

## Lesson 08 Demo 01

### Installing Kubernetes and Setting Up Cluster

**Objective:** To guide the user through the process of installing Kubernetes on a master node and setting up a Kubernetes cluster, enabling them to effectively manage containerized applications

**Tools required:** Docker, Kubernetes

**Pre-requisites:** None

Steps to be followed:

1. Install Kubernetes in master node
2. Set up a Kubernetes cluster

#### Step 1: Install Kubernetes in master node

- 1.1 Use the following command to install Kubernetes and run it on the master node:

```
sudo su
curl -s https://packages.cloud.google.com/apt/doc/apt-key.gpg | apt-key add -
sudo echo deb http://apt.kubernetes.io/ kubernetes-xenial main > /etc/apt/sources.list.d/kubernetes.list
```

```
labsuser@ip-172-31-41-222:~$ sudo su
root@ip-172-31-41-222:/home/labsuser# curl -s https://packages.cloud.google.com/apt/doc/apt-key.gpg | apt-key add -
Warning: apt-key is deprecated. Manage keyring files in trusted.gpg.d instead (see apt-key(8)).
OK
root@ip-172-31-41-222:/home/labsuser# sudo echo deb http://apt.kubernetes.io/ kubernetes-xenial main > /etc/apt/sources.list.d/kubernetes.list
```

- 1.2 Update the apt-get package by executing the command mentioned below:

```
sudo apt-get update
```

```
root@ip-172-31-41-222:/home/labsuser# sudo apt-get update
Hit:1 http://us-west-2.ec2.archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://us-west-2.ec2.archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:3 http://us-west-2.ec2.archive.ubuntu.com/ubuntu jammy-backports InRelease [109 kB]
Get:5 http://security.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Get:4 https://packages.cloud.google.com/apt kubernetes-xenial InRelease [8993 B]
Get:6 http://us-west-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main amd64 Packages [1318 kB]
Get:7 https://ppa.launchpadcontent.net/mozillateam/ppa/ubuntu jammy InRelease [23.8 kB]
Get:8 http://us-west-2.ec2.archive.ubuntu.com/ubuntu jammy-updates/main Translation-en [266 kB]
```

```
Get:45 http://security.ubuntu.com/ubuntu jammy-security/universe DEP-11 64x64 Icons [34.6 kB]
Get:46 http://security.ubuntu.com/ubuntu jammy-security/universe amd64 c-n-f Metadata [16.8 kB]
Get:47 http://security.ubuntu.com/ubuntu jammy-security/multiverse amd64 Packages [37.1 kB]
Get:48 http://security.ubuntu.com/ubuntu jammy-security/multiverse Translation-en [7476 B]
Get:49 http://security.ubuntu.com/ubuntu jammy-security/multiverse amd64 c-n-f Metadata [260 B]
Fetched 9973 kB in 4s (2579 kB/s)
Reading package lists... Done
W: http://apt.kubernetes.io/dists/kubernetes-xenial/InRelease: Key is stored in legacy trusted.gpg keyring (/etc/apt/trusted.gpg), see the DEPRECATI
ON section in apt-key(8) for details.
root@ip-172-31-41-222:/home/labsuser#
```

- 1.3 Install Kubernetes and the tools required to manage it by running the command mentioned below in the terminal. Enter **Y** to proceed further:
- sudo apt install docker.io kubect1=1.20.5-00 kubeadm=1.20.5-00 kubelet=1.20.5-00**

```
ON section in apt-key(8) for details.
root@ip-172-31-41-222:/home/labsuser# sudo apt install docker.io kubect1=1.20.5-00 kubeadm=1.20.5-00 kubelet=1.20.5-00
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
docker.io is already the newest version (24.0.5-0ubuntu1~22.04.1).
The following packages will be DOWNGRADED:
  kubeadm kubect1 kubelet
0 upgraded, 0 newly installed, 3 downgraded, 0 to remove and 198 not upgraded.
Need to get 34.5 MB of archives.
After this operation, 17.9 MB disk space will be freed.
Do you want to continue? [Y/n] Y
Get:1 https://packages.cloud.google.com/apt/kubernetes-xenial/main amd64 kubelet amd64 1.20.5-00 [18.9 MB]
Get:2 https://packages.cloud.google.com/apt/kubernetes-xenial/main amd64 kubect1 amd64 1.20.5-00 [7945 kB]
Get:3 https://packages.cloud.google.com/apt/kubernetes-xenial/main amd64 kubeadm amd64 1.20.5-00 [7709 kB]
Fetched 34.5 MB in 4s (9042 kB/s)
dpkg: warning: downgrading kubelet from 1.28.2-1.1 to 1.20.5-00
(Reading database ... 218319 files and directories currently installed.)
Preparing to unpack .../kubelet_1.20.5-00_amd64.deb ...
Unpacking kubelet (1.20.5-00) over (1.28.2-1.1) ...
```

## Step 2: Set up a Kubernetes cluster

- 2.1 Update the apt-get package by executing the command mentioned below:
- sudo apt-get update**

```
No VM guests are running outdated hypervisor (qemu) binaries on this host.
root@ip-172-31-41-222:/home/labsuser# sudo apt-get update
Hit:1 http://us-west-2.ec2.archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://us-west-2.ec2.archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Hit:3 http://us-west-2.ec2.archive.ubuntu.com/ubuntu jammy-backports InRelease
Hit:5 http://security.ubuntu.com/ubuntu jammy-security InRelease
Get:4 https://packages.cloud.google.com/apt/kubernetes-xenial InRelease [8993 B]
Hit:6 https://ppa.launchpadcontent.net/mozillateam/ppa/ubuntu jammy InRelease
Fetched 128 kB in 2s (60.6 kB/s)
```

2.2 To initialize the cluster, run the following command on the master node:

**sudo kubeadm init**

```
ON section in apt-key(8) for details.
root@ip-172-31-41-222:/home/labsuser# sudo kubeadm init
I0125 07:36:28.080728 24816 version.go:254] remote version is much newer: v1.29.1; falling back to: stable-1.20
[init] Using Kubernetes version: v1.20.15
[preflight] Running pre-flight checks
[WARNING SystemVerification]: this Docker version is not on the list of validated versions: 24.0.5. Latest validated version: 19.03
[preflight] Pulling images required for setting up a Kubernetes cluster
[preflight] This might take a minute or two, depending on the speed of your internet connection
[preflight] You can also perform this action in beforehand using 'kubeadm config images pull'
```

2.3 To start using your cluster, you need to run the following 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**

```
You should now deploy a pod network to the cluster.
Run "kubectl apply -f [podnetwork].yaml" with one of the options listed at:
https://kubernetes.io/docs/concepts/cluster-administration/addons/

Then you can join any number of worker nodes by running the following on each as root:

kubeadm join 172.31.41.222:6443 --token oiz1m6.t952vchkm6ubc2ku \
--discovery-token-ca-cert-hash sha256:c71225eabd5aa7755cdf7cd087f0c580e4bcf5cb3c5989817574bab607dbab15
root@ip-172-31-41-222:/home/labsuser# mkdir -p $HOME/.kube
root@ip-172-31-41-222:/home/labsuser# sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
root@ip-172-31-41-222:/home/labsuser# sudo chown $(id -u):$(id -g) $HOME/.kube/config
root@ip-172-31-41-222:/home/labsuser#
```

2.4 Upon running the command below, you should see a single master node deployed:

**sudo kubectl get nodes**

```
labsuser@ip-172-31-41-222:~$ sudo kubectl get nodes
NAME                STATUS    ROLES                  AGE     VERSION
ip-172-31-41-222    Ready    control-plane,master   7m54s   v1.20.5
labsuser@ip-172-31-41-222:~$
```

By following these steps, you have successfully installed Kubernetes on the master node and set up a Kubernetes cluster.