02_CVD: Red Hat OCP Prerequisites

Deploy Red Hat OpenShift Container Platform

This section provides the implementation steps for deploying Red Hat OpenShift Container Platform (OCP) in an Enterprise data center. The cluster will be used for hosting AI/ML workloads and OpenShift AI for MLOps. The OCP cluster is deployed from the cloud using Red Hat Hybrid Cloud Console using the Automated or Installer Provisioned Infrastructure (IPI) method. Red Hat provides other installation options depending on the level of customization required.

Prerequisites

The prerequisites for deploying Red Hat OCP are:

- Installer workstation with access to the VMware vSphere environment (VMware vCenter, ESXi hosts) where the OCP cluster will be deployed. Post-deployment, the installer will be used for SSH access to the nodes in the OCP cluster. For this solution, the installer virtual machine is deployed on the FlashStack infrastructure management network.
- A valid Red Hat account to centrally deploy and manage the on-prem OCP clusters from the cloud using Red Hat Hybrid Cloud Console. Enterprises can also use Red Hat's Advance Cluster Management for this.
- FlashStack VSI infrastructure for hosting the AI/ML OCP cluster. Cluster should be fully licensed, with NTP and vSphere HA/DRS enabled. The cluster will also need access to a datastore for the OCP cluster VMs.
- VLAN and IP subnet for the OCP cluster. The VLAN should be reachable from the installer, have access to network services (DNS, DHCP, NTP) as well as Internet access for reachability to quay.io, Hybrid Cloud Console etc. The OCP cluster will use a FlashStack Guest VM network.
- From the IP subnet allocated, Installer requires two static IP addresses for the API VIP and Ingress VIP as outlined below and DHCP pool for the OCP cluster to use

Component	Record	Description
API VIP	`api.<cluster_name>.<base_domain>.`	This DNS A/AAAA or CNAME record must point to the load balancer for the control plane machines. This record must be resolvable by both clients external to the cluster and from all the nodes within the cluster.
Ingress VIP	`*.apps.<cluster_name>.<base_domain>.`	A wildcard DNS A/AAAA or CNAME record that points to the load balancer that targets the machines that run the Ingress router pods, which are the worker nodes by default. This record must be resolvable by both clients external to the cluster and from all the nodes within the cluster.

- Setup DNS server : Identify domain for OCP cluster and add DNS records for the two static IP addresses must be in place prior to install.
- NTP Server IP: Provision DHCP server to provide NTP.
- Gateway IP for OCP subnet: Provision DHCP server to provide Gateway IP
- Setup DHCP server: Add a DHCP pool and NTP server IP for the OCP cluster to use.
- To enable SSH Access to the OCP cluster, public keys must be provided to the OCP installer. Installer will pass the keys to the nodes through the initial configuration (ignition) files during installation. The nodes will add the keys to the **~/.ssh/authorized_keys** list to enable password-less authentication as user: **core.**
- VMware vCenter root CA certificates – To install the OCP cluster on VMware vSphere, the installer needs access to VMware vCenter. To enable this, the vCenter's root CA certificates must be added to the system trust on the OCP installer workstation.

Setup Information

Table 10 lists the installation parameters for the on-prem deployment.

<Insert table from OCP word doc>

Deployment Steps:

Deploy Installer workstation/virtual machine

1. Deploy OCP installer with reachability to VMware vSphere cluster (vCenter, ESXi hosts) and Internet.
2. Create a directory for all cluster related software, for e.g., AIML

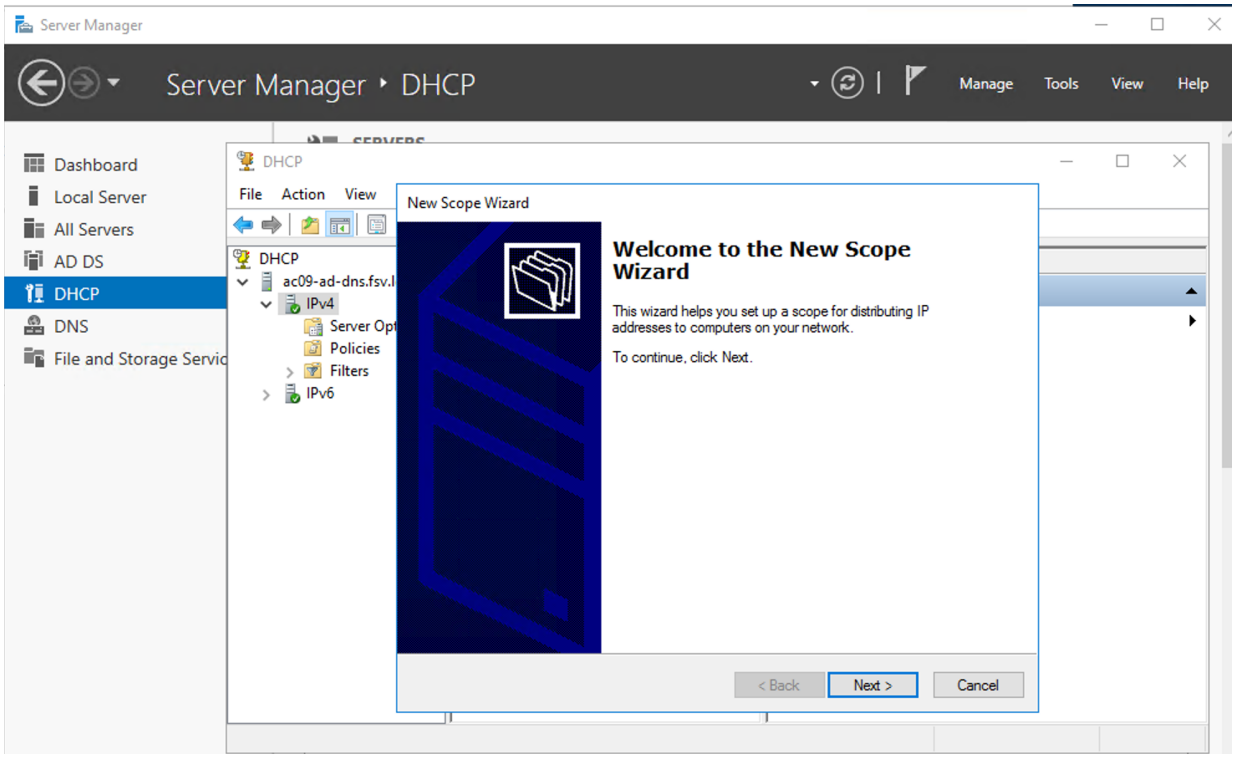
Add DNS records

1. On the DNS server, create a domain (for e.g. ocp3) and sub-domain (for e.g. apps) under the parent domain (for e.g. fsv.local)

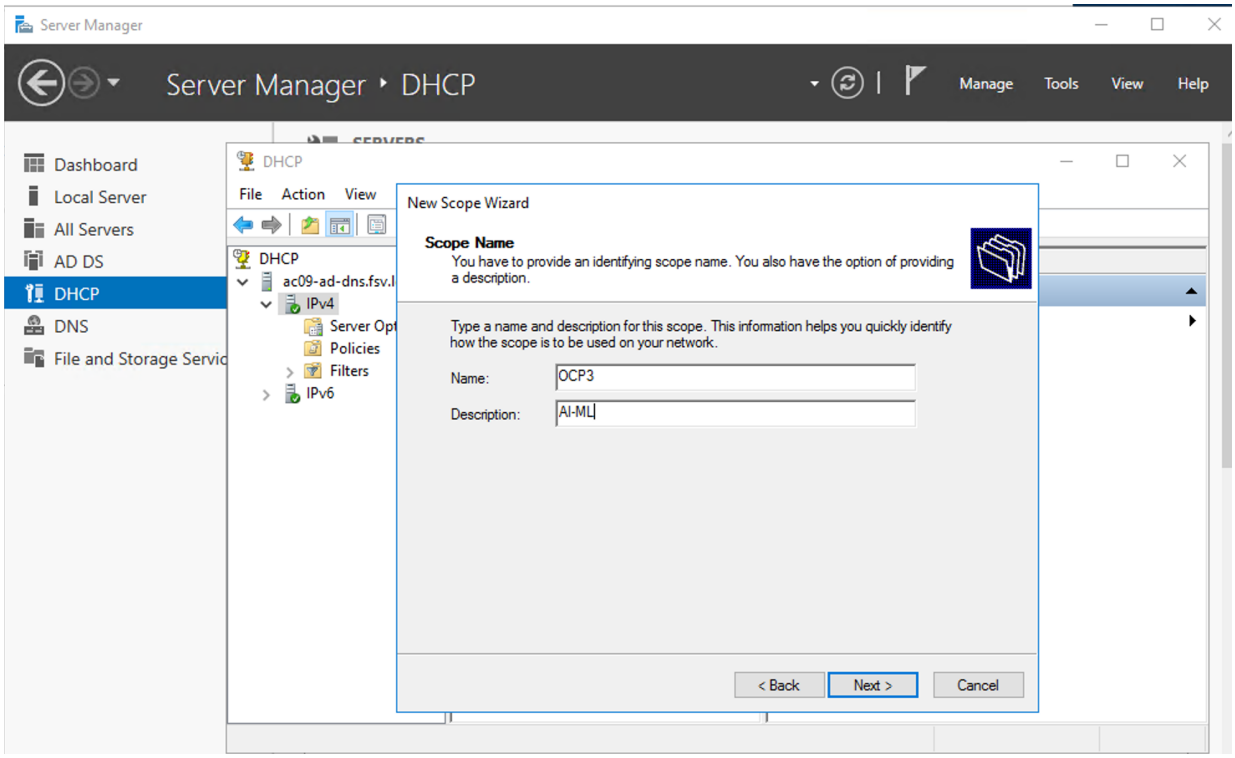
Add DHCP pool and NTP server

This solution uses a Windows DHCP server.

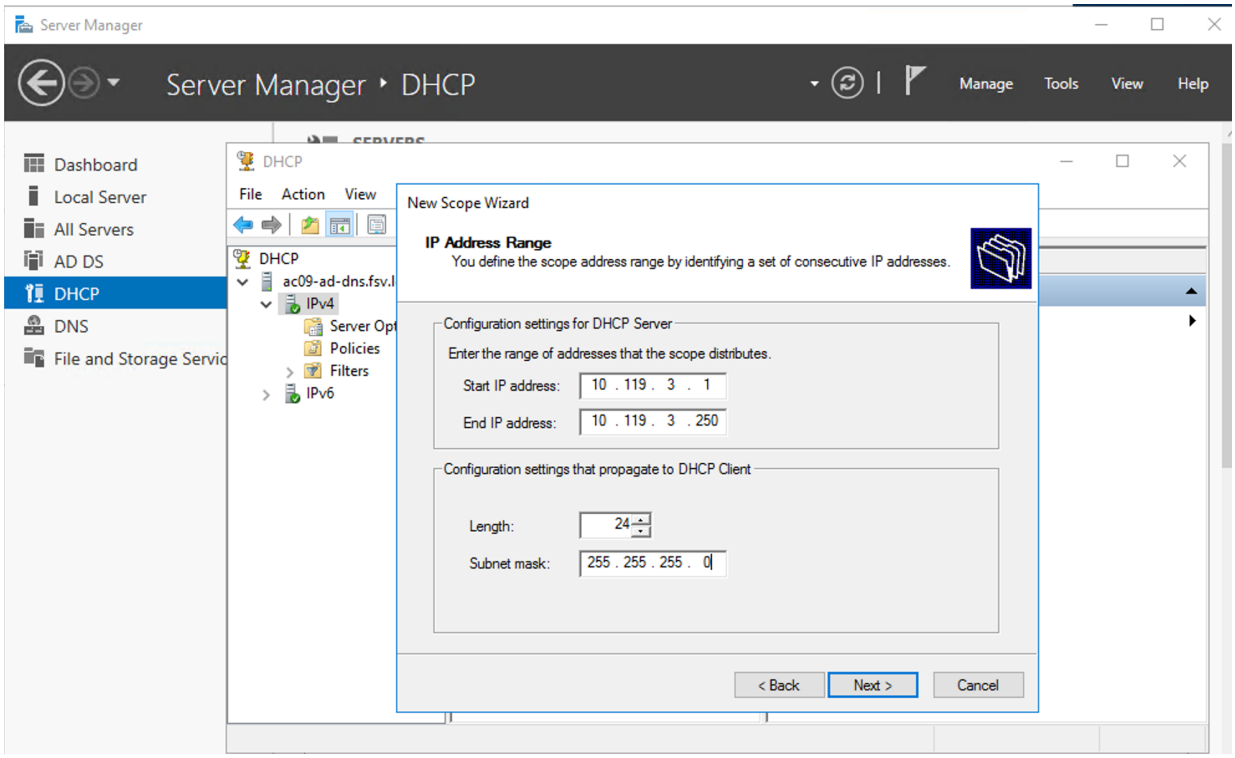
1. On the DHCP server, create a new DHCP scope with the following Scope and Server options (GW, Domain, DNS, NTP)



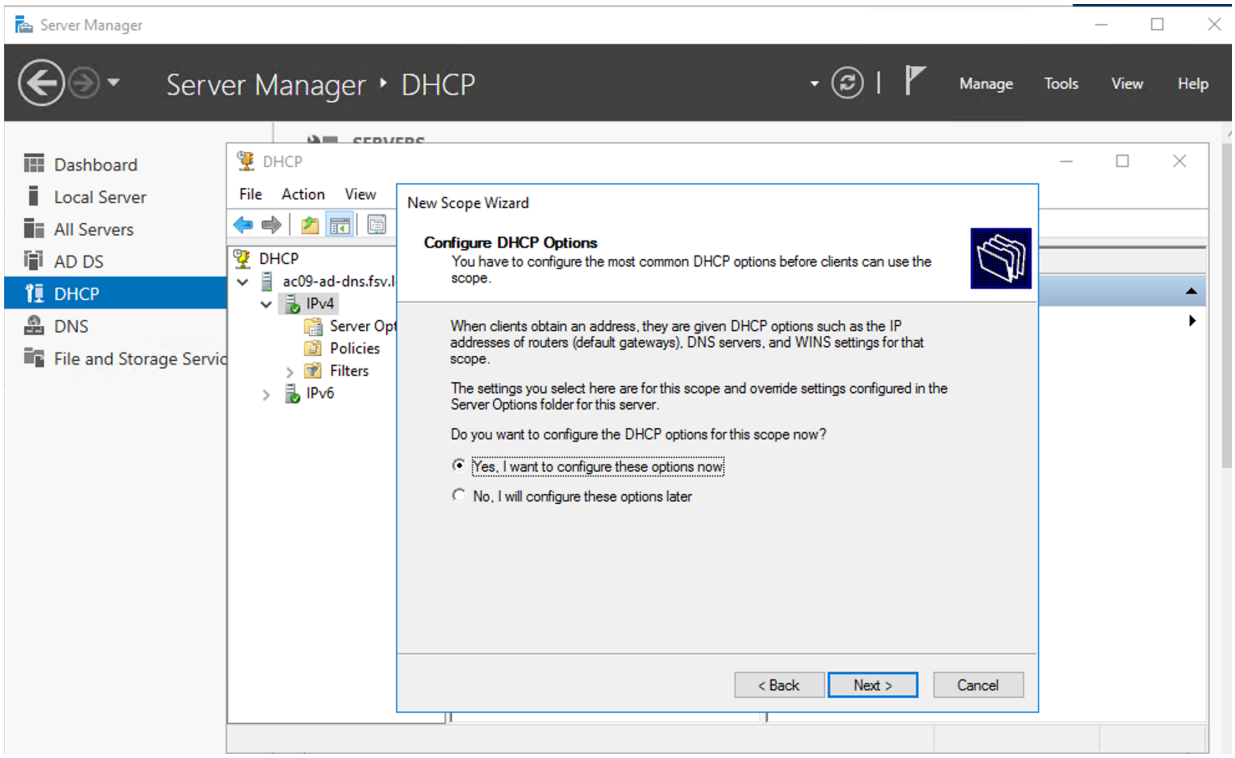
2. Specify a Scope Name and Description.



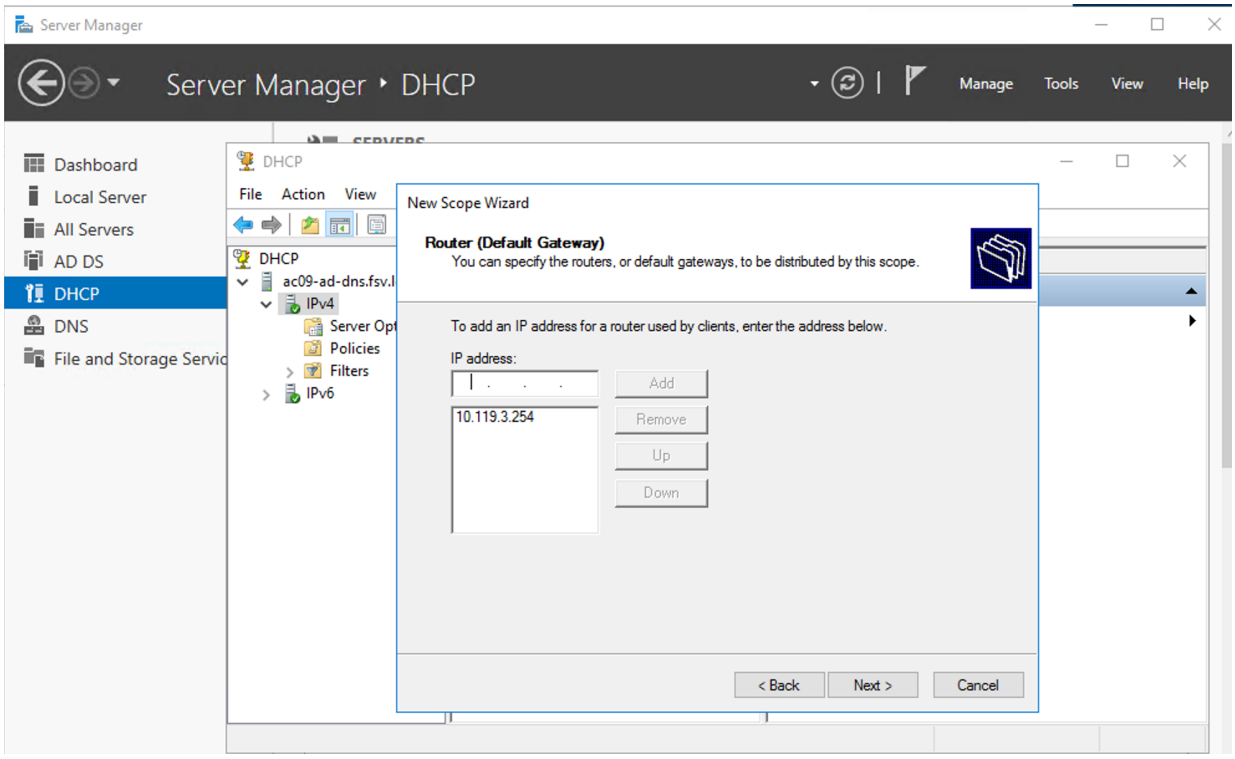
3. Specify an address range for the scope. Specify any addresses that should be excluded from this reason and a Lease Duration.



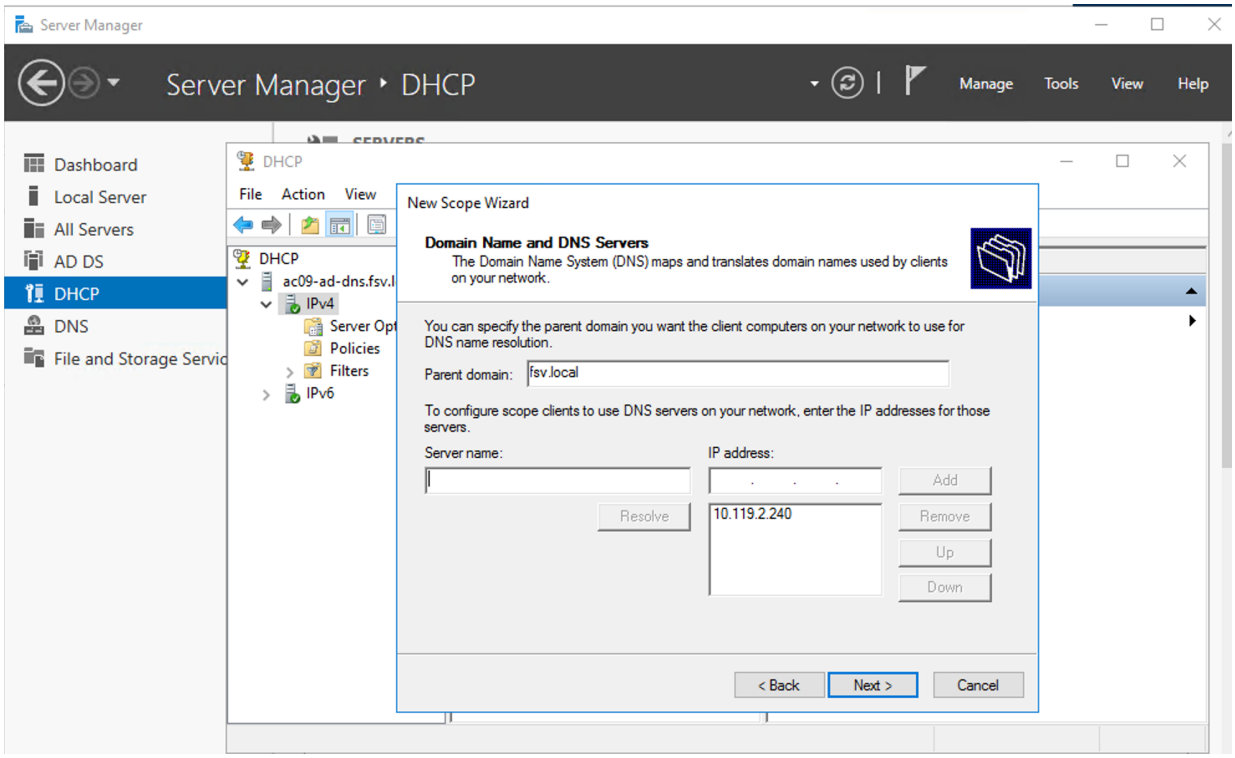
4. Configure DHCP Options.



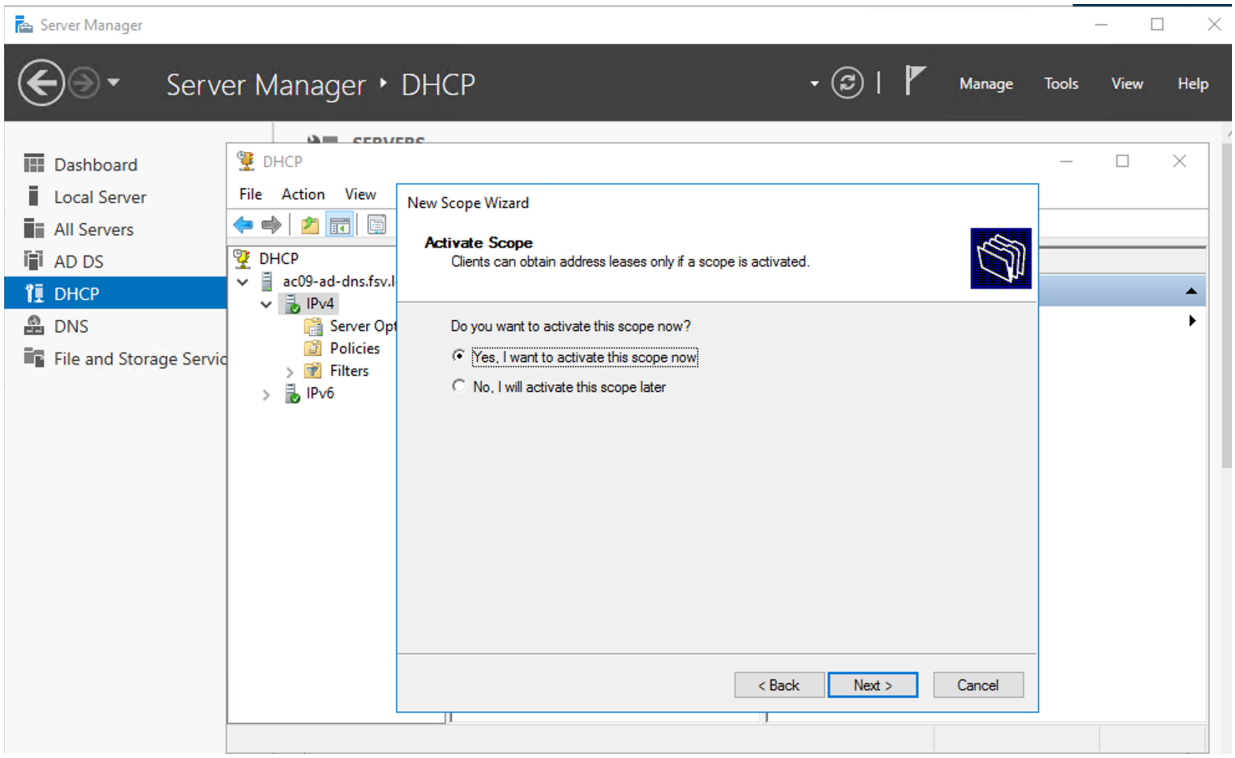
5. Configure DHCP Option: Default Gateway



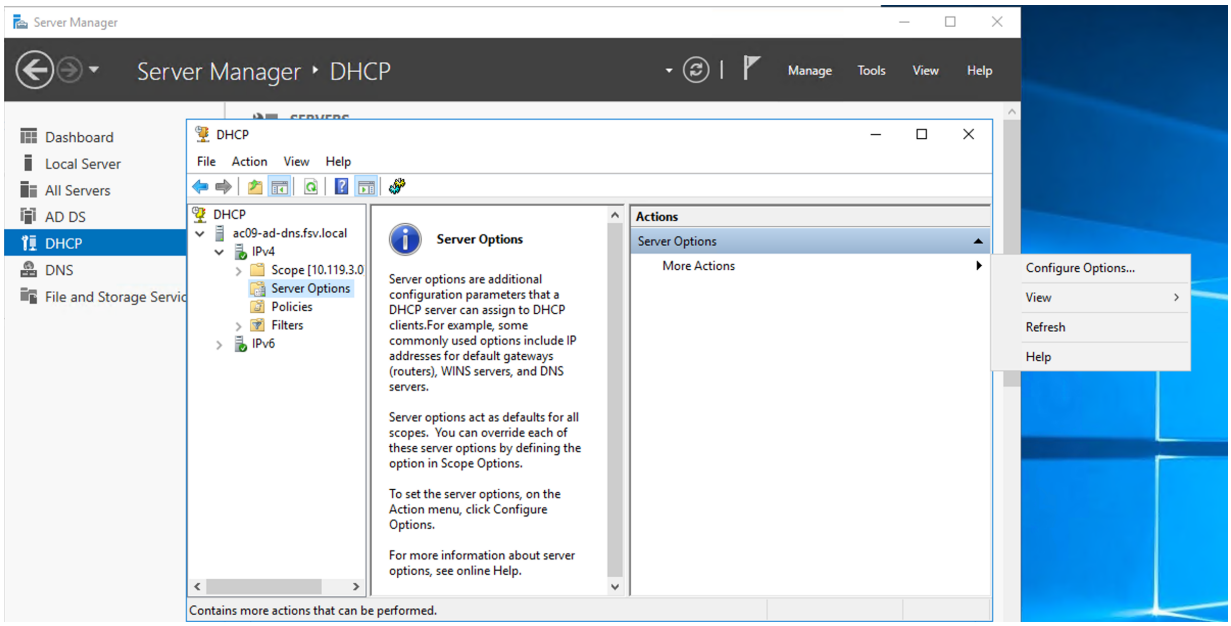
6. Configure DHCP Option: Domain Name and DNS Servers



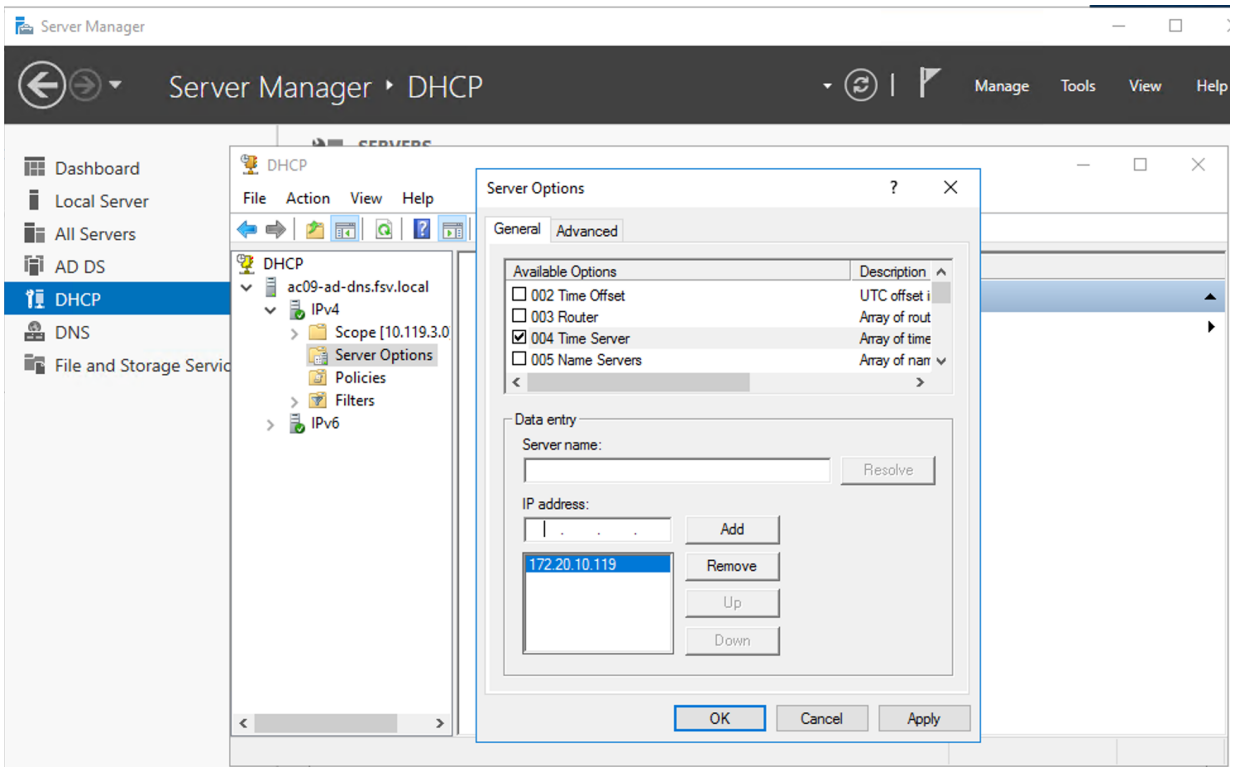
7. **Activate Scope** and complete New Scope creation.



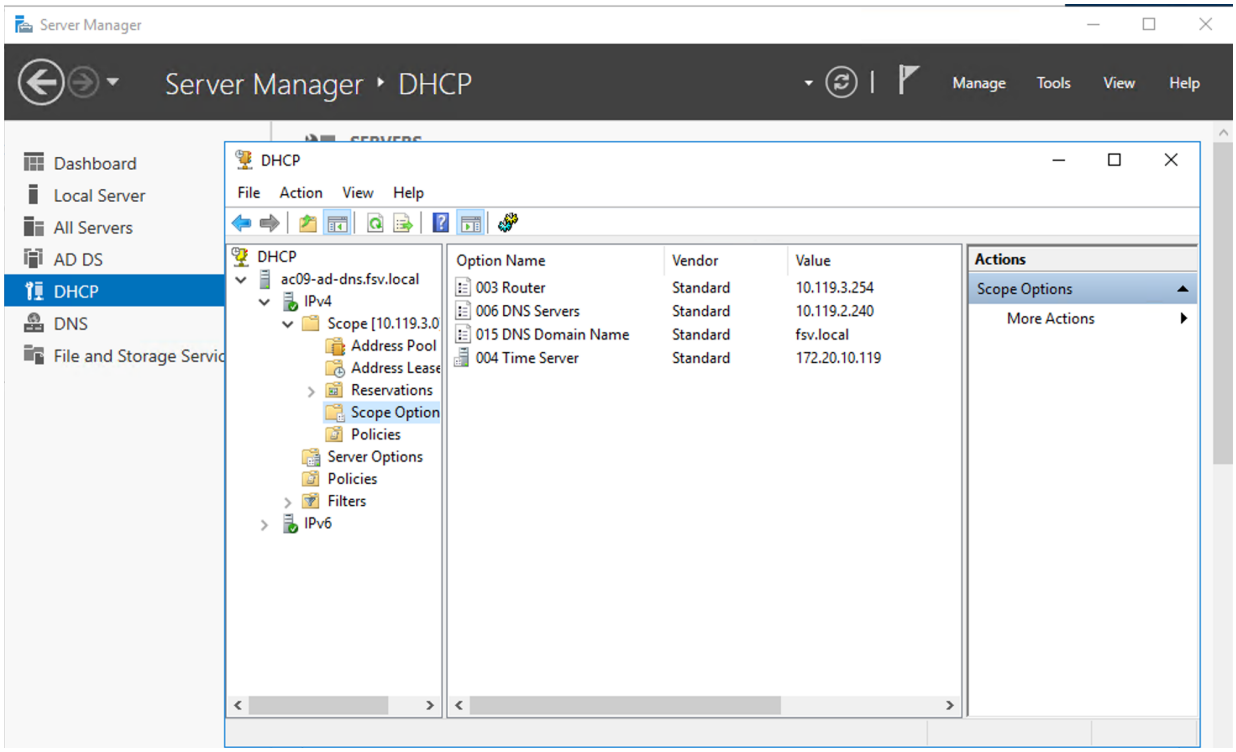
8. Select **Server Options** to configure remaining DHCP options (NTP,



9. Configure DHCP Option: **NTP**



10. Review DHCP Options configured.



Enable SSH access to OCP

1. On the OCP Installer, generate a SSH key pair for SSH access to the OCP cluster. This must be done prior to cluster deployment. The commands you'll need are provided below.

```
ssh-keygen -t rsa -N '' -f <path>/<file_name>
eval "$(ssh-agent -s)"
ssh-add <path>/<file_name>
```

2. On the OCP Installer , generate the SSH keys - you can use either rsa or edcsa algorithm.

```
[administrator@FSV-AI-OCP-Installer ~]$ ssh-keygen -t rsa -N '' -f ~/.ssh/id_rsa
Generating public/private rsa key pair.
Your identification has been saved in /home/administrator/.ssh/id_rsa.
Your public key has been saved in /home/administrator/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:C+jhBhxeMpzsTifI1SVc+TsjTVcBZ7IUUu60/ra8V+0 administrator@FSV-AI-OCP-
Installer
The key's randomart image is:
+---[RSA 3072]----+
| ...o...*o+. |
```

```
| o ...o. + =. |
| B... . +. |
|.=.= . oo.. |
|..B + . S oo .|
| o * . o *. o|
| . + o o. ..|
| . o. .E|
| .=+ |
+----[SHA256]-----+
```

3. Verify that the **ssh-agent** process is running and if not, start it as a background task as outlined below.

```
[administrator@FSV-AI-OCP-Installer ~]$ eval "$(ssh-agent -s)"
Agent pid 4817
```

4. Add the SSH private key identity to the SSH agent for your local user.

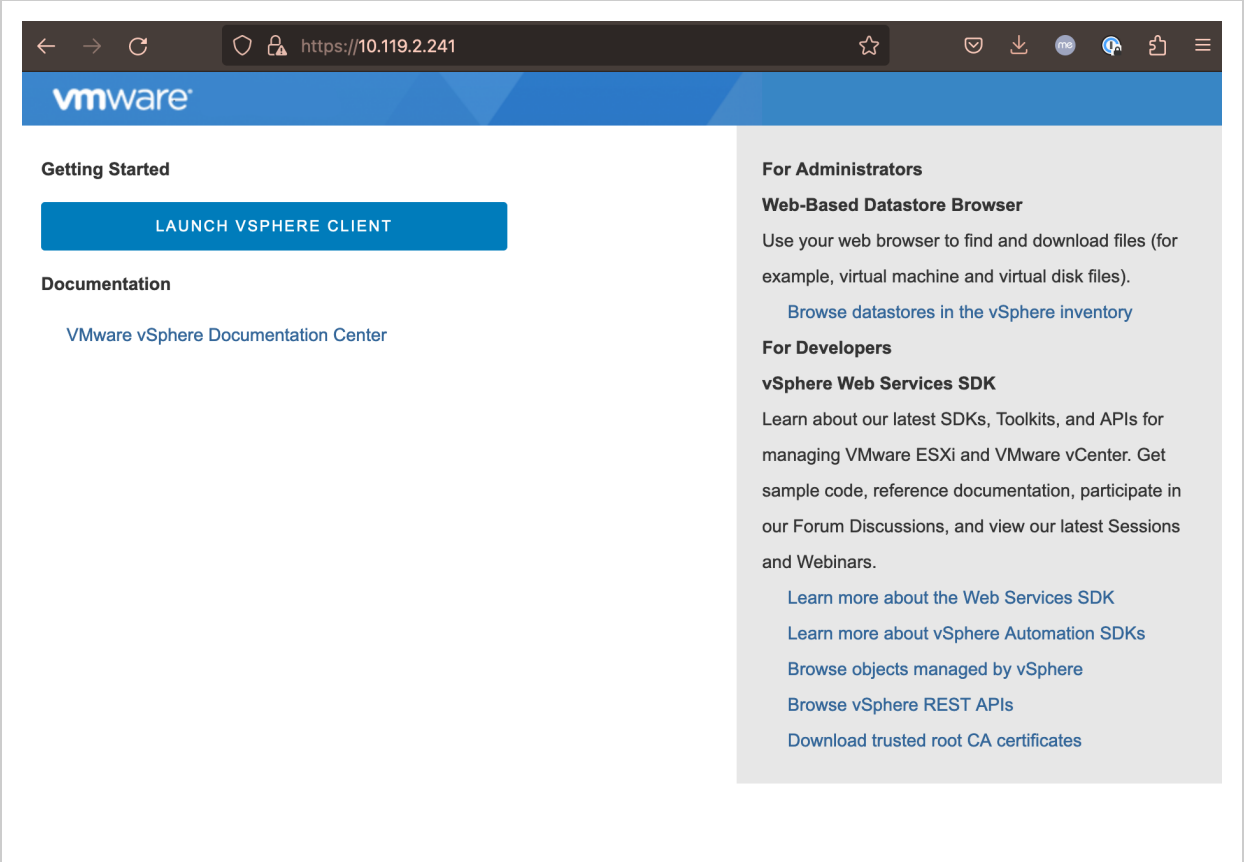
```
[administrator@FSV-AI-OCP-Installer ~]$ ssh-add ~/.ssh/id_rsa
Identity added: /home/administrator/.ssh/id_rsa (administrator@FSV-AI-OCP-Installer)
```

Installer will add the SSH keys to the ignition files that are used for the initial OCP node configuration. Once the OCP cluster is deployed, you will be able to access the cluster as user **core** without the need for password.

Download VMware vCenter's root CA Certificates

OCP installer needs API access to VMware vCenter. To enable this access, download VMware vCenter's root CA certificates to OCP installer's system trust.

1. Use a web browser and navigate to VMware vCenter IP or hostname.



2. Click on **Download trusted root CA certificates** before logging in.
3. Upload the downloaded file (download.zip) to OCP installer.
4. Copy the certificates to the system trust of your installer.
5. Update the system trust on your workstation

```
[administrator@FSV-AI-OCP-Installer AIML]$ unzip download.zip
Archive: download.zip
inflating: certs/lin/d6884dda.r0
inflating: certs/mac/d6884dda.r0
inflating: certs/win/d6884dda.r0.crl
inflating: certs/lin/d6884dda.0
inflating: certs/mac/d6884dda.0
inflating: certs/win/d6884dda.0.crt
[administrator@FSV-AI-OCP-Installer AIML]$ sudo cp certs/lin/* /etc/pki/ca-
trust/source/anchors
[sudo] password for administrator:
[administrator@FSV-AI-OCP-Installer AIML]$ sudo update-ca-trust extract
```

Download Installer files from Red Hat Hybrid Cloud Console

1. Navigate to Red Hat Hybrid Cloud Console (https://console.redhat.com). Select the the Data Center tab, and select VMware vSphere infrastructure > Automated (IPI) installation. Download the following tar files and pull-secret.

```
[administrator@FSV-AI-OCP-Installer ~]$ cd AIML
[administrator@FSV-AI-OCP-Installer AIML]$ ls
openshift-client-linux.tar.gz openshift-install-linux.tar.gz pull-secret.txt
```

3. Untar the above two files

```
[administrator@FSV-AI-OCP-Installer AIML]$ tar -xvf openshift-install-linux.tar.gz
README.md
openshift-install
[administrator@FSV-AI-OCP-Installer AIML]$ tar -xvf openshift-client-linux.tar.gz
README.md
oc
kubectl
[administrator@FSV-AI-OCP-Installer AIML]$ ls -al
total 1271676
drwxrwxr-x. 2 administrator administrator 171 Oct 16 22:36 .
drwx------. 24 administrator administrator 4096 Oct 16 22:35 ..
-rwxr-xr-x. 2 administrator administrator 148751344 Sep 18 18:53 kubectl
-rwxr-xr-x. 2 administrator administrator 148751344 Sep 18 18:53 oc
-rw-r--r--. 1 administrator administrator 62349027 Oct 16 22:19 openshift-client-
linux.tar.gz
-rwxr-xr-x. 1 administrator administrator 575819416 Sep 26 05:22 openshift-install
-rw-r--r--. 1 administrator administrator 366505297 Oct 16 22:27 openshift-install-
linux.tar.gz
-rw-r--r--. 1 administrator administrator 2767 Oct 16 22:27 pull-secret.txt
-rw-r--r--. 1 administrator administrator 950 Sep 18 18:53 README.md
[administrator@FSV-AI-OCP-Installer AIML]$
```
