

# Kubernetes Cluster Setup

## 1 Configure UTM Network

1. Shut down the VM.
2. Open **UTM** → **VM Settings** → **Network**.
3. Set **Adapter 1** to:
  - **Mode:** Bridged
  - **Bridge to:** `en0` (your Mac's active interface) — this is your Ethernet/Wi-Fi interface.
  - **Cable connected:** Checked
  - **MAC address:** leave default or generate a new one for clones

Why: Bridged mode allows the VM to appear on the same network as your Mac so you can ping/SSH directly.

## 2 Identify VM Network Interface

Inside the VM console:

```
ip link
```

- Look for the interface that is **not** `lo`.
- Usually: `enp0s1`

## 3 Create a Netplan Configuration for Static IP

1. On the VM, create Netplan YAML:

```
sudo nano /etc/netplan/01-netcfg.yaml
```

## 1. Paste template (example for control plane):

```
network:
  version: 2
  ethernets:
    enp0s1:
      dhcp4: no
      addresses:
        - 192.168.125.210/23 # choose an unused IP on your subnet
      gateway4: 192.168.125.1 # your router/gateway IP
      nameservers:
        addresses: [8.8.8.8,1.1.1.1]
```

### Notes:

- `/23` mask matches your Mac subnet (check with `ifconfig` on Mac).
- IP must be free and on the same subnet as your Mac.
- Change `addresses` and `hostname` for each worker clone.

## 4 Apply Netplan

```
sudo netplan generate
sudo netplan apply
sudo reboot
```

- `generate` checks syntax.
- `apply` activates the configuration.
- Reboot ensures it sticks and network comes up cleanly.

## 5 Verify Connectivity

Inside VM:

```
ip addr show enp0s1    # confirm IP is applied
ping 192.168.125.1     # test router
ping 8.8.8.8           # test internet
ping <other VM IP>     # optional: test inter-node connectivity
```

From your Mac:

```
ping 192.168.125.210   # VM IP
ssh k8sadmin@192.168.125.210
```

- Should respond if everything is correct.

## Optional: Hostname & /etc/hosts

- Set hostname:

```
sudo hostnamectl set-hostname k8s-cp1
```

- Update `/etc/hosts` for all cluster nodes (makes inter-node SSH easier):

```
192.168.125.210 k8s-cp1
192.168.125.211 k8s-worker1
192.168.125.212 k8s-worker2
192.168.125.213 k8s-worker3
```

## Summary

- **UTM bridged network** → VM is on same subnet as Mac
- **Static IP in Netplan** → VM is reachable and predictable
- **Interface activation + Netplan apply** → network comes up cleanly

- **Test ping/SSH** → ensures VM is reachable from Mac and other nodes