Manual Kubernetes Cluster Setup using kubeadm

Pre-requisites (on all nodes)

1. Set hostname

sudo hostnamectl set-hostname <hostname>

2. Disable swap

sudo swapoff -a

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

3. Load kernel modules

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

br_netfilter

EOF

sudo modprobe br_netfilter

4. Set sysctl params

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 sysctl --system

5. Install container runtime (e.g., containerd)

sudo apt update && sudo apt install -y containerd

sudo mkdir -p /etc/containerd

containerd config default | sudo tee /etc/containerd/config.toml

sudo systemctl restart containerd

sudo systemctl enable containerd

Install Kubernetes components (on all nodes)

sudo apt update && sudo apt install -y apt-transport-https curl

curl -s https://packages.cloud.google.com/apt/doc/apt-key.gpg | sudo apt-key add -

cat <<EOF | sudo tee /etc/apt/sources.list.d/kubernetes.list

deb https://apt.kubernetes.io/ kubernetes-xenial main

EOF

sudo apt update

sudo apt install -y kubelet kubeadm kubectl

sudo apt-mark hold kubelet kubeadm kubectl

Initialize Control Plane (on master node only)

sudo kubeadm init --pod-network-cidr=192.168.0.0/16

```
mkdir -p $HOME/.kube

sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config

sudo chown $(id -u):$(id -g) $HOME/.kube/config
```

Install Calico CNI

```
kubectl apply -f https://raw.githubusercontent.com/projectcalico/calico/v3.27.0/manifests/calico.yaml
```

Join Worker Nodes

Run this on each worker node:

```
sudo kubeadm join <master-ip>:6443 --token <token> --discovery-token-ca-cert-hash sha256:<hash>
```

To regenerate join command:

```
kubeadm token create --print-join-command
```

Verify Cluster

```
kubectl get nodes
kubectl get pods -A
```