

KUBERNETES MULTI NODE CLUSTER SETUP USING KUBEADM

This document provides a step-by-step guide for setting up a multinode Kubernetes cluster using **kubeadm** with **Flannel** as the pod network. The setup includes one master node and multiple worker nodes.

Prerequisites

- **Operating System:** Ubuntu 20.04/22.04 (or compatible versions)
- Minimum system requirements:
 - **Master Node:** 2 CPU, 2GB RAM
 - **Worker Nodes:** 1 CPU, 1GB RAM each
- All nodes should have:
 - SSH access
 - Unique hostname
 - Internet connectivity
 - Root or sudo access

1- Update and Install Required Tools:

```
sudo apt-get update
```

```
sudo apt install apt-transport-https curl -y
```

2- Add Docker's Official GPG Key and Repository:

```
sudo mkdir -p /etc/apt/keyrings
curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo gpg --dearmor -o /etc/apt/keyrings/
docker.gpg
echo "deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.gpg]
https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable" | sudo tee
/etc/apt/sources.list.d/docker.list > /dev/null
sudo apt-get update
```

3- Install containerd.io:

```
sudo apt-get install containerd.io -y
```

4- Configure Containerd:

```
sudo mkdir -p /etc/containerd
sudo containerd config default | sudo tee /etc/containerd/config.toml
```

```
sudo sed -i -e 's/SystemdCgroup = false/SystemdCgroup = true/g' /etc/containerd/config.toml
sudo systemctl restart containerd
```

5- Install Kubernetes Components (Run on all nodes)

Add Kubernetes Signing Key and Repository:

```
curl -fsSL https://pkgs.k8s.io/core:/stable:/v1.30/deb/Release.key | sudo gpg --dearmor -o
/etc/apt/keyrings/kubernetes-apt-keyring.gpg
echo 'deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg]
https://pkgs.k8s.io/core:/stable:/v1.30/deb/ ' | sudo tee /etc/apt/sources.list.d/kubernetes.list
sudo apt-get update
```

6- Install Kubernetes Tools:

```
sudo apt-get install -y kubelet kubeadm kubectl
sudo apt-mark hold kubelet kubeadm kubectl
```

7- Enable kubelet Service:

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

8- Disable Swap:

```
sudo swapoff -a
sudo sed -i '/swap/d' /etc/fstab
```

9- Load Kernel Modules:

```
sudo modprobe br_netfilter
sudo sysctl -w net.ipv4.ip_forward=1
```

10- Initialize the Kubernetes Cluster (Run only on master)

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

11- Set Up kubeconfig:

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

12- Install Pod Network (Flannel):

```
kubectl apply -f https://github.com/flannel-io/flannel/releases/latest/download/kube-flannel.yml
```

13- Verify Cluster Components:

```
kubectl get pods --all-namespaces
```

14 – Add Worker Nodes to the Cluster:

```
sudo kubeadm join <MASTER_IP>:6443 --token <TOKEN> --discovery-token-ca-cert-hash  
sha256:<HASH>
```

15- Confirm the worker node joined the cluster

```
kubectl get nodes
```