Kubernetes On-Premises Cluster Setup Using kubeadm (RPM-based Linux)

System Requirements

- Linux servers: CentOS 7/8, RHEL, Rocky Linux, AlmaLinux
- At least 1 Master + 1 Worker node
- Static IP addresses configured
- sudo/root access on all machines
- Internet access for downloading packages

1. Configure Static IP (All Nodes)

```
nmcli con show
nmcli con mod "System eth0" ipv4.addresses 192.168.1.10/24
nmcli con mod "System eth0" ipv4.gateway 192.168.1.1
nmcli con mod "System eth0" ipv4.dns "8.8.8.8 1.1.1.1"
nmcli con mod "System eth0" ipv4.method manual
nmcli con up "System eth0"
```

2. Disable Swap (All Nodes)

```
sudo swapoff -a
sudo sed -i '/ swap / s/^/#/' /etc/fstab
```

3. Set Hostnames (All Nodes)

```
sudo hostnamectl set-hostname master-node
sudo hostnamectl set-hostname worker-node1
```

4. Enable Required Kernel Modules and Sysctl (All Nodes)

```
cat <<EOF | sudo tee /etc/modules-load.d/k8s.conf
br_netfilter
EOF

cat <<EOF | sudo tee /etc/sysctl.d/k8s.conf
net.bridge.bridge-nf-call-ip6tables = 1
net.bridge.bridge-nf-call-iptables = 1
net.ipv4.ip_forward = 1
EOF
```

```
sudo modprobe br_netfilter
sudo sysctl --system
```

5. Install Container Runtime: containerd (All Nodes)

```
sudo yum install -y yum-utils device-mapper-persistent-data lvm2
sudo yum-config-manager --add-repo https://download.docker.com/linux/centos/docker-ce.repo
sudo yum install -y containerd.io
sudo mkdir -p /etc/containerd
containerd config default | sudo tee /etc/containerd/config.toml
sudo systemctl restart containerd
sudo systemctl enable containerd
```

6. Install Kubernetes Components (All Nodes)

```
cat <<EOF | sudo tee /etc/yum.repos.d/kubernetes.repo
[kubernetes]
name=Kubernetes
baseurl=https://packages.cloud.google.com/yum/repos/kubernetes-el7-x86_64
enabled=1
gpgcheck=1
repo_gpgcheck=1
gpgkey=https://packages.cloud.google.com/yum/doc/yum-key.gpg \
      https://packages.cloud.google.com/yum/doc/rpm-package-key.gpg
EOF

sudo yum install -y kubelet kubeadm kubectl --disableexcludes=kubernetes
sudo systemctl enable --now kubelet
```

7. Initialize Kubernetes Master Node (Master Only)

```
sudo kubeadm init --pod-network-cidr=10.244.0.0/16

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

8. Install Pod Network (Master Only)

kubectl apply -f https://raw.githubusercontent.com/coreos/flannel/master/Documentation/kube-flannel.yml

9. Join Worker Nodes (Worker Only)

```
sudo kubeadm join 192.168.1.10:6443 --token <token> \
--discovery-token-ca-cert-hash sha256:<hash>
```

10. Verify the Cluster (Master Only)

```
kubectl get nodes
```

Optional: Enable Bash Completion

```
echo "source <(kubectl completion bash)" >> ~/.bashrc
source ~/.bashrc
```