**Installation and Configuration of OpenShift OKD on RHEL 9 Guide**

**RHEL 9:**

Installing and configuring **Red Hat OpenShift** on **RHEL 9** can be done in several ways, depending on your use case:

* **Single-node (developer/local)**: using **CodeReady Containers** or **OpenShift Local**.
* **Multi-node production-ready**: using **IPI (Installer-Provisioned Infrastructure)** or **UPI (User-Provisioned Infrastructure)**.

For most users on RHEL 9, the **UPI (User-Provisioned Infrastructure)** method using **OpenShift Installer** is the most flexible. Below is a guide to install **OpenShift 4.x** on RHEL 9 using the **UPI** method (bare metal or virtualization).

**Prerequisites**

* **Red Hat subscription**
* RHEL 9 system(s) (min 4 vCPU, 8 GB RAM for test, 16 GB+ for prod nodes)
* **DNS entries** or /etc/hosts for cluster
* Internet access (or mirrored registry for disconnected installs)
* podman, openshift-install, and oc CLI
* RHCOS ISO or RHEL 9 nodes prepared as worker/master

**CENTOS 9:**

Installing **Red Hat OpenShift** on **CentOS Stream 9** (or CentOS 9) is **not officially supported** by Red Hat for production environments. OpenShift officially supports:

* **RHCOS** (Red Hat CoreOS) for master/control plane nodes
* **RHEL 8/9** for worker nodes (under certain conditions)

However, for **non-production**, **development**, or **learning purposes**, you can install **OpenShift OKD** (the upstream open-source version of OpenShift) on CentOS Stream 9.

**Install OKD 4.x on CentOS 9 (User-Provisioned Infrastructure - UPI)**

We will use the OKD installer to set up a **bare-metal or virtual cluster**. This guide walks you through installing an **OKD 4.x cluster** with **Fedora CoreOS (FCOS)** as control/worker nodes and **CentOS 9** as the installation base.

**Prerequisites**

* One CentOS Stream 9 machine as the **installer host**
* Minimum 4 machines:
  + 1 Bootstrap
  + 3 Control plane (masters)
  + 0+ Workers (can be RHEL/CentOS with CRI-O)
* Internet access
* Domain name with DNS configured (or /etc/hosts)
* Pull secret from https://console.redhat.com/openshift/install/pull-secret
* Fedora CoreOS (FCOS) ISO and PXE images for node booting

To run **OKD 4.x on CentOS 9 as the installer and helper node**, the required **vCPU and RAM sizes** depend on the node type (bootstrap, control plane, worker) and the number of nodes in your cluster.

Here's a breakdown:

**Installer Host (CentOS 9 VM)**

This is the machine where you run openshift-install, oc, and serve ignition files.

**Component Minimum Recommended**

|  |  |  |
| --- | --- | --- |
| **vCPU** | 2 cores | 4 cores |
| **RAM** | 8 GB | 16 GB |
| **Disk** | 40 GB | 100 GB+ |

Make sure this VM can reach all the OKD nodes via IP and hostnames. DNS, HTTP server, and oc commands will run here.

**Bootstrap Node (Fedora CoreOS)**

**Component Minimum Recommended**

|  |  |  |
| --- | --- | --- |
| **vCPU** | 2 cores | 4 cores |
| **RAM** | 8 GB | 16 GB |
| **Disk** | 40 GB | 100 GB+ |

The bootstrap node is **temporary** — it can be deleted after the control plane is ready.

**Master Nodes (Fedora CoreOS)**

Each master runs etcd and the OpenShift control plane components.

**Component Minimum Recommended (Prod)**

|  |  |  |
| --- | --- | --- |
| **vCPU** | 4 cores | 8 cores |
| **RAM** | 16 GB | 32 GB |
| **Disk** | 100 GB | 120+ GB SSD |

You need **3 master nodes** for an HA control plane.

**Worker Nodes (Fedora CoreOS)**

**Component Minimum Recommended**

|  |  |  |
| --- | --- | --- |
| **vCPU** | 2 cores | 4+ cores |
| **RAM** | 8 GB | 16+ GB |
| **Disk** | 100 GB | 120+ GB |

Workers are where pods run. Size them based on workload.

**Summary Example for a Test Cluster**

|  |  |  |  |
| --- | --- | --- | --- |
| **Node** | **vCPU** | **RAM** | **Disk** |
| Installer | 4 | 16 GB | 100 GB |
| Bootstrap | 4 | 16 GB | 100 GB |
| Master x3 | 4 | 16 GB | 100 GB |
| Worker x1 | 2 | 8 GB | 100 GB |

**Tips:**

* Avoid using less than the minimum, or the cluster install **will fail**.
* CentOS 9 is **not used for OKD nodes**, only for the **installer host**.
* Use **Fedora CoreOS** as the OS for all cluster nodes.

**Prepare Installer Host (CentOS 9)**

# sudo dnf install -y wget curl git vim bind-utils net-tools bash-completion \

iptables-services NetworkManager podman jq python3

**Enable NetworkManager and firewall:**

# sudo systemctl enable --now NetworkManager firewalld

**Download OKD Installer and CLI**

**Download from the OKD release page (e.g. 4.14):**

https://github.com/okd-project/okd/releases

**Example:**

# wget https://github.com/okd-project/okd/releases/download/4.14.0-0.okd-2024-01-12-203314/openshift-install-linux-4.14.0-0.okd-2024-01-12-203314.tar.gz

# tar -xvzf openshift-install-linux-\*.tar.gz

# sudo mv openshift-install /usr/local/bin/

# wget https://github.com/okd-project/okd/releases/download/4.14.0-0.okd-2024-01-12-203314/openshift-client-linux-4.14.0-0.okd-2024-01-12-203314.tar.gz

# tar -xvzf openshift-client-linux-\*.tar.gz

# sudo mv oc kubectl /usr/local/bin/

**Generate Install Config**

**Create a working directory:**

# mkdir ~/okd-install && cd ~/okd-install

# openshift-install create install-config --dir=cluster

You will be prompted for:

* Cluster name
* Base domain
* Platform (choose none for bare metal)
* Pull secret
* SSH key

This creates **install-config.yaml.**

**Create Manifests and Ignition Configs**

# openshift-install create manifests --dir=cluster

# openshift-install create ignition-configs --dir=cluster

You now have:

* bootstrap.ign
* master.ign
* worker.ign

Use these with PXE, CoreOS Live ISO, or ISO image to boot your nodes.

**Boot Nodes (FCOS)**

For each machine:

* Bootstrap node: use **bootstrap.ign**
* Master nodes: use **master.ign**
* Worker nodes (optional): use **worker.ign** or use CentOS 9 with CRI-O

You can boot them using:

* Fedora CoreOS Live ISO + Ignition config via kernel arguments
* PXE boot

Example kernel boot option for ISO:

# coreos.inst.install\_dev=/dev/sda coreos.inst.ignition\_url=http://<installer\_ip>:8080/bootstrap.ign

**Start the Installation**

# openshift-install wait-for bootstrap-complete --dir=cluster --log-level=info

After bootstrap is complete, power off the bootstrap node.

**Approve CSRs for masters and workers:**

# oc get csr

# oc adm certificate approve <csr\_name>

**Then wait for install completion:**

# openshift-install wait-for install-complete --dir=cluster --log-level=info

**Access Console**

Once installed:

* Console: https://console-openshift-console.apps.<cluster>.<domain>
* Get admin credentials:

# cat cluster/auth/kubeadmin-password

**Notes & Limitations**

* Official Red Hat **OpenShift 4.x does not support CentOS** as control plane nodes.
* CentOS 9 can be used as **worker nodes only** with **CRI-O** or **Podman** configured.
* **OKD** is community-supported and ideal for testing/learning

**Alternative: OpenShift Local (CRC)**

For testing on a single machine (CentOS 9 included):

# curl -LO https://developers.redhat.com/content-gateway/file/pub/openshift-v4/clients/crc/latest/crc-linux-amd64.tar.xz

# tar -xf crc-linux-\*.tar.xz

# sudo mv crc-linux-\*/crc /usr/local/bin/

# crc setup

# crc start