Lenovo ThinkAgile CP
Implement Red Hat OCP (Quick Start)

Models: CP 4000, CP 6000

Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at the following address:

http://thinksystem.lenovofiles.com/help/topic/safety_documentation/pdf_files.html

In addition, be sure that you are familiar with the terms and conditions of the Lenovo warranty for your solution, which can be found at the following address:

http://datacentersupport.lenovo.com/warrantylookup

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Implement Red Hat OCP in ThinkAgile CP

Lenovo has added a template to the ThinkAgile CP marketplace that will enable **infrastructure admin** users to create Red Hat OpenShift Container Platform (OCP) clusters on ThinkAgile CP.

Red Hat OCP is a cluster-based platform (based on Kubernetes) that can used to develop and run containerized applications. At a minimum, Red Hat clusters consist of the following machines:

- Three control plane nodes, which are also called *master nodes*. The control plane nodes contain the services that are used to manage the cluster.
- Two compute nodes, which are also called *worker nodes*. The actual workloads are run on the compute nodes.
- One temporary bootstrap node that is used to deploy the OCP cluster on the control plane nodes. After the cluster is deployed, the bootstrap node can be removed.

For more information about Red Hat OCP, see the following website:

https://docs.openshift.com/container-platform/4.5/welcome/index.html

Complete the following steps to set up an OCP cluster:

- Create VMs for the cluster components
- Run Ansible Playbooks
- Set up the bootstrap node
- Set up the control plane nodes
- Set up the worker nodes
- Complete the installation process

Create VMs for the cluster components

Install the Red Hat OCP Bastion Template and use it to set up the VMs for the devices in the cluster.

Step 1. Create a Virtual Data Center (VDC) if one does not already exist. The VDC should be created with a minimum of 60 cores, 120 GB of RAM, and 1 TB of storage).

For information about creating a VDC, see:

https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/creating-virtual-datacenters.html

Note: Make sure that you assign the default VLAN to the VDC.

Step 2. Create a network function virtualization (NFV) VM to create a subnet and isolate resources in that subnet (create an OCP tenant).

https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/creating-virtual-datacenters.html

Note: When creating the VNET that will use this NVF instance, make sure that you also enter a Domain Name. For example:

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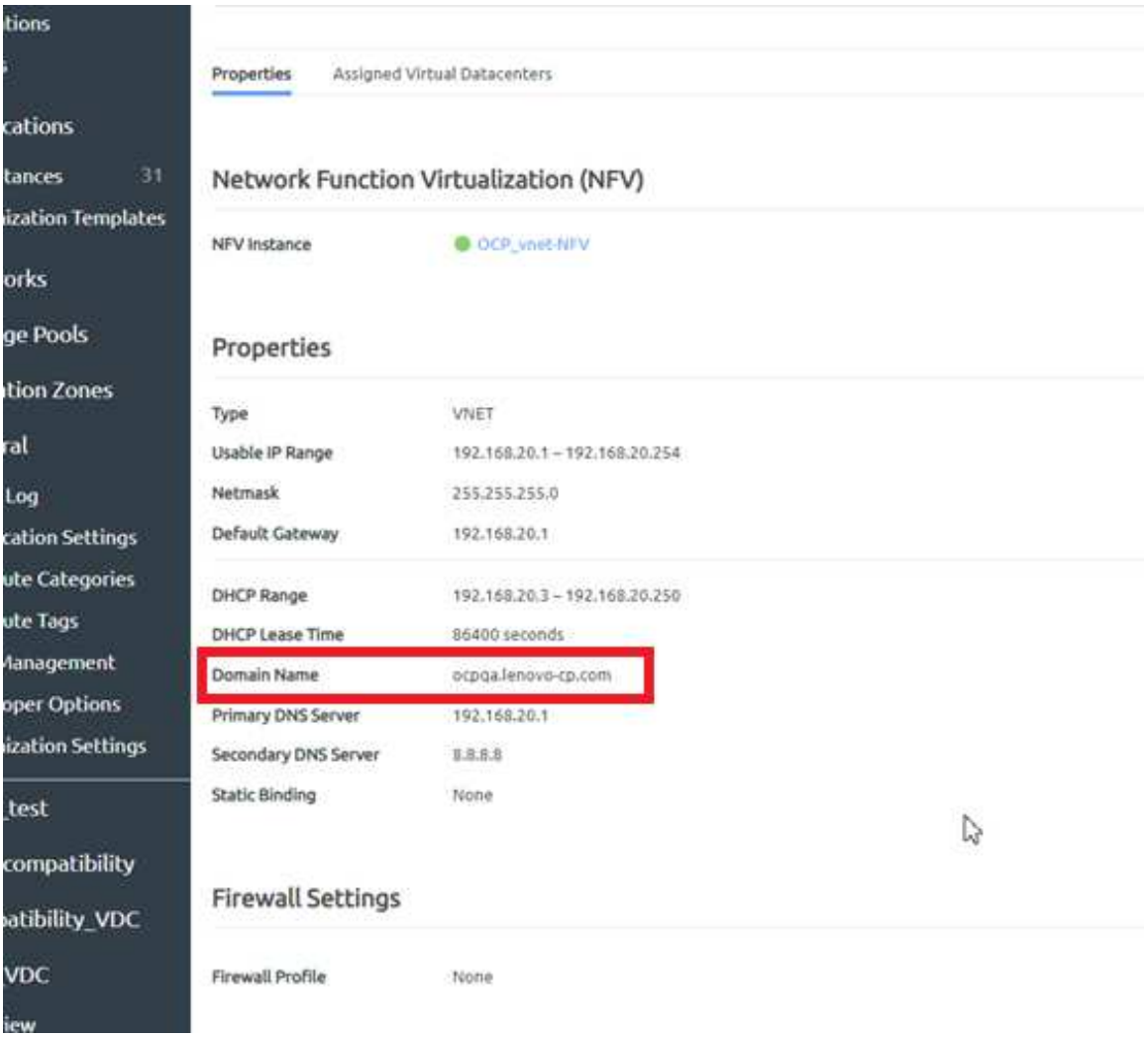
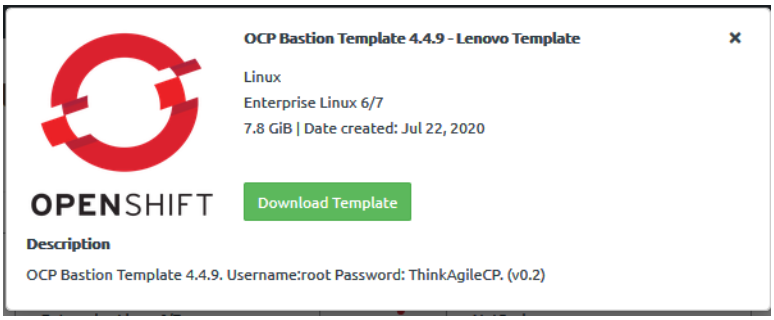


Step 3. Download the OCP Bastion template from the Lenovo Cloud Marketplace.



a. Click the template and then click **Download Template**.

b. In the Download Template dialog, choose the location where the template will be downloaded. Choose to save the template to the Templates section for the organization or choose the save the template to the VDC templates section of the VDC that you created.

Note: The template has been pre-provisioned with the minimum number of CPU cores and the minimum about of memory recommended by Red Hat. You do not need to modify those fields.

c. Click **Save Application Template**.

Step 4. Create a Bastion VM instance from the template. The Bastion node is used to grant access (through SSH) into the OCP nodes within the OCP tenant.

For more information about creating a VM instance from a template, see the following topic:

https://thinkagile.lenovofiles.com/help/topic/thinkagile_cp/create-an-instance-from-a-template.html

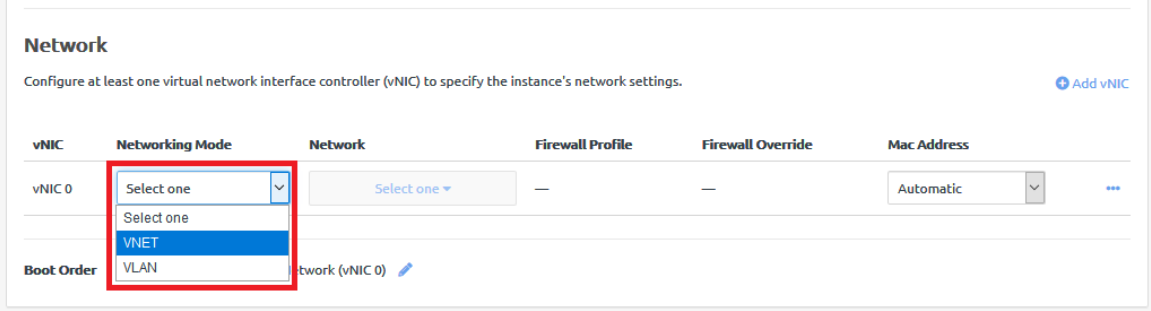
Step 5. Create VMs from the template for the cluster components.

At a minimum, create the following VMs:

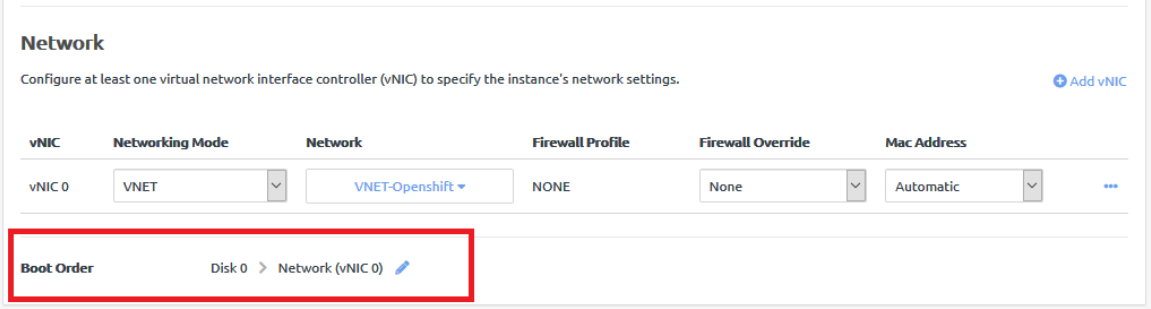
- One bootstrap node
- Three control plane nodes
- Two worker nodes

When creating these VMs:

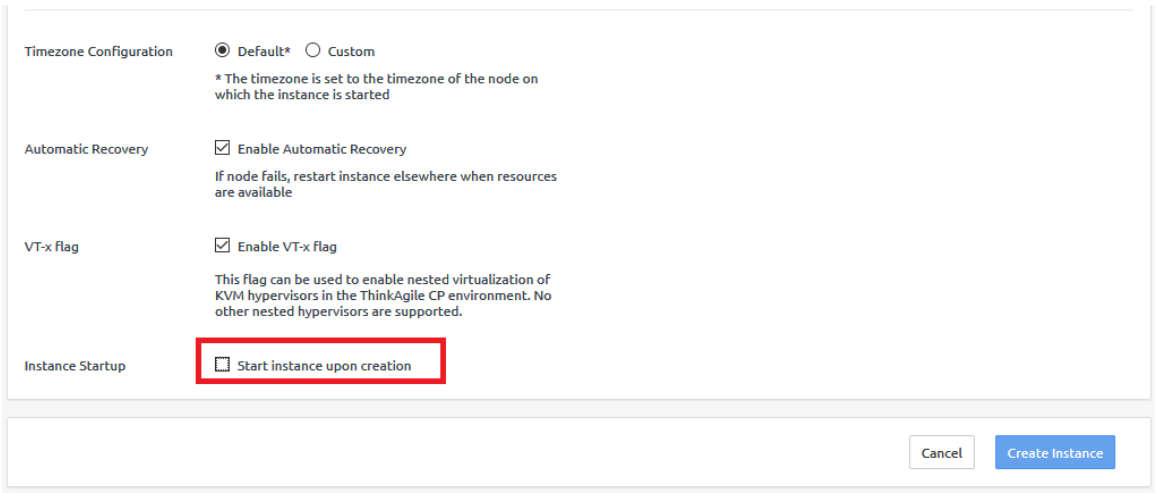
- In the Network section, choose the VNET that you created in Step 2.



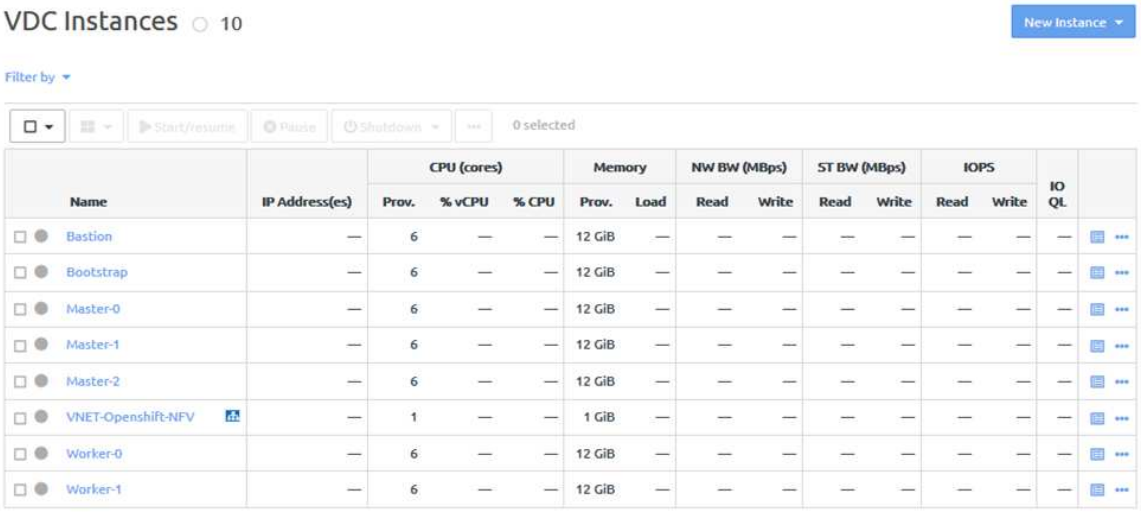
- Change the boot order to make sure that the first boot option is from the network.



- Make sure that Start Instance is disabled. Deselect **Start instance upon creation**.



After the VMs have been created, you should see the following instances in the VDC:



Step 6. Establish an SSH session with the Bastion VM, and make sure that you can ping an IP address on the external Internet.

Step 7. Edit `/opt/ocpOD/roles/common/vars/network_env.yml` to add the IP addresses for the cluster.

Step 8. Edit `/opt/ocpOD/roles/common/vars/cluster_mac_address.yml` to add the MAC addresses for the cluster.

Step 9. Add the OCP pull secret to `/opt/ocpOD/roles/common/vars/pull_key.yml`.

a. Go to the following Red Hat website:

https://cloud.redhat.com/openshift/install/pull-secret

Note: You must have an account with Red Hat to access the page.

b. Copy the pull secret.

c. Paste it within the quotes in `pull_key.xml`.

Run Ansible playbooks to configure the Bastion node

Run Ansible playbooks to configure the Bastion node.

Step 1. Run the following Ansible playbooks:

- `/opt/ocpOD/roles/common/tasks/ocpod-step1.yaml`

```
ansible-playbook /opt/ocpOD/roles/common/tasks/ocpod-step1.yaml

#...

#PLAY RECAP *********************************************************************************************************************************************************
#Localhost                  : ok=53   changed=15   unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

- `/opt/ocpOD/roles/common/tasks/ocpod-step2.yaml`

```
ansible-playbook /opt/ocpOD/roles/common/tasks/ocpod-step2.yaml


#...


#PLAY RECAP *********************************************************************************************************************************************************
#10.241.14.134              : ok=2    changed=2    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
#Localhost                  : ok=1    changed=1    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

Step 2. Run the following commands in the path where you cloned the source code (/root/).

```
mkdir install
cp install-config.yaml install/
./openshift-install create manifests --dir=/root/ocp-44/install
```

```
mkdir install
cp install-config.yaml install/
./openshift-install create manifests --dir=/root/ocp-44/install
#INFO Consuming Install Config from target directory
#WARNING Making control-plane schedulable by setting MastersSchedulable to true for Scheduler cluster settings
```

Step 3. Edit `install/manifests/cluster-schedule-02-config.yml` and change **mastersSchedulable** from true to false.

Step 4. Run the following commands to generate the Ignition configuration files are used to make the nodes in the cluster.

```
./openshift-install create ignition-configs --dir=/root/ocp-44/install
cp install/*.ign /opt/nginx/html/
cd /opt/nginx/html/
chmod 0755 *.ign
```

```
./openshift-install create ignition-configs --dir=/root/ocp-44/install
#INFO Consuming Master Machines from target directory
#INFO Consuming Common Manifests from target directory
#INFO Consuming OpenShift Install (Manifests) from target directory
#INFO Consuming Openshift Manifests from target directory
#INFO Consuming Worker Machines from target directory
```

```
cp install/*.ign /opt/nginx/html/
#cp: overwrite '/opt/nginx/html/bootstrap.ign'? y
#cp: overwrite '/opt/nginx/html/master.ign'? y
#cp: overwrite '/opt/nginx/html/worker.ign'? y
```

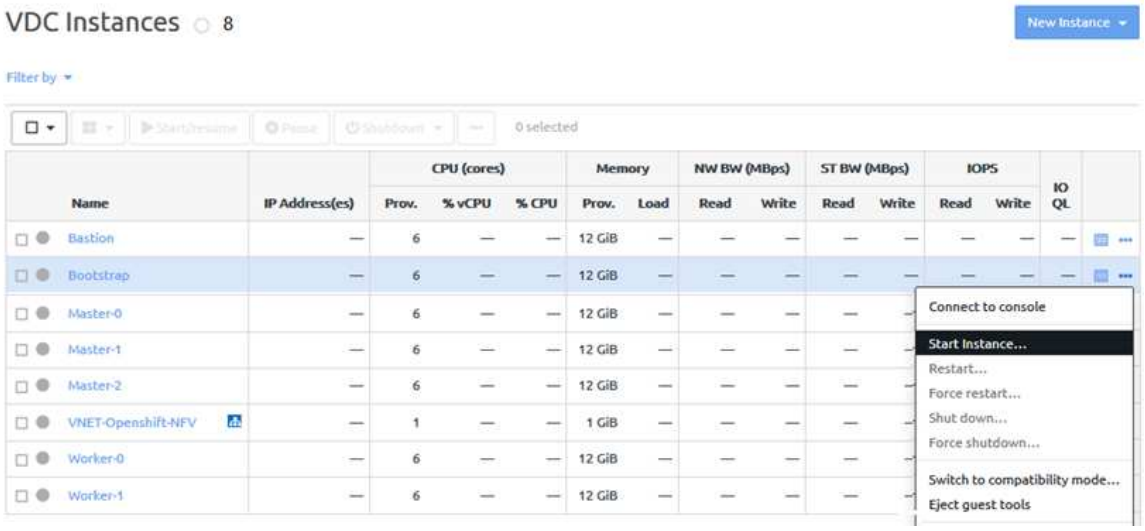
```
cd /opt/nginx/html/
chmod 0755 *.ign
```

Set up the bootstrap node

The bootstrap node is a temporary node that is used to deploy the OCP cluster on the control plane nodes. After the cluster is deployed, the bootstrap node can be removed.

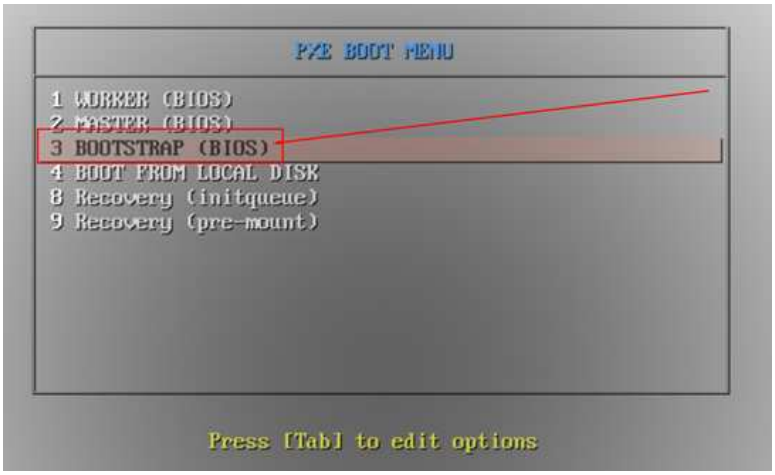
Complete the following steps to set up the bootstrap node:

Step 1. From the VDC Instances page, click **Start Instance** to start the bootstrap instance:



Step 2. Quickly establish an SSH session with the bootstrap node to see the boot menu. After the Instance is Powered ON, it will automatically boot from the pre-selected option: LOCAL DISK. We want to boot first from BOOTSTRAP (BIOS), then from LOCAL DISK.

Choose **BOOSTRAP (BIOS)** from the menu:



Step 3. Choose **BOOT FROM LOCAL DISK**.

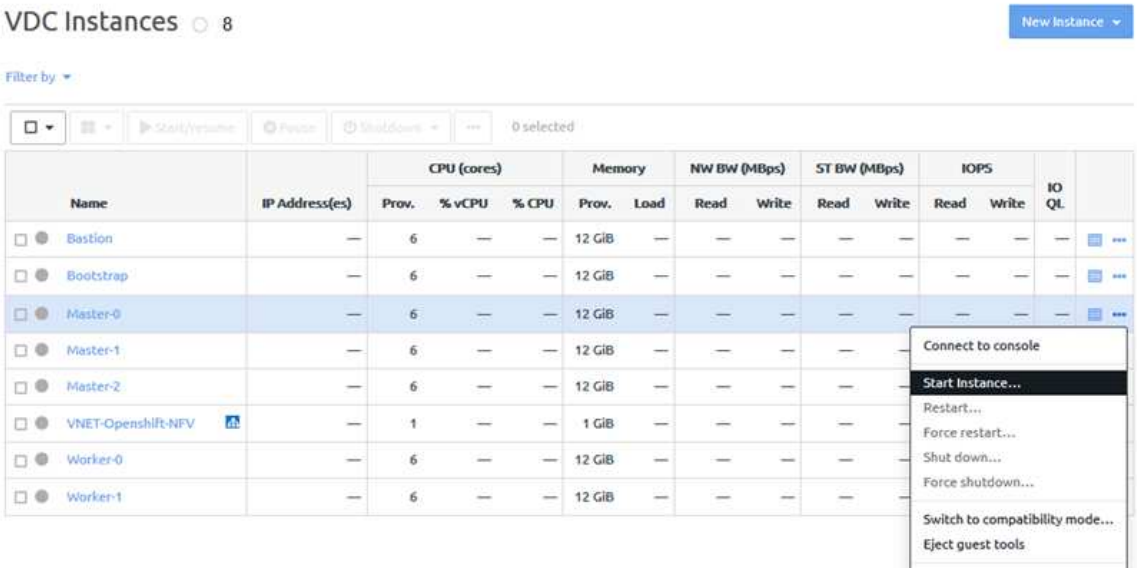
The bootstrap node is rebooted.

Set up the control plane nodes

The control plane nodes, which are also known as *master nodes*, contain the services that are used to manage the cluster.

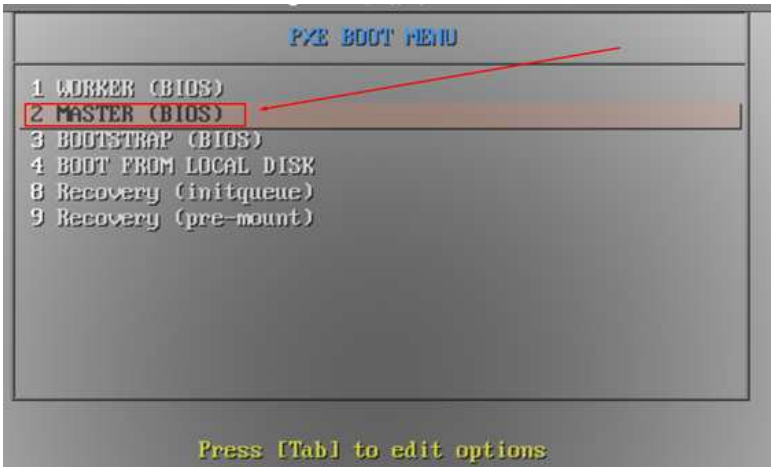
A minimum of three control plane nodes are required. For **each** control plane node, complete the following steps:

Step 1. From the VDC Instances page, click the Actions menu (•••) next to the instance. Then, click **Start Instance** to start the control plane instance:

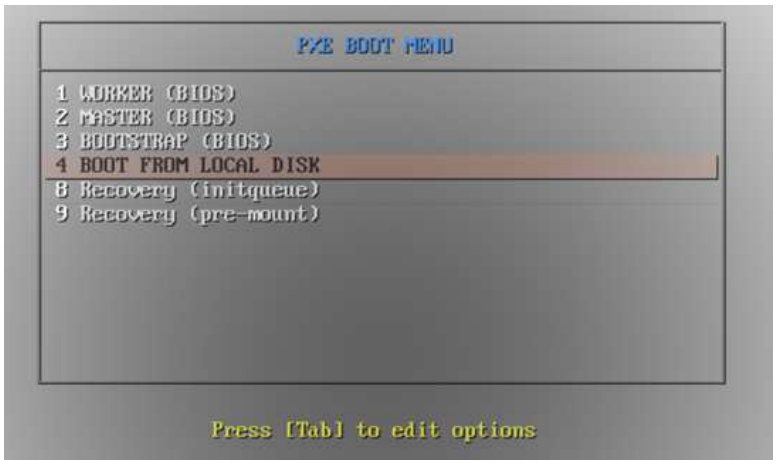


Step 2. Quickly establish an SSH session with the control plane node to see the boot menu. After the Instance is Powered ON, it will automatically boot from the pre-selected option: LOCAL DISK. We want to boot first from MASTER (BIOS), then from LOCAL DISK.

Choose **MASTER (BIOS)** from the menu:



Step 3. Choose **BOOT FROM LOCAL DISK**.



The control plane node is rebooted.

Step 4. After the node reboots, run the following command to install OpenShift.

```
$ ./openshift-install  wait-for bootstrap-complete --log-level debug --dir=/root/ocp-44/install
```

```
$ ./openshift-install  wait-for bootstrap-complete --log-level debug --dir=/root/ocp-44/install
#DEBUG OpenShift Installer 4.4.9
#DEBUG Built from commit 1541bf917973186bbab6a5f895f08db4334a5d9a
#INFO Waiting up to 20m0s for the Kubernetes API at https://api.ocp2.lenovo-cp.com:6443...
#INFO API v1.17.1+912792b up
#INFO Waiting up to 40m0s for bootstrapping to complete...
#DEBUG Bootstrap status: complete
#INFO It is now safe to remove the bootstrap resources
```

Step 5. After the command completes successfully, you can shut down the bootstrap instance from the VDC Instances page.

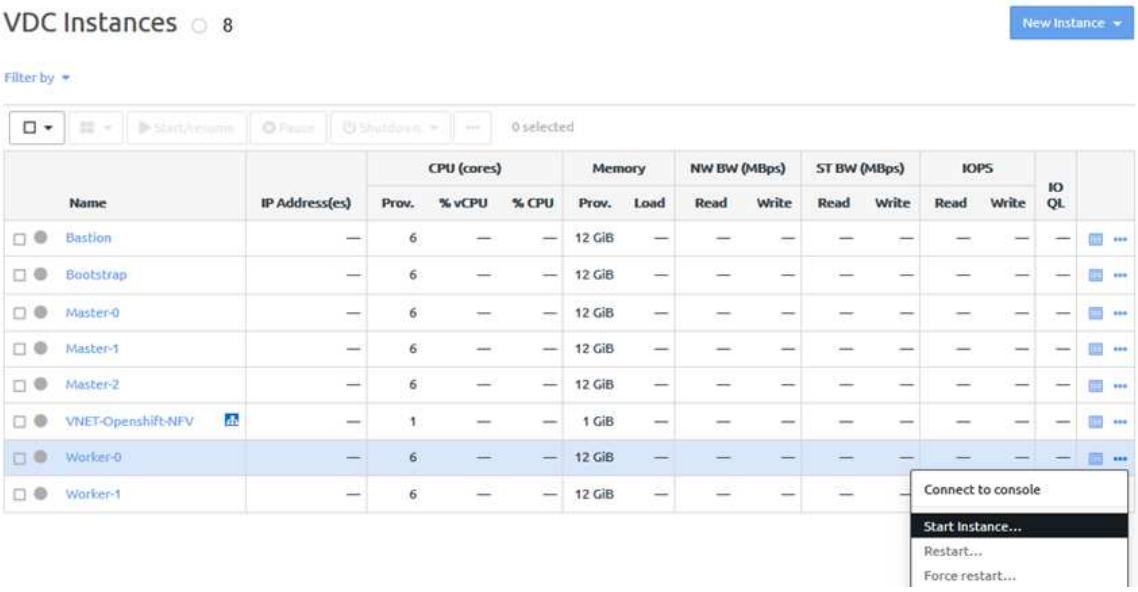
Repeat these steps for all control plane nodes.

Set up the compute nodes

The compute nodes, which are also known as *worker nodes*, run the workloads.

A minimum of two compute nodes are required. For **each** compute node, complete the following steps:

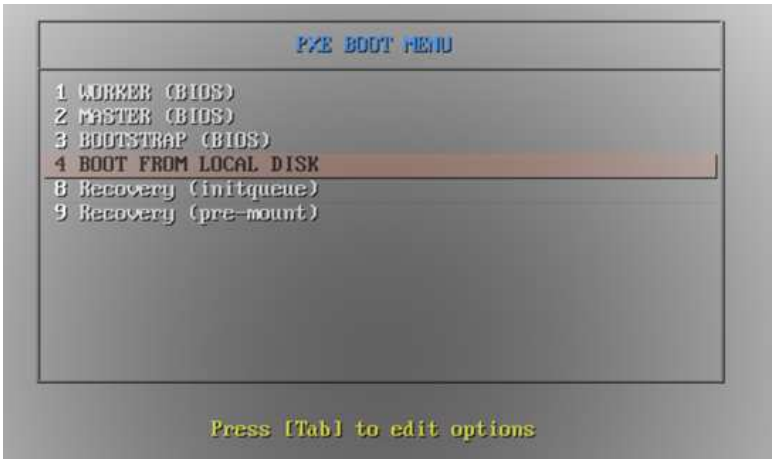
Step 1. From the VDC Instances page, click **Start Instance** to start the compute instance:



Step 2. Quickly establish an SSH session with the compute node to see the boot menu. After the Instance is Powered ON, it will automatically boot from the pre-selected option: LOCAL DISK. We want to boot first from WORKER (BIOS), then from LOCAL DISK.

Choose **WORKER (BIOS)** from the menu:

Step 3. Choose **BOOT FROM LOCAL DISK**.



The worker node is rebooted.

Repeat these steps for all worker nodes.

Complete the OCP installation process

After completing the OCP installation process, you can establish access the web console.

Complete the following steps to complete the OCP installation process and access the OCP web console.

Step 1. Establish an SSH session with the Bastion instance.

Step 2. Run the following command to install and approve all OCP admin certificates:

Note: You might have multiple Certificate Signing Requests (CSRs). Make sure that you run this command for all CSRs.

```
$ ./oc get csr -o go-template='{{range .items}}{{if not .status}}{{.metadata.name}}{{"\n"}}{{end}}{{end}}'
     | xargs ./oc adm certificate approve
```

```
$ ./oc get csr -o go-template='{{range .items}}{{if not .status}}{{.metadata.name}}{{"\n"}}{{end}}{{end}}' | xargs ./oc adm certificate approve
#certificatesigningrequest.certificates.k8s.io/csr-cqwlr approved
#certificatesigningrequest.certificates.k8s.io/csr-pzr7z approved
```

Step 3. Run the following command to install the OpenShift cluster:

```
$ ./openshift-install --dir=/root/ocp-44/install wait-for install-complete
```

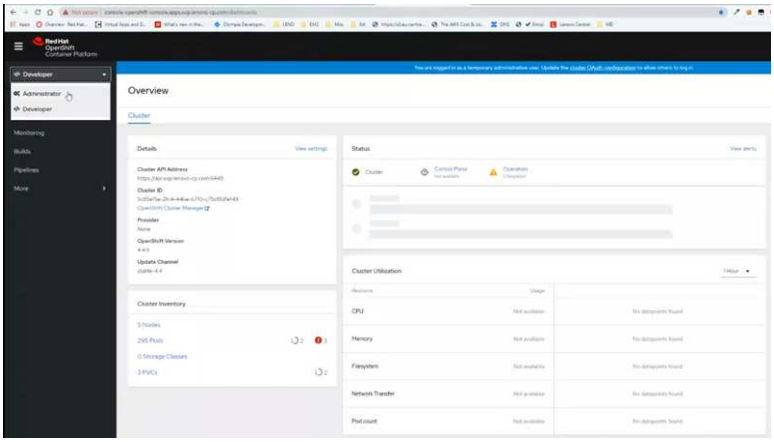
```
$ ./openshift-install --dir=/root/ocp-44/install wait-for install-complete
#INFO Waiting up to 30m0s for the cluster at https://api.ocp2.lenovo-cp.com:6443 to initialize...
#INFO Waiting up to 10m0s for the openshift-console route to be created...
#INFO Install complete!
#INFO To access the cluster as the system:admin user when using 'oc', run 'export KUBECONFIG=/root/ocp-44/install/auth/kubeconfig'
#INFO Access the OpenShift web-console here: https://console-openshift-console.apps.ocp2.lenovo-cp.com
#INFO Login to the console with user: kubeadmin, password: roC5M-Dd6Cn-HdsIn-6PXbR
```

Step 4. Run the following command to enable access to the cluster when using oc:

```
$ export KUBECONFIG=/root/ocp-44/install/auth/kubeconfig
```

```
$ export KUBECONFIG=/root/ocp-44/install/auth/kubeconfig
```

Step 5. To access the OpenShift web console, use the URL that is listed in the results of the `openshift-install` command (Step 3).



For more information about using Red Hat OCP, see the following website:

https://cloud.redhat.com/openshift/overview

Note: You must have a Red Hat account to access the site.