv4 stack).

You can upgrade Cisco Crosswork Planning using these methods:

- Upgrade using existing hardware, on page 42

- Upgrade using parallel hardware, on page 46

Cisco Crosswork Planning applications can be independently updated from the Cisco Crosswork Planning UI in case of minor updates or patch releases. For more information, see Upgrade Cisco Crosswork Planning applications (standalone activity) , on page 49.

Upgrade limitations

Warning

⚠

Upgrading to Cisco Crosswork Planning from an earlier version has these limitations:

- License tags are not auto-registered as part of the upgrade operation. You must register them manually after the upgrade.

- Custom user roles (Read-Write/Read) created in the earlier version of Cisco Crosswork Planning are not migrated, and need to be updated manually on the new version post migration.

- Any user roles with administrative privileges in the earlier version of Cisco Crosswork Planning must be assigned new permissions after the upgrade to continue being administrative users.

- After a successful migration, you must perform a hard refresh or browser cache deletion before proceeding to use the system. Failing to do this step can result in data discrepancy.

Upgrade using existing hardware

This section explains how to migrate to the latest version of Cisco Crosswork Planning using the existing hardware.

Each stage in this upgrade workflow must be executed in sequence, and is explained in detail in later sections of this chapter. The stages are:

1. Create backup of Cisco Crosswork Planning, on page 42

2. Shut down Cisco Crosswork Planning, on page 44

3. Install the latest version of Cisco Crosswork Planning, on page 44

4. Migrate Cisco Crosswork Planning backup, on page 45

Create backup of Cisco Crosswork Planning

This is the first stage of the upgrade workflow. Creating a backup is a prerequisite when upgrading your current version of Cisco Crosswork Planning to a new version.

Note

✎

We recommend that you create a backup only during a scheduled upgrade window. You should not attempt to access Cisco Crosswork Planning while the backup operation is running.

Before you begin

Follow these guidelines whenever you create a backup:

- Cisco Crosswork Planning will back up the configuration of the system to an external server using SCP. Before you begin you need to have the following configuration in place and information about the SCP server available:

  - The hostname or IP address and the port number of a secure SCP server.

  - A preconfigured path on the SCP server where the backup will be stored.

  - User credentials with file read and write permissions to the directory.

  - The SCP server storage requirements will vary slightly but you must have at least 25 GB of storage.

- Ensure that you have configured a destination SCP server to store the backup files. This configuration is a one-time activity.

- After the backup operation is completed, navigate to the destination SCP server directory and ensure that the backup file is created. You will require this backup file in the later stages of the upgrade process.

- Both Cisco Crosswork Planning and the SCP server must be in the same IP environment. For example, if Cisco Crosswork Planning is communicating over IPv4, so must the backup server.

Procedure

Step 1   Log in to the Cisco Crosswork Planning UI.

Step 2   Check and confirm that the Cisco Crosswork Planning VM and the applications are healthy.

Step 3   **Configure an SCP backup server:**
   a) From the main menu, choose **Administration** > **Backup and Restore**.
   b) Click **Destination** to display the **Edit Destination** drawer panel. Make the relevant entries in the fields provided.
   c) Click **Save** to confirm the backup server details.

Step 4   **Create a backup:**
   a) From the main menu, choose **Administration** > **Backup and Restore**.
   b) Click **Actions** > **Data backup** to display the **Data Backup** drawer panel with the destination server details pre-filled.
   c) Provide a relevant name for the backup in the **Job name** field.
   d) If the VM or any of the applications are not in Healthy state, but you want to create the backup, check the **Force** check box.

   Note
   The **Force** option must be used only after consultation with the Cisco Customer Experience team.

   e) Complete the remaining fields as needed.

   If you want to specify a different remote server upload destination: Edit the pre-filled **Host name**, **Port**, **Username**, **Password** and **Server path/Location** fields to specify a different destination.

   f) (Optional) Click **Verify backup readiness** to verify that Cisco Crosswork Planning has enough free resources to complete the backup. If the check is successful, Cisco Crosswork Planning displays a warning about the time-consuming nature of the operation. Click **OK** to continue.

   If the verification is unsuccessful, contact the Cisco Customer Experience team for assistance.

   g) Click **Backup** to start the backup operation. Cisco Crosswork Planning creates the corresponding backup job set and adds it to the job list. The Job Details panel reports the status of each backup step as it is completed.

h) To view the progress of a backup job, enter the job details (such as Status or Job Type) in the search fields in the **Backup restore job sets** table. Then, click on the job set you want.

The **Job Details** panel displays information about the selected job set, such as the job Status, Job name, and Job type. If there's a failed job, hover the mouse pointer over the icon near the **Status** column to view the error details.

Note
After the backup operation is completed, navigate to the destination SCP server directory and ensure that the backup file is created. You will require this backup file in the later stages of the upgrade process.

Note
If you do not see your backup job in the list, refresh the **Backup and Restore Job Sets** table.

i) If the backup fails during upload to the remote server: In the **Job Details** panel, just under the Status icon, click the **Upload backup** button to retry the upload.

Note
Upload can fail due to connectivity problems with the SCP backup server (for example, incorrect credentials, missing directory or directory permissions, missing path and so on). This is indicated by failure of the task `uploadBackupToRemote`). If this happens, check the SCP server details, correct any mistakes and try again. Alternatively, you can use the **Destination** button to specify a different SCP server and path before clicking **Upload backup**.

Shut down Cisco Crosswork Planning

After a successful backup, shut down Cisco Crosswork Planning by powering down the VM.

Procedure

Step 1   Log in to the VMware vSphere Web Client.

Step 2   In the **Navigator** pane, right-click the VM that you want to shut down.

Step 3   Choose **Power** > **Power Off**.

Step 4   Wait for the VM status to change to **Off**.

Install the latest version of Cisco Crosswork Planning

After the successful backup of the old version of Cisco Crosswork Planning, proceed to install the latest version of Cisco Crosswork Planning.

Procedure

Step 1   Install the latest version of Cisco Crosswork Planning using the instructions in Install Cisco Crosswork Planning using the vCenter vSphere UI, on page 20.

During installation, a special administrative ID (**virtual machine (VM) administrator**, with the username *cw-admin*, and the default password *cw-admin*) is created. The administrative username is reserved and cannot be changed. The first time you log in using this administrative ID, you will be prompted to change the password. Data center administrators use this ID to log into and troubleshoot the Cisco Crosswork Planning VM. You will use it to verify that the VM has been properly set up.

Step 2   After the installation is completed, confirm all the applications are reporting a **Healthy** status.

   a)   Log in to the Cisco Crosswork Planning UI.

   b)   From the main menu, choose **Administration** > **Crosswork Manager** > **Crosswork summary**. Ensure that all the applications are displaying a **Healthy** status.

Migrate Cisco Crosswork Planning backup

After successfully installing the new version of Cisco Crosswork Planning, proceed to migrate the Cisco Crosswork Planning backup taken earlier to the new Cisco Crosswork Planning VM.

Before you begin

Ensure that you have

- the hostname or IP address and the port number of a secure destination SCP server used in Create backup of Cisco Crosswork Planning, on page 42

- the name and path of the backup file created in Create backup of Cisco Crosswork Planning, on page 42, and

- user credentials with file read and write permissions to the directory.

Procedure

Step 1   Check and confirm that the Cisco Crosswork Planning VM is healthy.

Step 2   **Configure an SCP backup server:**

   a)   From the main menu, choose **Administration** > **Backup and Restore**.

   b)   Click **Destination** to display the **Edit Destination** drawer panel.

   c)   Make the relevant entries in the fields provided.

   > **Note**
   > In the **Sever path/Location** field, provide the location of the backup created in Create backup of Cisco Crosswork Planning, on page 42.

   d)   Click **Save** to confirm the backup server details.

Step 3   **Migrate the old Cisco Crosswork Planning backup:**

   a)   From the main menu, choose **Administration** > **Backup and Restore**.

   b)   Click **Actions** > **Data migration** to display the **Data Migration** drawer panel with the destination server details prefilled.

   c)   Provide the name of the data migration backup (created in Create backup of Cisco Crosswork Planning, on page 42) in the **Backup file name** field.

d) If you want to perform the data migration backup despite any Cisco Crosswork Planning application or microservice issues, check the **Force** check box.

e) Click **Start migration** to start the data migration operation. Cisco Crosswork Planning creates the corresponding data migration job set and adds it to the **Backup and Restore Job Sets** table. The Job Details panel reports the status of each backup step as it is completed.

> **Note**
> If you do not see your job in the list, please wait for a few minutes and refresh the **Backup and Restore Job Sets** table.

f) To view the progress of a data migration job: Enter the job details (such as Status or Job Type) in the search fields in the **Backup and Restore Job Sets** table. Then click on the job set you want.

The **Job Details** panel displays information about the selected job set, such as the job Status, Job Type, and Start Time. If there's a failed job, hover the mouse pointer over the icon near the **Status** column to view the error details.

> **Note**
> Cisco Crosswork Planning UI might become temporarily unavailable during the data migration operation. When the Cisco Crosswork Planning UI is down, you can view the job status in the Grafana dashboard. The Grafana link is available as *View Data Migration Process Dashboard* option on the right side of the Job Details window.

g) If the data migration fails in between, you need to restart the procedure from step 1.

Step 4 After the data migration is successfully completed, check the health of the new Cisco Crosswork Planning VM.

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

b) Ensure that all the applications are displaying a **Healthy** status.

Upgrade using parallel hardware

This section explains how to migrate to the latest version of Cisco Crosswork Planning using new hardware. This method relies on installing the new Cisco Crosswork Planning on new hardware in parallel while the data from the old Cisco Crosswork Planning is being backed up. This method is faster but requires twice the amount of resources for creating the new VM in parallel.

The stages of the parallel upgrade workflow are:

1. Deploy Cisco Crosswork Planning on a different VM, on page 46

2. Create backup of Cisco Crosswork Planning, on page 47

3. Update DNS server and run migration, on page 47

4. Shut down the old Cisco Crosswork Planning, on page 48

Deploy Cisco Crosswork Planning on a different VM

Follow these steps to install the latest version of Cisco Crosswork Planning on a new VM in parallel.

> **Note** The new Cisco Crosswork Planning must be installed with the same FQDN as in the old version of Cisco Crosswork Planning.

Procedure

Step 1 Install the latest of Cisco Crosswork Planning on the new VM using the instructions in Install Cisco Crosswork Planning using the vCenter vSphere UI, on page 20.

During installation, a special administrative ID (**virtual machine (VM) administrator**, with the username *cw-admin*, and the default password *cw-admin*) is created. The administrative username is reserved and cannot be changed. The first time you log in using this administrative ID, you will be prompted to change the password. Data center administrators use this ID to log into and troubleshoot the Cisco Crosswork Planning VM. You will use it to verify that the VM has been properly set up.

Step 2 After the installation is completed, confirm all the applications are reporting a **Healthy** status.

a) Log in to the Cisco Crosswork Planning UI.

b) From the main menu, choose **Administration** > **Crosswork Manager** > **Crosswork summary**. Ensure that all the applications are displaying a **Healthy** status.

Create backup of Cisco Crosswork Planning

Log in to the old Cisco Crosswork Planning UI and create the backup by following the steps in Create backup of Cisco Crosswork Planning, on page 42.

Update DNS server and run migration

Before you begin

Ensure that you have

- the hostname or IP address and the port number of a secure SCP server

- the name and path of the backup file created in Create backup of Cisco Crosswork Planning, on page 47, and

- user credentials with file read and write permissions to the directory.

Procedure

Step 1 Update the DNS server to point the FQDN of the previous version of Cisco Crosswork Planning to the <VIP> of the new Cisco Crosswork Planning VM.

Step 2 Log in to the upgraded Cisco Crosswork Planning UI using https://<new_VIP>:30603.

Step 3 **Configure an SCP backup server:**

a) From the main menu, choose **Administration** > **Backup and Restore**.

b) Click **Destination** to display the **Edit Destination** drawer panel.

c) Make the relevant entries in the fields provided.

> **Note**
> In the **Sever path/Location** field, provide the location of the backup created in Create backup of Cisco Crosswork Planning, on page 42.

d) Click **Save** to confirm the backup server details.

Step 4 **Migrate the old Cisco Crosswork Planning backup:**

a) From the main menu, choose **Administration** > **Backup and Restore**.

b) Click **Actions** > **Data migration** to display the **Data Migration** drawer panel with the destination server details prefilled.

c) Provide the name of the data migration backup (created in Create backup of Cisco Crosswork Planning, on page 42) in the **Backup file name** field.

d) If you want to perform the data migration backup despite any Cisco Crosswork Planning application or microservice issues, check the **Force** check box.

e) Click **Start migration** to start the data migration operation. Cisco Crosswork Planning creates the corresponding data migration job set and adds it to the **Backup and Restore Job Sets** table. The Job Details panel reports the status of each backup step as it is completed.

> **Note**
> If you do not see your job in the list, please wait for a few minutes and refresh the **Backup and Restore Job Sets** table.

f) To view the progress of a data migration job: Enter the job details (such as Status or Job Type) in the search fields in the **Backup and Restore Job Sets** table. Then click on the job set you want.

The **Job Details** panel displays information about the selected job set, such as the job Status, Job Type, and Start Time. If there's a failed job, hover the mouse pointer over the icon near the **Status** column to view the error details.

> **Note**
> Cisco Crosswork Planning UI might become temporarily unavailable during the data migration operation. When the Cisco Crosswork Planning UI is down, you can view the job status in the Grafana dashboard. The Grafana link is available as *View Data Migration Process Dashboard* option on the right side of the Job Details window.

g) If the data migration fails in between, you need to restart the procedure from step 1.

Step 5 After the data migration is successfully completed, check the health of the new Cisco Crosswork Planning VM.

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

b) Ensure that all the applications are displaying a **Healthy** status.

Shut down the old Cisco Crosswork Planning

After a successful backup, shut down the old Cisco Crosswork Planning by following the steps in Shut down Cisco Crosswork Planning, on page 44.

Upgrade Cisco Crosswork Planning applications (standalone activity)

This section explains how to independently upgrade the Cisco Crosswork Planning applications from the Cisco Crosswork Planning UI in case of minor updates or patch releases. This procedure is not part of the upgrade workflow discussed in the earlier sections.

✎

Note   Cisco Crosswork Planning does not support the downgrade operation of an application file (CAPP). However, if you want to go back to an older application version, you can uninstall the application and install the older version of the application. You are advised to take a backup of your data prior to the operation.

Before you begin

Ensure that you:

- Take a backup of your data (using the backup/restore functionality) before any critical upgrade.

- Download the latest version of the Cisco Crosswork Planning application to your local machine.

- Perform upgrade operations in a maintenance window to minimize disruptions.

Procedure

Step 1   **Download and validate the CAPP files:**

a) Navigate to cisco.com and locate the CAPP files (.tar.gz) that you require.
b) Hover over the file and copy the MD5 or SHA512 checksum to your clip board.
c) Download the files to a server that can be reached from the Crosswork server.
d) Run a tool of your choice to calculate the checksum, and compare the checksum value in your downloaded file with the value you copied in the clip board.

For example, on a MAC you can use the **md5** command to calculate the MD5 sum on a file:

```
md5 signed-cw-na-design-patch-7.0.1-2-release-241112.tar.gz

3e3becf10a509c8e3787eec8e362fd4f
```

Verify that the result value matches with the posted value on cisco.com.

Step 2   Log in to Cisco Crosswork Planning UI. For more information, see .

Step 3   From the main menu, choose **Administration** > **Crosswork Manager**, and click the **Application management** tab.

The Crosswork Platform Infrastructure and any applications that are added are displayed here as tiles.

Step 4   Click **Add new file** > **Upload application bundle file (.tar.gz)**. The **Add Application Bundle (.tar.gz)** dialog box is displayed.

Step 5   In the dialog box, choose either **URL** or **SCP** as your preferred protocol. Based on your selection, fill in the additional fields with the required information. Click **Add** to proceed.

Step 6 To upgrade, click the Upgrade prompt and the new version of the application is installed. Alternately, click ⋯ on the tile, and select the **Upgrade** option from the drop-down list.

Step 7 In the Upgrade screen, select the new version that you want to upgrade to, and click **Upgrade**.

Step 8 (Optional) Click on **Job History** to see the progress of the upgrade operation.

> **Note**
> During an upgrade, only the changed components are installed, with the new version reusing most resources from the older version to ensure a fast and non-disruptive process. However, the application being updated will be degraded until the upgrade is complete, and users will be notified of the upgrade through an alarm.

Collector configuration migration

A collector configuration migration is a process that enables you to migrate collector configurations from Cisco WAE 7.5.x/7.6.x or between different Cisco Crosswork Planning instances.

> **Note** When using collectors that have file upload options, ensure to upload the correct files after importing the collector configuration. This is necessary because, after you import the configuration, the server restores only the file name and not the actual file. If you do not use the correct file, the collection will fail.

Migrate collector configurations from Cisco WAE

This section explains how to migrate collector configurations from Cisco WAE 7.5.x/7.6.x to Cisco Crosswork Planning.

Before you begin

- Download the upgrade script from the Cisco Software Download page.

Procedure

Step 1 If you have not backed up the configuration, use these steps to back up and migrate it to a configuration compatible with Cisco Crosswork Planning:

   a) Log in to the machine where Cisco WAE 7.x is installed.

   b) Enter this command:

```
# ./wae_upgrade --export --install-dir <WAE_7.x_INSTALL_DIR> --cfg-dir
<dir_to_save_exported_config>
Where:
    --install-dir   indicates the directory where 7.x WAE is installed
    --cfg-dir       indicates the folder where the backup of 7.x configuration
                    must reside
```

Step 2 If you already have the backed-up configuration, use these steps to convert the file into a format compatible with Cisco Crosswork Planning:

a) Log in to the machine where the Cisco WAE 7.x configuration is backed up.

b) Enter this command:

```
# ./wae_upgrade --migrate --cfg-dir <dir_containing_7.x_config>

Where:
     --cfg-dir   indicates the folder where the 7.x configuation is backed up.
                 This configuration will be migrated to Cisco Crosswork Planning
                 compatible configuration.
```

Step 3   Import the Cisco Crosswork Planning compatible configuration file to Cisco Crosswork Planning using these steps:

Note
Before migration, ensure that configurations are backed up using the upgrade scripts. Otherwise, the migration will fail.

a) Log in to the Cisco Crosswork Planning UI.

b) From the main menu, choose **Collector** > **Migration**.

c) Click **Actions** and select **Configuration migration**.

The Import Configuration File page appears.

Figure 4: Import Configuration File page

d) Select **WAN Automation Engine** from the **Import type** drop-down list.

e) Click **Browse** and select the Cisco WAE collector configuration file which is compatible with Cisco Crosswork Planning compatible.

f) (Optional) If you want to overwrite the existing collector configuration, check the **Overwrite the existing data** check box.

g) Click **Import** to import the collector configuration file.

The system proceeds with the import using your configuration. You can monitor the progress on the Migration page (**Collector** > **Migration**). Once the import is successful, the **Import status** column displays **Success**.

What to do next

| Note | • After restoring the backup, navigate to the **Collector** > **Collections** page and perform the Edit collection operation on each listed collection. Save the collections without making any changes. This ensures that the configuration data is properly updated.
| | • After migrating from Cisco WAE to Cisco Crosswork Planning, the Telnet and SSH settings are not preserved. You need to manually verify and update these settings, if required. |

Migrate collector configurations between Cisco Crosswork Planning instances

This section explains how to migrate collector configurations from one Cisco Crosswork Planning instance (source) to the other (target).

| Note | If using the SR-PCE collector in your configurations, ensure to update the **SR-PCE host** and **Backup SR-PCE host** fields manually after migration. This is necessary because, these fields are not updated while migrating the collector configurations between Cisco Crosswork Planning instances. |

Procedure

Step 1 Download the collector configuration file from the source machine.

   a) Log in to the Cisco Crosswork Planning instance from which you want to migrate the configuration.
   b) From the main menu, choose **Collector** > **Migration**.
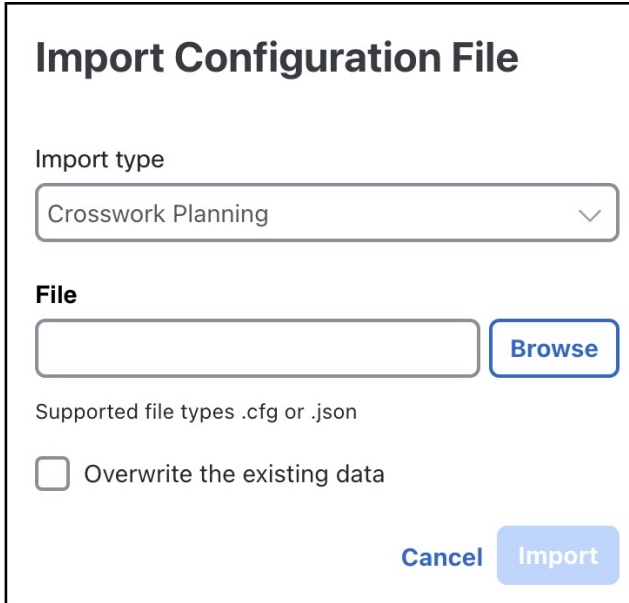   c) Click **Actions** and select **Configuration backup**.

   The collector configuration file is downloaded to your local machine.

Step 2 Import the collector configuration file to the target machine.

   a) Log in to the Cisco Crosswork Planning instance to which you want to migrate the configuration.
   b) From the main menu, choose **Collector** > **Migration**.
   c) Click **Actions** and select **Configuration migration**.

   The Import Configuration File page appears.

Figure 5: Import Configuration File page

Import Configuration File

Import type

Crosswork Planning

File

Browse

Supported file types .cfg or .json

Overwrite the existing data

Cancel   Import

d) Select **Crosswork planning** from the **Import type** drop-down list.

e) Click **Browse** and select the collector configuration file downloaded earlier in the Step 1 (c).

f) (Optional) If you want to overwrite the existing collector configuration, check the **Overwrite the existing data** check box.

g) Click **Import** to import the collector configuration file.

The system proceeds with the import using your configuration. You can monitor the progress on the Migration page (**Collector** > **Migration**). Once the import is successful, the **Import status** column displays **Success**.

What to do next

> **Note**
>
> - After restoring the backup, navigate to the **Collector** > **Collections** page and perform the Edit collection operation on each listed collection. Save the collections without making any changes. This ensures that the configuration data is properly updated.
>
> - In case of traffic collection, if the traffic poller agent status is displayed as down on the Agent page after migration, even though traffic collection has run successfully, follow these steps:
>
>   1. On the Collections page, click **Edit collection** for the collection corresponding to the agent.
>
>   2. On the Traffic collection configuration page, uncheck the **Traffic collection** check box and save the configuration.
>
>   3. Re-enable the **Traffic collection** check box and save the configuration again.

CHAPTER 5

Next Steps

The following topics describe the next steps you perform to get started with Cisco Crosswork Planning. You access the Cisco Crosswork Planning UI to perform operations. For detailed information, see the *Cisco Crosswork Planning Design 7.1 User Guide* and *Cisco Crosswork Planning 7.1 Collection Setup and Administration*.

- Install Smart License, on page 55
- Network model creation, on page 55

Install Smart License

A license is required to use all the features in Cisco Crosswork Planning. If you have questions about obtaining a license, contact your Cisco support representative or system administrator.

Cisco Crosswork Planning supports Smart Licensing, which enables you to monitor Cisco Crosswork Planning software licenses and endpoint license consumption easily and efficiently through a simple registration and license consumption reporting process instead of having to install node-locked license files. Details of all licenses that you have purchased are maintained in a centralized database called the Cisco Smart Software Manager (CSSM). For more information, refer to the Cisco Smart Licensing Overview on Cisco.com.

To install Smart Licensing, follow the steps outlined in the *"Workflow: Smart Licensing Configuration"* section in the *"Manage Licenses"* chapter of the *Cisco Crosswork Planning 7.1 Collection Setup and Administration*.

Network model creation

The Cisco Crosswork Planning UI provides an easy-to-use interface that hides the complexity of creating a model building chain for a network. It combines the configuration of multiple data collectors under one network (collection) and can produce a single plan file that contains the consolidated data.

Use the Cisco Crosswork Planning UI for device and network access configuration, network model creation, user management, agent configuration, and so on.

The following is a high-level description of tasks that are necessary to build a network model. For details, see the *Cisco Crosswork Planning 7.1 Collection Setup and Administration*.

1. Configure device auth groups, SNMP groups, and network profile access.

2. (Optional) Configure agents. This step is required only for collecting SR-PCE or NetFlow information.

3. Configure the collections (basic and advanced collections).

4. Schedule when to run collections.

5. (Optional) Manage the aggregation and archive of network model as per your requirement.

6. View or download the plan files in the Cisco Crosswork Planning Design application.

Uninstall Cisco Crosswork Planning

This section contains the following topics:

Uninstall the Cisco Crosswork Planning VM

This section explains the various methods to uninstall Cisco Crosswork Planning VM:

Delete the VM using the Docker installer tool

In case of a failed installation, the Docker installer tool is used to cleanup or delete any previously created VMs. This is a critical activity during failed deployments. Any changes made to the VM settings or the data center host requires a cleanup operation before redeployment.

Note   The installer cleanup option will delete the VM deployment based on the inventory in `/data` directory.

Procedure

Step 1   Enter the directory storing the deployment info.

For example, `_cd ~/cw-planning`.

Step 2   Run the container on the host.

```
docker run --rm -it -v `pwd`:/data <cw-installer docker container>
```

Step 3   Edit the copy of the template file (for example, `v4.tfvars`) in a text editor, adding the data center access parameters. Remaining parameters can be provided with dummy values, or entered on the command line during the execution of the operation.

Step 4   Run the `_cw-installer.sh install_` script with the clean directive along with the deployment manifest using the `-m`
flag.

Add `-o` option to remove the Cisco Crosswork image template from the data center.

For example:

```
./cw-installer.sh clean -m /data/deployment.tfvars -o
```

Step 5   Enter "yes" when prompted to confirm the operation.

Step 6   (Optional) To clean the VM quickly (without verification), run the installer using this command:

```
docker run --rm -it -v `pwd`:/data <cw installer docker image> -exec
'./cw-installer.sh clean -m /data/deployment.tfvars'
```

Delete the VM using the vSphere UI

Follow these steps to delete a Cisco Crosswork Planning VM from vCenter.

Note   Be aware that this procedure deletes all your app data.

Procedure

Step 1   Log into the VMware vSphere Web Client.

Step 2   In the **Navigator** pane, right-click the app VM that you want to remove and choose **Power** > **Power Off**.

Step 3   Once the VM is powered off, right-click the VM again and choose **Delete from Disk**.

The VM is deleted.

Uninstall Cisco Crosswork Planning applications

This procedure describes how to uninstall a Cisco Crosswork Planning application from the UI. The **Uninstall**
option removes the application, application-specific menus, and associated data.

Caution   Do not uninstall **Crosswork Platform Infrastructure** and **Crosswork Planning Infra**, as this will disrupt
the product's functionality. You can only uninstall the Design and Collector applications.

Procedure

Step 1   From the main menu, choose **Administration** > **Crosswork Manager**, and select the **Application Management** tab.

The Crosswork Platform Infrastructure and any Cisco Crosswork Planning applications that were added during installation are displayed here as tiles.

Step 2   Click ⋮ on the application tile that you want to uninstall, and select the **Uninstall** option.

Figure 6: Application management page
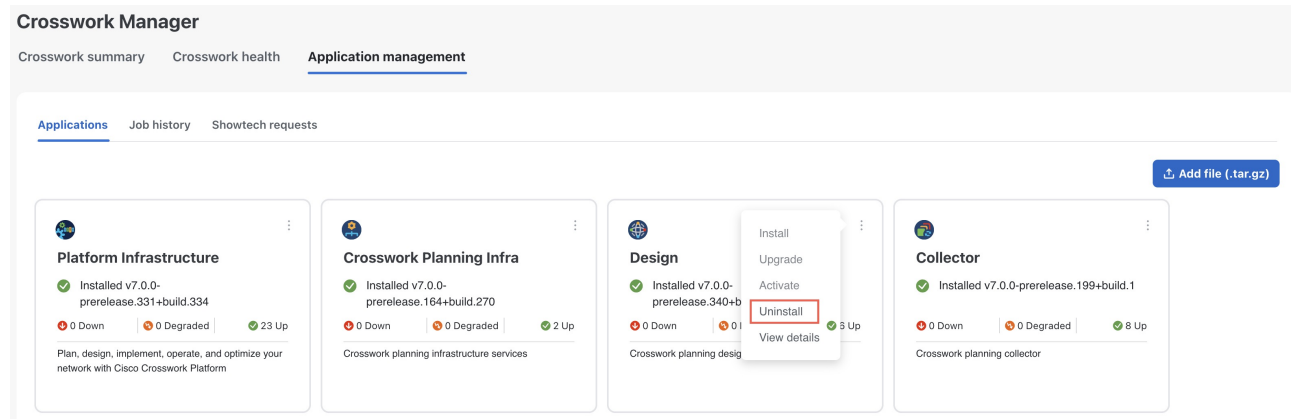
Step 3   Click **Uninstall** to confirm when prompted.

The selected application is uninstalled and the application tile is modified to reflect the same.

You can also view the progress of uninstallation in the Job History window (**Application Management** > **Job History**). If the uninstall fails, you can reattempt using the relevant options in the Job History window.

Note
The uninstall operation does not remove the CAPP file from the repository. The CAPP file will remain visible in the Cisco Crosswork Planning UI, in case you want to install the application in future.