



## **Cisco Optical Network Controller 3.1 Installation Guide**

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## CHAPTER 1

# Install Cisco Optical Network Controller 3.1

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## Installation Requirements

The following list contains the pre-requisites of Cisco Optical Network Controller 3.1 installation.

- Before installing Cisco Optical Network Controller 3.1, you must first login in to the VMware customer center and download VMware vCenter server version 7.0, as well as vSphere server and client with version 7.0. Cisco Optical Network Controller 3.1 is deployed on rack or blade servers within vSphere.
- ESXi host must be installed on servers with vSphere version of 6.7.0 or 7.0 to support creating Virtual Machines (VM).
- Before the Cisco Optical Network Controller 3.1 installation, two networks are required to be created.

- **Control Plane Network:**

The control plane network helps in the internal communication between the deployed VMs within a cluster. If you are setting up a standalone system, this can refer to any private network. However, in case of a High Availability (HA) cluster, this network is created between the servers where each node of the HA cluster is being created.

- **VM Network or Northbound Network:**

The VM network is used for communication between the user and the cluster. It handles all the traffic to and from the VMs running on your ESXi hosts and this is your Public network through which the UI is hosted.



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**Note** For more details on VMware vSphere, see *VMware vSphere*.

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The minimum requirement for Cisco Optical Network Controller 3.1 installation is given in the table below.

**Table 1: Minimum Requirement**

Sizing	CPU	Memory	Disk
XS	12 vCPU	52 GB	200
S	30 vCPU	100 GB	300

The requirements based on type of deployment are given in the table below.

**Table 2: Deployment Requirements**

Deployment Type	Requirements
Standalone ( SA )	<b>Control Plane:</b> 1 IP ( this can be a private network). <b>Northbound Network/VM Network:</b> 1 IP (this must be a public network)
Highly Available ( HA )	<b>Control Plane:</b> 3 IPs (this can be a private network) - IPs required for individual nodes. <b>VM Network:</b> 4 IPs ( this must be a public network) with 3 IPs for node management and 1 IP for Virtual IP, which is used for northbound communication and UI.



**Note** For a High Availability (HA) deployment, nodes on different ESXi hosts should have a minimum link bandwidth of 10G between them. This is recommended to ensure efficient data communication and synchronization between the nodes.

To create the control plane and virtual management networks follow the steps listed below.

1. From the vSphere client select the Datacenter where you want to add the ESXi host.
2. After adding the ESXi host create the Control Plane and VM Networks before deploying the SA or HA. The HA has four IPs where one is the primary and the others can join as secondary and tertiary IP addresses. The SA has only one IP. Also, in the case of HA the Virtual IP is the IP that exposes the active node to the user.

## SSH Key Generation

For accessing SSH, ed25519 key is required. The ed25519 key is different from the RSA key.

Use the CLI given below to generate the ed25519 key.

```
ssh-keygen -t ed25519
Generating public/private ed25519 key pair.
Enter file in which to save the key (/Users/xyz/.ssh/id_ed25519):
./<file-name-of-your-key>.pem
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
```

```

Your identification has been saved in ./<file-name-of-your-key>.pem
Your public key has been saved in ./<file-name-of-your-key>.pem.pub
The key fingerprint is:
SHA256:zGW6aGn8rxvEq82sA/97jOaHrl9rnoTaYi+TqU3MeRU xyz@abc
The key's randomart image is:
+--[ED25519 256]--+
|
|          E          |
|        + + .        |
|          S .        |
|      .+ = =        |
|      o@o*+o        |
|      =XX++=o       |
|      .o*#/X=       |
+-----[SHA256]-----+

```

```

#Once created you can cat the file with .pub extension for the public key. ( ex:
<file-name-of-your-key>.pem.pub )

```

```

cat <file-name-of-your-key>.pem.pub

```

```

#The above key has to be used in the deployment template ( SSH Public Key ) in the Deployment
process

```

## Installation

To deploy the OVA template. Follow the steps given below.

### Before you begin




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**Note** During the OVF deployment, the deployment gets aborted if there is an internet disconnection.

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**Step 1** Right click the ESXi host in the vSphere client screen and click **Deploy OVF Template**.

**Step 2** In the **Select an OVF template** screen, select the **URL** radio button for specifying the online link or select the **Local file** radio button to upload the downloaded ova files from your local system and click **Next**.

Figure 1: Select an OVF Template

Deploy OVF Template

- 1 Select an OVF template
- 2 Select a name and folder
- 3 Select a compute resource Scan Again
- 4 Review details
- 5 Select storage
- 6 Ready to complete

### Select an OVF template

Select an OVF template from remote URL or local file system

Enter a URL to download and install the OVF package from the Internet, or browse to a location accessible from your computer, such as a local hard drive, a network share, or a CD/DVD drive.

URL

http | https://remoteserver-address/filetodeploy.ovf|.ova

Local file

UPLOAD FILES ONC-3.0-789.ova

CANCEL NEXT

**Step 3**

In the **Select a name and folder** screen, specify a unique name for the virtual machine Instance. Cisco Optical Network Controller can be deployed as Standalone or High Availability. From the list of options, select the location of the VM to be used as Standalone or High Availability (primary, secondary, or tertiary) and click **Next**.



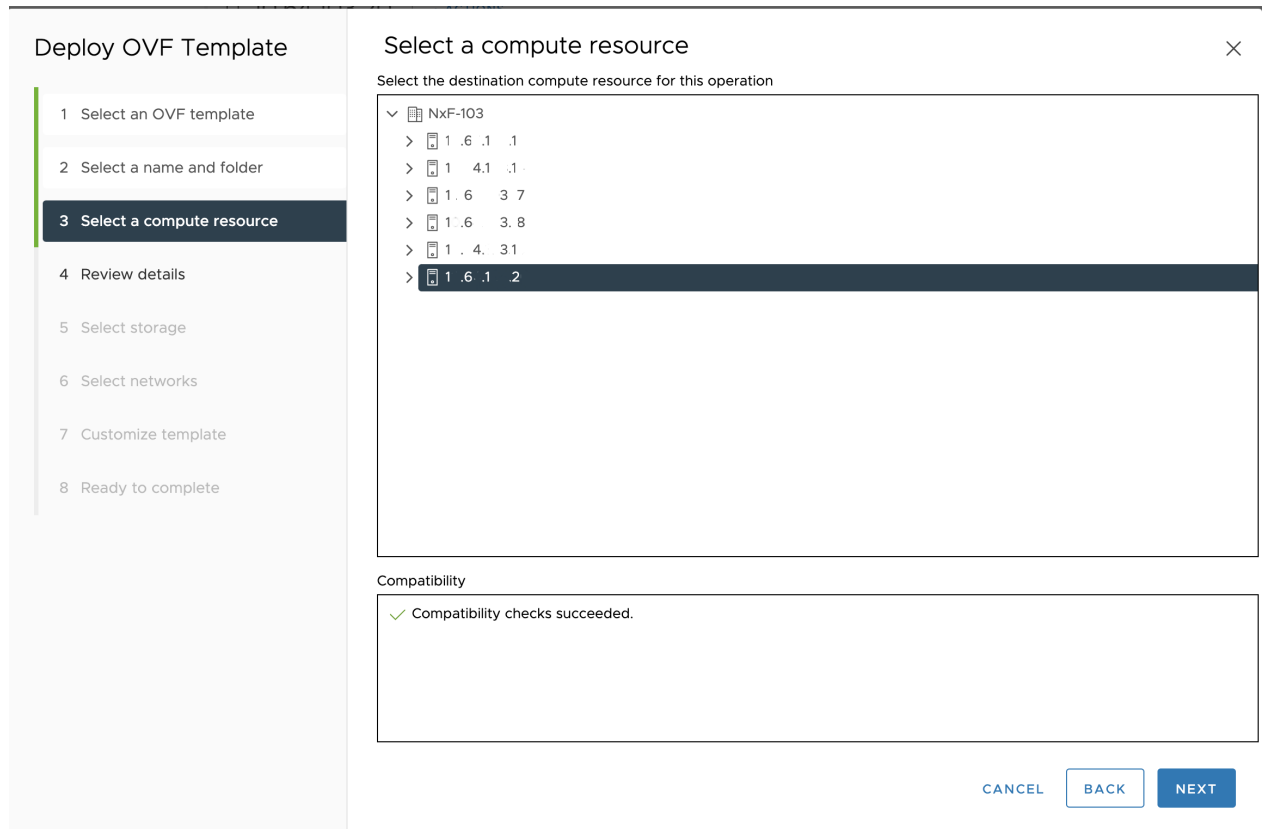
**Figure 2: Select a name and folder**

The screenshot shows a web-based wizard titled "Deploy OVF Template". On the left is a vertical sidebar with six steps: "1 Select an OVF template", "2 Select a name and folder" (highlighted in dark blue), "3 Select a compute resource", "4 Review details", "5 Select storage", and "6 Ready to complete". The main content area is titled "Select a name and folder" and includes a close button (X) in the top right. Below the title, it says "Specify a unique name and target location" and "Virtual machine name:" followed by a text input field containing "primary-90". Below this is the instruction "Select a location for the virtual machine." and a tree view of folders. The tree view starts with "onc-infra.cisco.com" (expanded), followed by "COSM-vxr-nc21-4", "Datacenter", "Datacenter1", and "NxF-103" (highlighted in dark blue). At the bottom right of the main area are three buttons: "CANCEL", "BACK", and "NEXT".

**Step 4**

In the **Select a compute resource** screen, select the destination compute resource on which you want to deploy the VM and click **Next**.

Figure 3: Select a Compute Resource

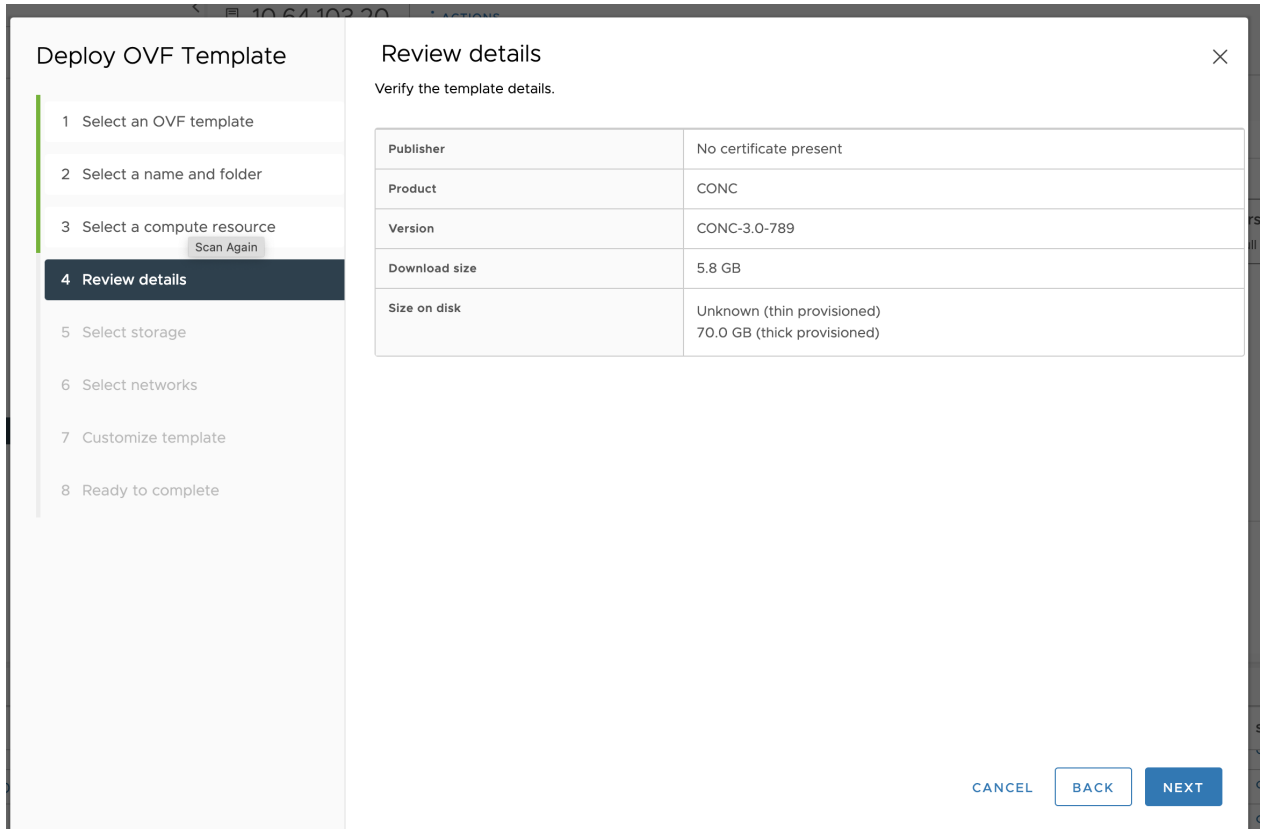


a) **Note:** While selecting the compute resource the compatibility check proceeds till it completes successfully.

**Step 5**

In the Review details screen, verify the template details and click **Next**.

Figure 4: Review Details

**Step 6**

In the Select storage screen, select the virtual disk format based on provision type requirement. **VM Storage Policy** is set as *Datastore Default* and click **Next**. Select the **virtual disk format** as *Thin Provision*.

the selection should be "Thin provisioning"

Figure 5: Select Storage

The screenshot shows the 'Select storage' screen in the 'Deploy OVF Template' wizard. The left sidebar lists the steps: 1. Select an OVF template, 2. Select a name and folder, 3. Select a compute resource (with a 'Scan Again' button), 4. Review details, 5. Select storage (highlighted), 6. Select networks, 7. Customize template, and 8. Ready to complete.

The main content area is titled 'Select storage' and includes the following options:

- Select the storage for the configuration and disk files
- Encrypt this virtual machine (Requires Key Management Server)
- Select virtual disk format: Thin Provision
- VM Storage Policy: Datastore Default
- Disable Storage DRS for this virtual machine

A table displays the available storage options:

Name	Storage Compatibility	Capacity	Provisioned	Free	Type	Cluster	S D
data-...	--	4.24 TB	1.42 TB	3.81 TB	VMFS 6		

Below the table, a compatibility check result is shown:  Compatibility checks succeeded.

At the bottom right, there are three buttons: CANCEL, BACK, and NEXT.

**Step 7**

In the Select networks screen, select the control and management networks as **Control Plane** and **VM Network** from the networks created earlier and click **Next**.

Figure 6: Select Networks

**Deploy OVF Template**

- Select an OVF template
- Select a name and folder
- Select a compute resource
- Review details
- Select storage
- Select networks**
- Customize template
- Ready to complete

**Select networks** ✕

Select a destination network for each source network.

Source Network	Destination Network
Control Plane	Control Plane ▾
Northbound	VM Network ▾

2 Items

**IP Allocation Settings**

IP allocation: Static - Manual

IP protocol: IPv4

CANCEL BACK NEXT

**Step 8**

In the **Customize template** screen, set the values using the following table as a guideline for deployment.

Figure 7: Customize Template

**Deploy OVF Template**

- Select an OVF template
- Select a name and folder
- Select a compute resource
- Review details
- Select storage
- Select networks
- Customize template**
- Ready to complete

**Customize template** ✕

Customize the deployment properties of this software solution.

✔ All properties have valid values ✕

General 2 settings	
Instance Hostname	nxfos-sa-dc21-159-temp
SSH Public Key	ssh-ed25519 AAAAC3N:

Node Config 6 settings	
Node Name	Must be a valid DNS name per RFC1123 (will be converted to one by NxF if invalid) primarynode
Data Volume Size (GB)	200
Cluster Join Token	mygyou.y2ts0k0hd64fa
Control Plane Node Count	1

CANCEL BACK NEXT

### Deploy OVF Template

- 1 Select an OVF template
- 2 Select a name and folder
- 3 Select a compute resource
- 4 Review details
- 5 Select storage
- 6 Select networks
- 7 Customize template
- 8 Ready to complete

### Customize template

Control Plane Node Count	1
Control Plane IP (ip/subnet)	1 .10.15
Initiator IP	Control plane IP of initiator node 1 .10.15
▼ Northbound Interface 4 settings	
Protocol	Static IP ▼
IP (ip/subnet)	Used only if DHCP is disabled 1 .106.20 15
Gateway	Used only if DHCP is disabled 1 .6 10 .1
DNS	Used only if DHCP is disabled 6 .10 .128.25

CANCEL
BACK
NEXT

### Deploy OVF Template

- 1 Select an OVF template
- 2 Select a name and folder
- 3 Select a compute resource
- 4 Review details
- 5 Select storage
- 6 Select networks
- 7 Customize template
- 8 Ready to complete

### Customize template

Gateway	1 .10 .20 1
DNS	Used only if DHCP is disabled 6 .10 .2
▼ Initiator Config 5 settings	
Initiator Node	<input checked="" type="checkbox"/>
Northbound Virtual IP	Required if node is initiator 1 .10 .20 15
Primary Node Name	primary node
Secondary Node Name	second node
Tertiary Node Name (Arbitrator)	tertiary node

CANCEL
BACK
NEXT

Table 3: Customize Template

Key	Values
Instance Hostname	<instance hostname>
SSH Public Key	<ssh-public-key>. Used for SSH access that allows you to connect to the instances securely without the need to manage credentials for multiple instances. SSH public key must be a ed25519 key.

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Node Name	<p>&lt;primary/secondary/tertiary&gt;</p> <p>Must be a valid DNS name per RFC1123.1.2..4</p> <ul style="list-style-type: none"> <li>• Contain at most 63 characters.</li> <li>• Contain only lowercase alphanumeric characters or '-'.3</li> <li>• Start with an alphanumeric character.</li> <li>• End with an alphanumeric character. Standalone: primary, High Availability: primary, secondary or tertiary in accordance with the node role.</li> </ul>
Data Volume Size (GB)	<recommended-size> The data storage limit is set for the host with 200GB is as minimum value.
Cluster Join Token	<token-value> This is a pre-filled value.
Control Plane Node Count	<CP-node-count> One for Standalone and three for High Availability.
Control Plane IP	<p>&lt;ip/subnet&gt; It is the private IP for the instance which is the dedicated control plane IP for this node from the control plane network.</p> <p><b>Note</b> Subnet is a mandatory field and must be specified in the template.</p>
Initiator IP	<p>&lt;&gt; Initiator IP should be matching the control plane IP of the node , which is marked as the initiator node as part of this template. We recommend using <i>primary</i> node as the Initiator node and use the control plane IP of the <i>primary</i> node.</p> <p>Standalone: Same as the control plane IP.</p> <p>High Availability: control plane IP of the <i>primary</i> node in all three repetition of the deployment.</p>
Protocol	Static or DHCP IP address.
IP (IP[/subnet]) - if not using DHCP	<p>&lt;ip/subnet&gt; It is the public IP for the instance in Northbound Network. This IP is used for managing the node and comes from the Northbound network or VM network. It can be used for SSH to the particular node. In case of High Availability, three distinct IP addresses are used.</p> <p><b>Note</b> Subnet is a mandatory field and must be specified in the template.</p>
Gateway - if not using DHCP	<gateway-ip for the instance> Northbound Network.
DNS	DNS Server IP. A valid DNS accessible from the network is required.
Initiator Node	This node is set to 'True' by checking it for the control plane IP. In case of Standalone, it is set as 'True' for the control plane IP of the single node. In case of high availability it is set to 'True' by checking it only for the Initiator node, which is the primary node for the Control Plane IP, similar to Standalone.

Northbound Virtual IP	<p>&lt;IP&gt; It is same as public IP for the Instance for the Northbound Network. It is used for all the northbound connections, such as UI and RESTCONF.</p> <p>For Standalone this IP is the same as the Northbound Network/VM Network IP of the primary node. For High Availability, we recommend using a distinct IP from Northbound Network/VM Network and must be the same for all 3 nodes.</p>
Primary Node Name	It is a string and is the name of the primary node. It must remain the same all the three times in case of High Availability. Use the node name that you chose for the primary node in node config.
Secondary Node Name	It is a string and is the name of the secondary node. Use the node name that you chose for the secondary node in node config.
Tertiary Node Name	It is a string and is the name of the tertiary node. Use the node name that you chose for the tertiary node in node config.

**Step 9**

In **Review the details** screen, review all your selections and click **Finish**. To check or change any properties from the review screen anytime, before clicking Finish click **BACK** to go back to the previous screen **Customize template** to ad your changes.

**Figure 8: Ready to Complete**

**Deploy OVF Template**

- Select an OVF template
- Select a name and folder
- Select a compute resource
- Review details
- Select storage
- Select networks
- Customize template
- Ready to complete**

**Ready to complete**

Review your selections before finishing the wizard

- Select a name and folder**
  - Name: primary-90
  - Template name: nxfos
  - Folder: NxF-103
- Select a compute resource**
  - Resource: 1 .6 3. 0
- Review details**
  - Download size: 5.9 GB
- Select storage**
  - Size on disk: 70.1 GB
  - Storage mapping: 1
  - All disks: Datastore: data-20; Format: Thick provision lazy zeroed
- Select networks**
  - Network mapping: 2
  - Control Plane: Control Plane
  - Northbound: VM Network
- IP allocation settings**
  - IP protocol: IPV4
  - IP allocation: Static - Manual

CANCEL BACK FINISH

**Step 10**

Using the steps above from step 1 to 8, you can create one VM for Standalone and three VMs for High Availability. In case of High Availability, it is recommended to create all three VMs (primary/secondary/tertiary) before they are turned **ON**.



**Attention** Upon activation of the virtual machine (VM), it is designed not to respond to ping requests. However, you can log in using SSH if the installation has been completed successfully.

**Step 11** After the VM is created, try connecting to the VM using the pem key which was generated earlier, see [SSH Key Generation](#) above. For this, use the private key that is generated along with the public key during customizing the public key options.

**Step 12** Log in to the VM using the private key.

**Note:**

- After the nodes are deployed, the deployment of OVA progress can be checked in the Tasks console of vSphere Client. After Successful deployment CONC takes around 30 minutes to boot.
- The user-id by default is the admin user id and only the password is needed to be set.

**Step 13** **SSH to the node** and execute the following CLI command.

```
##Command to have change permission of key
chmod 400 <file-name-of-your-key>.pem

ssh -i [ed25519 Private key] nxf@[primary, secondary, tertiary]
Enter passphrase for key '<file-name-of-your-key>.pem':
```

**Note** Private key is created as part of the key generation with just the **.pem** extension, and it must be set with the least permission level before using it.

**Step 14** When the SSH to node completes use the following command to check the ready status of CONC.

**Note:** Services can take up to 30 minutes to boot.

**Step 15** Use the **sedo system status** command to check the status of all the pods as seen below.

```
#Command
sedo system status
```

#Example Output

System Status (Mon, 26 Feb 2024 07:34:48 UTC)					
OWNER	NAME	ZONE/NODE	STATUS	RESTARTS	STARTED
system	authenticator	primary	Running	0	3 weeks ago
system	controller	primary	Running	0	3 weeks ago
system	ingress-proxy	primary	Running	0	3 weeks ago
system	kafka	primary	Running	0	3 weeks ago
system	loki	primary	Running	0	3 weeks ago
system	metrics	primary	Running	0	3 weeks ago
system	minio	primary	Running	0	3 weeks ago
system	postgres	primary	Running	0	3 weeks ago
system	promtail-fg6ws	primary	Running	0	3 weeks ago
system	registry	primary	Running	0	3 weeks ago
system	vip-add	primary	Running	0	3 weeks ago
onc	monitoring	primary	Running	0	6 days ago
onc	onc-alarm-service	primary	Running	0	3 weeks ago
onc	onc-apps-ui	primary	Running	0	3 weeks ago
onc	onc-circuit-service	primary	Running	0	3 weeks ago
onc	onc-collector-service	primary	Running	0	3 weeks ago
onc	onc-config-service	primary	Running	0	3 weeks ago
onc	onc-deployer-service	primary	Running	0	3 weeks ago
onc	onc-deployerengine-service	primary	Running	0	3 weeks ago
onc	onc-devicemanager-service	primary	Running	0	3 weeks ago

onc	onc-inventory-service	primary	Running	0	3 weeks ago
onc	onc-nbi-service	primary	Running	0	3 weeks ago
onc	onc-netconfcollector-service	primary	Running	0	3 weeks ago
onc	onc-osapi-gw-service	primary	Running	0	3 weeks ago
onc	onc-pce-service	primary	Running	0	3 weeks ago
onc	onc-pm-service	primary	Running	0	3 weeks ago
onc	onc-pmcollector-service	primary	Running	0	3 weeks ago
onc	onc-topology-service	primary	Running	0	3 weeks ago
onc	onc-torch-service	primary	Running	0	3 weeks ago

- Note**
- The different pods along with their statuses including active and standby modes are all displayed in the different terminal sessions for each pod.
  - All the services with owner *onc* must display the status as *Running*.

**Step 16** Use the following CLI command to check and verify which node is active.

```
root@vc39-es20-ha-171-primary:~#
root@vc39-es20-ha-171-primary:~# kubectl describe project onc | head
Name:          onc
Namespace:
Labels:        active=secondary
               standby=primary
Annotations:   <none>
API Version:   nxf.cisco.com/v1alpha1
Kind:          Project
Metadata:
  Creation Timestamp:  2024-02-15T14:29:24Z
  Generation:         2
```

**Step 17** Use the following CLI command to check and verify whether all nodes have joined the cluster or not.

```
root@vc39-es20-ha-171-primary:~# kubectl get nodes
NAME          STATUS    ROLES          AGE    VERSION
primary       Ready     control-plane  5d15h  v1.28.5
secondary     Ready     control-plane  5d15h  v1.28.5
tertiary      Ready     control-plane  5d15h  v1.28.5
```

**Note** The steps 16 and 17 above are for High Availability installation.

**Step 18** SSH to the node and set the initial UI password for the admin user.

For both Standalone and High Availability, execute the following command on any of the nodes.

```
sedo security user set admin --password
```

**Step 19** Set up the Network Time Protocol (NTP) command to set the NTP server configuration on all the hosts using the following commands.

```
vi /etc/chrony.conf
server IP/DNS iburst
# Apply the new ntp setting
systemctl restart chronyd
## To Check the Server
chronyc sources
```

- Note**
- You must perform NTP configuration as a superuser.
  - In case of High Availability, the following steps must be executed in all the three nodes.

**Step 20** You can check the current version using the **sedo version** command on the SSH of the VM.

**Step 21** The default admin user id can be checked by using the **sedo security user list** command and the default password can be changed using the sedo command **sedo security user admin set --password** on the CLI console of the VM or through web UI both.

**Step 22** Check the **servicepack status, sedo service list-installed** on the SSH of the VM.

```
#Enable Password Login
sudo vi /etc/ssh/sshd_config

##Add the following Configs
PermitRootLogin Yes
PasswordAuthentication yes

systemctl restart sshd
passwd root ##It prompts you to enter the password
```

**Step 23** Cisco Optical Network Controller 3.1 WebUI can be used for browsing using the IP addresses. In case of Standalone, the Standalone IP address is used in the URL and in case of High Availability the Virtual IP (VIP) addresses are used in the URL as given here: *https://<virtual ip>:8443/*

**Step 24** Once the setup steps given above are completed successfully, the Cisco Optical Network Controller 3.1 devices page appears on the screen. Use the admin id and the password to access the installed Cisco Optical Network Controller 3.1.

**Note** For High Availability deployments, you must set the **NETCONF Session Timeout Configuration** to **no-timeout** on COSM before they are onboarded to Cisco ONC.

To configure **NETCONF Session Timeout Configuration** in COSM, follow the instructions at [Configure Netconf and Nodal Craft Session Timeout](#). Go to:  
`https://<Cisco-Optical-Site-Manager-IP>/#/usersConfiguration?tab=General`

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