

How To Install Kubernetes On Rocky Linux 9 | AlmaLinux 9

By Pradeep Kumar / Last Updated: November 26, 2023 / 5 Minutes Of Reading



In this blog post, we will explain how to install Kubernetes cluster on Rocky Linux 9 or AlmaLinux 9 with Kubeadm utility.

Kubernetes, often referred to as K8s, is an open-source container orchestration platform. With its robust capabilities for automating deployment, scaling, and managing containerized applications, [Kubernetes](#) has become the go-to solution for DevOps teams worldwide.

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Prerequisites

- A fresh Installation of Rocky Linux 9 or AlmaLinux 9
- Sudo user with admin rights
- Minimum of 2 GB RAM, 2 vCPUs and 20 GB Disk Space
- A reliable Internet Connection

Lab Setup

We have used three Virtual machines with following specification.

- K8s-master01 – 192.168.1.190
- K8s-worker01 – 192.168.1.191
- K8s-worker02 – 192.168.1.192
- Sysops as [sudo user](#) on each node

Without any further delay, lets deep dive into Kubernetes installation steps.

Step 1: Set Hostname And Update Hosts File

Login or ssh each machine and run hostnamectl commands to set their respective hostname.

```
$ sudo hostnamectl set-hostname "k8s-master01" && exec bash
$ sudo hostnamectl set-hostname "k8s-worker01" && exec bash
$ sudo hostnamectl set-hostname "k8s-worker02" && exec bash
```

Add the following entries in `/etc/hosts` file on each node.

```
192.168.1.190    k8s-master01
192.168.1.191    k8s-worker01
192.168.1.192    k8s-worker02
```

Step 2: Disable Swap Space On Each Node

For kubelet to work smoothly, we must disable swap space on all the nodes. Run beneath command,

```
$ sudo swapoff -a
$ sudo sed -i '/ swap / s/^\(.*\)$/#\1/g' /etc/fstab
```

Step 3: Adjust SELinux And Firewall Rules For Kubernetes

Set SELinux mode as permissive on all the nodes using following commands,

```
$ sudo setenforce 0
$ sudo sed -i --follow-symlinks 's/SELINUX=enforcing/SELINUX=permissive/g' /etc/sysconfig/selinux
```

On the master node, allow following ports in the firewall.

```
$ sudo firewall-cmd --permanent --add-port={6443,2379,2380,10250,10251,10252,10257,10259,179}/tcp
$ sudo firewall-cmd --permanent --add-port=4789/udp
$ sudo firewall-cmd --reload
```

On the Worker Nodes, allow beneath ports in the firewall,

```
$ sudo firewall-cmd --permanent --add-port={179,10250,30000-32767}/tcp
$ sudo firewall-cmd --permanent --add-port=4789/udp
$ sudo firewall-cmd --reload
```

Step 4: Add Kernel Modules And Parameters

For kuberetes cluster, we must add the [overlay](#) and [br_netfilter](#) kernel modules on all the nodes.

Create a file and add following content to it,

```
$ sudo tee /etc/modules-load.d/containerd.conf <<EOF
overlay
br_netfilter
EOF
```

In order to load above modules, run

```
$ sudo modprobe overlay
$ sudo modprobe br_netfilter
```

Next, add the following kernel parameters, create a file and with following content,

```
$ sudo vi /etc/sysctl.d/k8s.conf
net.bridge.bridge-nf-call-iptables = 1
net.ipv4.ip_forward = 1
net.bridge.bridge-nf-call-ip6tables = 1
```

Save & close the file.

Now add these parameters by running below command

```
$ sudo sysctl --system
```

Step 5: Install Conatinerd Runtime

Kubernetes requires a container runtime, and one of the most popular choices is containerd. But It is not available in the default package repositories of Rocky Linux or AlmaLinux, so add the following docker repo on all the nodes.

```
$ sudo dnf config-manager --add-repo https://download.docker.com/linux/centos/docker-ce.repo
```

Now, run following dnf command to install containerd on all the nodes.

```
$ sudo dnf install containerd.io -y
```

```
[sysops@k8s-master01 ~]$ sudo dnf config-manager --add-repo https://download.docker.com/linux/centos/docker-ce.repo
Adding repo from: https://download.docker.com/linux/centos/docker-ce.repo
[sysops@k8s-master01 ~]$
[sysops@k8s-master01 ~]$
[sysops@k8s-master01 ~]$
[sysops@k8s-master01 ~]$ sudo dnf install containerd.io -y
Docker CE Stable - x86_64                               3.0 kB/s | 31 kB    00:10
Dependencies resolved.
=====
Package                                Architecture      Version           Repository        Size
=====
Installing:
containerd.io                          x86_64            1.6.22-3.1.el9    docker-ce-stable  33 M
Installing dependencies:
container-selinux                       noarch            3:2.205.0-1.el9_2 appstream         50 k
Transaction Summary
=====
Install 2 Packages
```

Configure containerd so that it will use [systemdgroup](#), execute the following commands on each node.

```
$ containerd config default | sudo tee /etc/containerd/config.toml >/dev/null 2>&1
$ sudo sed -i 's/SystemdCgroup \= false/SystemdCgroup \= true/g' /etc/containerd/config.toml
```

Restart and enable containerd service using beneath commands,

```
$ sudo systemctl restart containerd
$ sudo systemctl enable containerd
```

Verify containerd service status, run

```
$ sudo systemctl status containerd
```

```
[sysops@k8s-master01 ~]$ sudo systemctl status containerd
● containerd.service - containerd container runtime
   Loaded: loaded (/usr/lib/systemd/system/containerd.service; enabled; preset: disabled)
   Active: active (running) since Sat 2023-09-16 15:19:54 IST; 1min 1s ago
     Docs: https://containerd.io
   Main PID: 2422 (containerd)
      Tasks: 8
     Memory: 14.7M
        CPU: 410ms
    CGroup: /system.slice/containerd.service
            └─2422 /usr/bin/containerd

Sep 16 15:19:54 k8s-master01 containerd[2422]: time="2023-09-16T15:19:54.665571946+05:30" level=info msg=serving ... address=/run/containerd/containerd.sock
Sep 16 15:19:54 k8s-master01 containerd[2422]: time="2023-09-16T15:19:54.665668769+05:30" level=info msg=serving ... address=/run/containerd/containerd.sock
Sep 16 15:19:54 k8s-master01 containerd[2422]: time="2023-09-16T15:19:54.666646433+05:30" level=info msg="Start subscribing containerd event"
Sep 16 15:19:54 k8s-master01 containerd[2422]: time="2023-09-16T15:19:54.666901360+05:30" level=info msg="Start recovering state"
Sep 16 15:19:54 k8s-master01 containerd[2422]: time="2023-09-16T15:19:54.666997490+05:30" level=info msg="Start event monitor"
Sep 16 15:19:54 k8s-master01 containerd[2422]: time="2023-09-16T15:19:54.667021811+05:30" level=info msg="Start snapshots syncer"
Sep 16 15:19:54 k8s-master01 containerd[2422]: time="2023-09-16T15:19:54.667033541+05:30" level=info msg="Start cni network conf syncer for default"
Sep 16 15:19:54 k8s-master01 containerd[2422]: time="2023-09-16T15:19:54.667041932+05:30" level=info msg="Start streaming server"
Sep 16 15:19:54 k8s-master01 containerd[2422]: time="2023-09-16T15:19:54.669232779+05:30" level=info msg="containerd successfully booted in 0.057829s"
Sep 16 15:19:54 k8s-master01 systemd[1]: Started containerd container runtime.
```

Step 6: Install Kubernetes Tools

Kubernetes tools like Kubeadm, kubectl and kubelet are not available in the default package repositories of Rocky Linux 9 or AlmaLinux 9. So, to install these tools, add the following repository on all the nodes.

```
$ cat <<EOF | sudo tee /etc/yum.repos.d/kubernetes.repo
[kubernetes]
name=Kubernetes
baseurl=https://pkgs.k8s.io/core:/stable:/v1.28/rpm/
enabled=1
gpgcheck=1
gpgkey=https://pkgs.k8s.io/core:/stable:/v1.28/rpm/repodata/repomd.xml.key
exclude=kubelet kubeadm kubectl cri-tools kubernetes-cni
EOF
```

```
[sysops@k8s-master01 ~]$
[sysops@k8s-master01 ~]$ cat <<EOF | sudo tee /etc/yum.repos.d/kubernetes.repo
[kubernetes]
name=Kubernetes
baseurl=https://pkgs.k8s.io/core:/stable:/v1.28/rpm/
enabled=1
gpgcheck=1
gpgkey=https://pkgs.k8s.io/core:/stable:/v1.28/rpm/repodata/repomd.xml.key
exclude=kubelet kubeadm kubectl cri-tools kubernetes-cni
EOF
[kubernetes]
name=Kubernetes
baseurl=https://pkgs.k8s.io/core:/stable:/v1.28/rpm/
enabled=1
gpgcheck=1
gpgkey=https://pkgs.k8s.io/core:/stable:/v1.28/rpm/repodata/repomd.xml.key
exclude=kubelet kubeadm kubectl cri-tools kubernetes-cni
[sysops@k8s-master01 ~]$
```

Note: At time of writing this post, Kubernetes 1.28 version was available, that's why I have mentioned v1.28 while adding the repo.

Next, install Kubernetes tools by running following dnf command,

```
$ sudo yum install -y kubelet kubeadm kubectl --disableexcludes=kubernetes
```

```
[sysops@k8s-master01 ~]$
[sysops@k8s-master01 ~]$ sudo yum install -y kubelet kubeadm kubectl --disableexcludes=kubernetes
Last metadata expiration check: 0:10:47 ago on Sat 16 Sep 2023 03:28:10 PM IST.
Dependencies resolved.
=====
Package                                Architecture      Version            Repository          Size
=====
Installing:
kubeadm                                x86_64            1.28.2-150500.1.1  kubernet.es         9.9 M
kubectl                                x86_64            1.28.2-150500.1.1  kubernet.es         10 M
kubelet                                x86_64            1.28.2-150500.1.1  kubernet.es         19 M
Installing dependencies:
conntrack-tools                       x86_64            1.4.7-2.el9        appstream           221 k
cri-tools                             x86_64            1.28.0-150500.1.1  kubernet.es         8.1 M
kubernetes-cni                        x86_64            1.2.0-150500.2.1    kubernet.es         6.2 M
libnetfilter_cthelper                 x86_64            1.0.0-22.el9        appstream            23 k
libnetfilter_cttimeout                x86_64            1.0.0-19.el9        appstream            23 k
libnetfilter_queue                    x86_64            1.0.5-1.el9         appstream            28 k
socat                                  x86_64            1.7.4.1-5.el9       appstream           300 k
=====
Transaction Summary
=====
Install 10 Packages
```

After installing Kubernetes tools, start the kubelet service on each node.

```
$ sudo systemctl enable --now kubelet
```

Step 7: Install Kubernetes Cluster On Rocky Linux 9 / Alma Linux 9

Now, we are all set to install Kubernetes cluster. Run beneath Kubeadm command to initialize the Kubernetes cluster from the master node.

```
$ sudo kubeadm init --control-plane-endpoint=k8s-master01
```

Once above command is executed successfully, we will get following output,

From the output above make a note of the command which will be executed on the worker nodes to join the Kubernetes cluster.

To start interacting with Kubernetes cluster, run the following commands on the master node.

```
$ mkdir -p $HOME/.kube
$ sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
$ sudo chown $(id -u):$(id -g) $HOME/.kube/config
```

Next, join the worker nodes to the cluster, run following Kubeadm command from the worker nodes.

```
$ kubeadm join k8s-master01:6443 --token 69s57o.3muk7ey0j0zknw69 \
--discovery-token-ca-cert-hash sha256:8000dff8e803e2bf687f3dae80b4bc1376e5bd770e7a752a3c9fa314de6449fe
```

Output from Worker01

Output from Worker02

Now, head back to master node and run kubectl command to verify the nodes status.

```
$ kubectl get nodes
```

Output above shows that nodes is "NotReady", so to make the nodes status "Ready", install Calico network addon or plugin in the next step.

Step 8: Install Calico Network Addon

Calico network addon is required on Kubernetes cluster to enable communication between pods, to make DNS service function with the cluster and to make the nodes status as Ready.

In order to install calico CNI (Container Network Interface) addon, run following kubectl commands from the master node only.

```
$ kubectl apply -f https://raw.githubusercontent.com/projectcalico/calico/v3.26.1/manifests/calico.yaml
```

Verify calico pods status,

```
$ kubectl get pods -n kube-system
```

Next, verify the nodes status, this time nodes status should be in Ready State.

```
$ kubectl get nodes
```

Perfect, output above confirms nodes are in Ready state and can handle workload. Let's test our Kubernetes installation the next step.

Step 9: Test Kubernetes Cluster Installation

To test Kubernetes cluster installation, let's try to deploy nginx based application using deployment. Run following kubectl

commands,

```
$ kubectl create deployment web-app01 --image nginx --replicas 2
$ kubectl expose deployment web-app01 --type NodePort --port 80
$ kubectl get deployment web-app01
$ kubectl get pods
$ kubectl get svc web-app01
```

Try to access the application using nodeport “31121”, run following curl command,

```
$ curl k8s-worker01:31121
```

Great, above confirms that we can access our application web page. This also confirms that our Kubernetes cluster has been installed successfully.

That’s all from this post, we believe that you have found informative and useful. If you have any queries and feedback, please do post it in below comments section.

Also Read: [How to Install Kubernetes Dashboard Using Helm](#)

About The Author



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I am a Cloud Consultant with over 15 years of experience in Linux, Kubernetes, cloud technologies (AWS, Azure, OpenStack), automation (Ansible, Terraform), and DevOps. I hold certifications like RHCA, CKA, CKAD, CKS, AWS, and Azure.

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OCTOBER 1, 2024 AT 4:21 PM

Thanks Pradeep for the straight forward guide. It worked fine.

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