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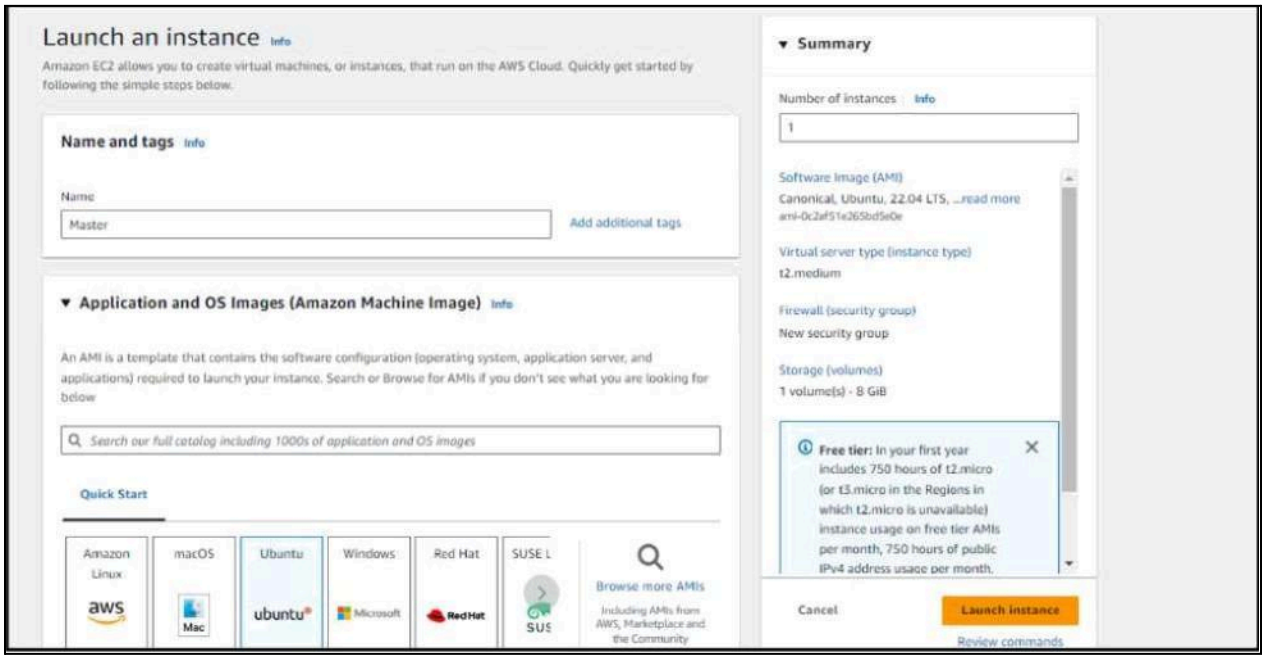
EXPERIMENT. 3

Aim: To understand the Kubernetes Cluster Architecture, install and Spin Up a Kubernetes Cluster on Linux Machines/Cloud Platforms.

Steps:

Create 3 EC2 Ubuntu Instances on AWS.



Created a master and 2 slaves

Now click on connect to instance, then click on SSH client

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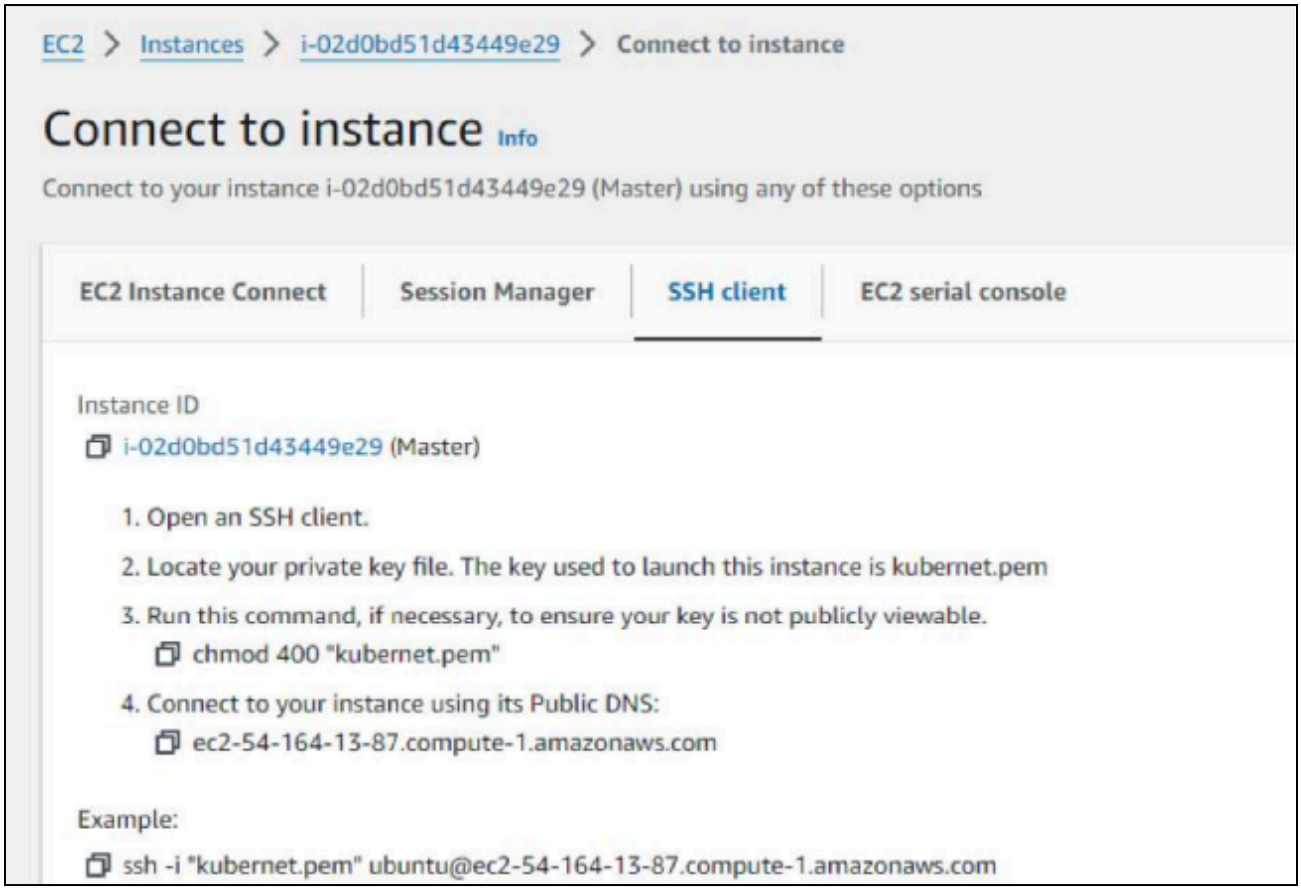
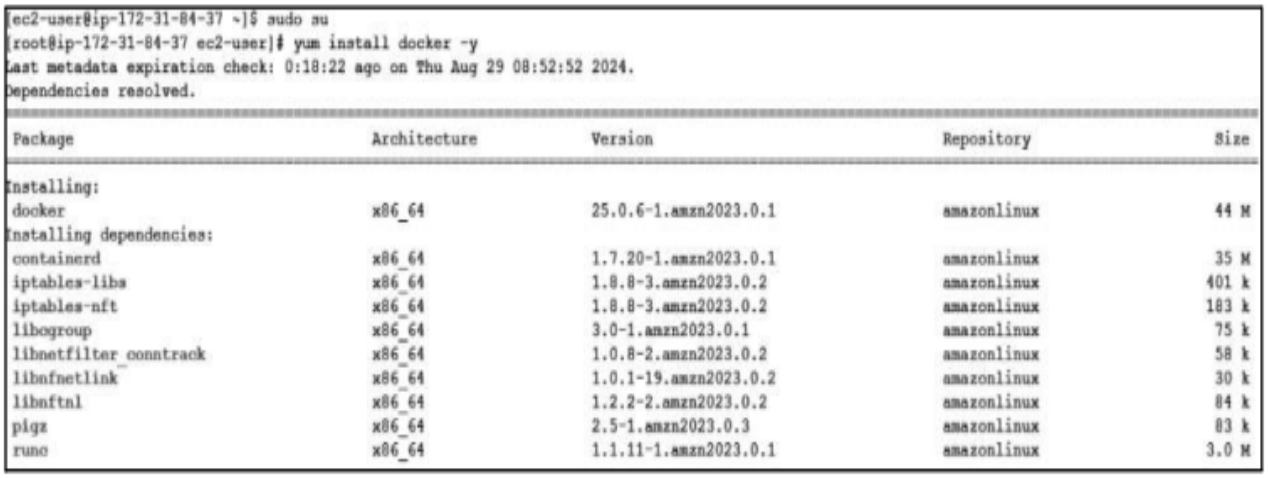
Now copy the ssh from the example and paste it on command prompt.



Commands:

After this type on all 3 machines

Yum install docker -y



```
[ec2-user@ip-172-31-84-37 ~]$ sudo su
[root@ip-172-31-84-37 ec2-user]# yum install docker -y
Last metadata expiration check: 0:18:22 ago on Thu Aug 29 08:52:52 2024.
Dependencies resolved.
```

Package	Architecture	Version	Repository	Size
Installing:				
docker	x86_64	25.0.6-1.amzn2023.0.1	amazonlinux	44 M
Installing dependencies:				
containerd	x86_64	1.7.20-1.amzn2023.0.1	amazonlinux	35 M
iptables-libs	x86_64	1.8.8-3.amzn2023.0.2	amazonlinux	401 k
iptables-nft	x86_64	1.8.8-3.amzn2023.0.2	amazonlinux	183 k
libcgroup	x86_64	3.0-1.amzn2023.0.1	amazonlinux	75 k
libnetfilter_conntrack	x86_64	1.0.8-2.amzn2023.0.2	amazonlinux	58 k
libnfnetlink	x86_64	1.0.1-19.amzn2023.0.2	amazonlinux	30 k
libnftnl	x86_64	1.2.2-2.amzn2023.0.2	amazonlinux	84 k
pigz	x86_64	2.5-1.amzn2023.0.3	amazonlinux	83 k
runc	x86_64	1.1.11-1.amzn2023.0.1	amazonlinux	3.0 M

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```
  Running scriptlet: docker-25.0.6-1.amzn2023.0.1.x86_64
  Installing       : docker-25.0.6-1.amzn2023.0.1.x86_64
  Running scriptlet: docker-25.0.6-1.amzn2023.0.1.x86_64
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /usr/lib/systemd/system/docker.socket.

  Verifying        : containerd-1.7.20-1.amzn2023.0.1.x86_64
  Verifying        : docker-25.0.6-1.amzn2023.0.1.x86_64
  Verifying        : iptables-libs-1.8.8-3.amzn2023.0.2.x86_64
  Verifying        : iptables-nft-1.8.8-3.amzn2023.0.2.x86_64
  Verifying        : libcgroup-3.0-1.amzn2023.0.1.x86_64
  Verifying        : libnetfilter_conntrack-1.0.8-2.amzn2023.0.2.x86_64
  Verifying        : libnfnetlink-1.0.1-19.amzn2023.0.2.x86_64
  Verifying        : libnftnl-1.2.2-2.amzn2023.0.2.x86_64
  Verifying        : pigz-2.5-1.amzn2023.0.3.x86_64
  Verifying        : runc-1.1.11-1.amzn2023.0.1.x86_64

Installed:
  containerd-1.7.20-1.amzn2023.0.1.x86_64      docker-25.0.6-1.amzn2023.0.1.x86_64      iptables-libs-1.8.8-3.amzn2023.0.2.x86_
  iptables-nft-1.8.8-3.amzn2023.0.2.x86_64     libcgroup-3.0-1.amzn2023.0.1.x86_64      libnetfilter_conntrack-1.0.8-2.amzn2023
  libnfnetlink-1.0.1-19.amzn2023.0.2.x86_64    libnftnl-1.2.2-2.amzn2023.0.2.x86_64     pigz-2.5-1.amzn2023.0.3.x86_64
  runc-1.1.11-1.amzn2023.0.1.x86_64

Complete!
```

To start the docker on master and slave perform this command :Systemctl start docker
To check if docker is installed successfully:Docker -v or Docker –version

```
[root@ip-172-31-84-37 ec2-user]# systemctl start docker
[root@ip-172-31-84-37 ec2-user]# sudo su
[root@ip-172-31-84-37 ec2-user]# yum repolist
repo id                                                repo name
amazonlinux                                            Amazon Linux 2023 repository
kernel-livepatch                                       Amazon Linux 2023 Kernel Livepatch repository
[root@ip-172-31-84-37 ec2-user]# docker --version
Docker version 25.0.5, build 5dc9bcc
```

Now install kubeadm on master and slaves:

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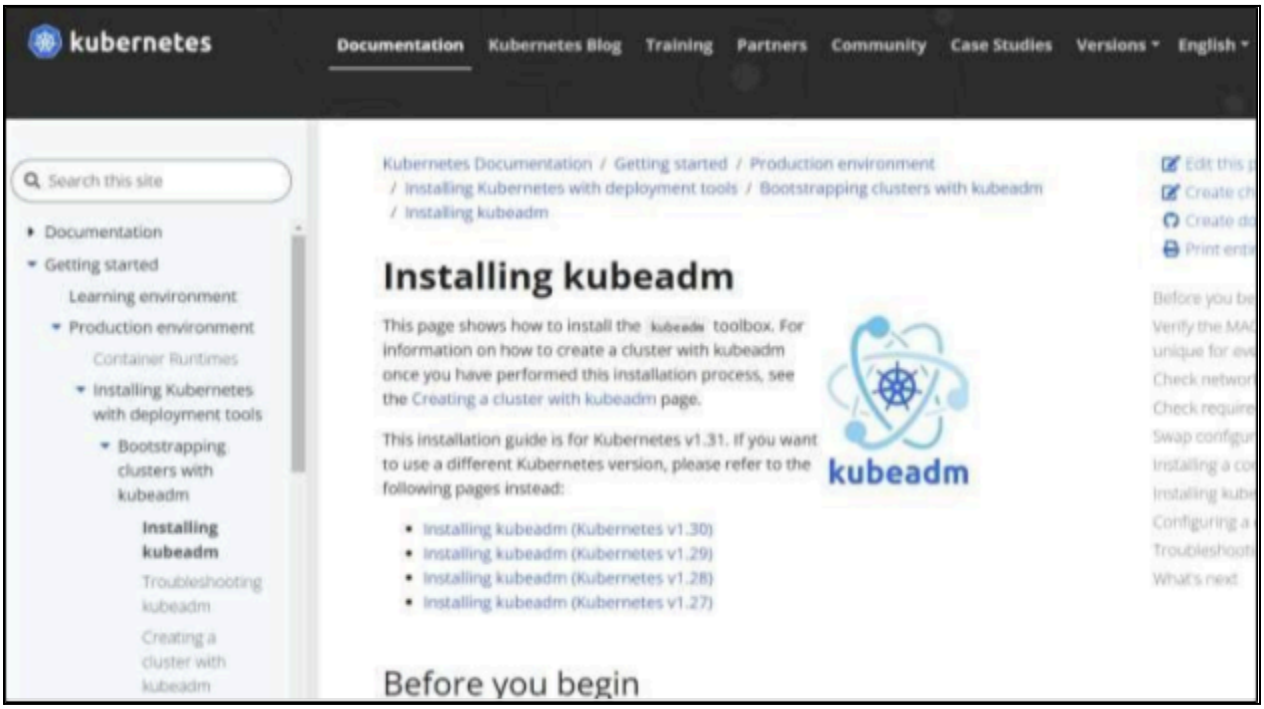
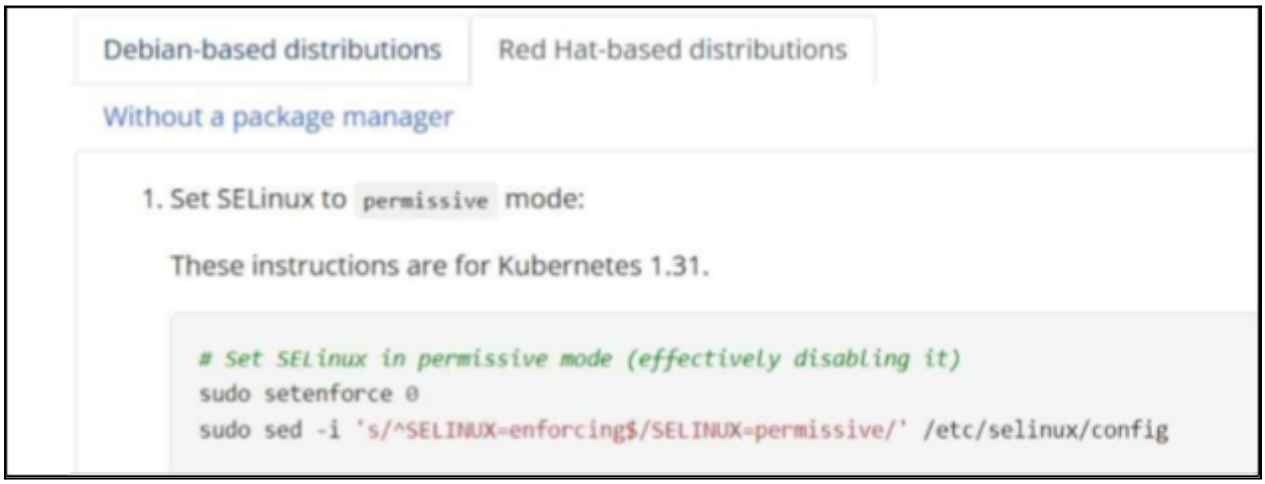


Scroll down and select Red Hat based distributions

Now copy the command on all 3 machines:
Set SELinux to permissive mode: These instructions are for Kubernetes
# Set SELinux in permissive mode (effectively disabling it)
sudo setenforce 0
sudo sed -i 's/^SELINUX=enforcing$/SELINUX=permissive/' /etc/selinux/config



Now copy all the commands on the GitBash on all 3 machines

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```
  Installing       : kubectl-1.31.0-150500.1.1.x86_64
  Running scriptlet: kubectl-1.31.0-150500.1.1.x86_64
  Verifying        : conntrack-tools-1.4.6-2.amzn2023.0.2.x86_64
  Verifying        : libnetfilter_cthelper-1.0.0-21.amzn2023.0.2.x86_64
  Verifying        : libnetfilter_cttimeout-1.0.0-19.amzn2023.0.2.x86_64
  Verifying        : libnetfilter_queue-1.0.5-2.amzn2023.0.2.x86_64
  Verifying        : socat-1.7.4.2-1.amzn2023.0.2.x86_64
  Verifying        : cri-tools-1.31.1-150500.1.1.x86_64
  Verifying        : kubeadm-1.31.0-150500.1.1.x86_64
  Verifying        : kubectl-1.31.0-150500.1.1.x86_64
  Verifying        : kubelet-1.31.0-150500.1.1.x86_64
  Verifying        : kubernetes-cni-1.5.0-150500.2.1.x86_64

Installed:
  conntrack-tools-1.4.6-2.amzn2023.0.2.x86_64
  kubeadm-1.31.0-150500.1.1.x86_64
  kubelet-1.31.0-150500.1.1.x86_64
  libnetfilter_cthelper-1.0.0-21.amzn2023.0.2.x86_64
  libnetfilter_queue-1.0.5-2.amzn2023.0.2.x86_64

Complete!
```

Type yum repolist to check the repository of kubernetes

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```
[root@ip-172-31-84-143 ec2-user]# yum repolist
repo id                                                    repo name
amazonlinux                                                Amazon Linux 2023 repository
kernel-livepatch                                           Amazon Linux 2023 Kernel Livepatch repository
kubernetes                                                 Kubernetes
```

Copy them one by one and
paste it on slaves

```
To start using your cluster, you need to run the following as a regular user:

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

Alternatively, if you are the root user, you can run:

  export KUBECONFIG=/etc/kubernetes/admin.conf

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 172.31.26.66:6443 --token qrw4r4.qb3kkhb7392dnvjp \
```

After pasting type kubectl get nodes:
The nodes are connected successfully

```
ubuntu@ip-172-31-45-227:~$ kubectl get nodes
NAME               STATUS   ROLES           AGE     VERSION
ip-172-31-43-211   Ready    <none>          50s     v1.29.0
ip-172-31-45-13    Ready    <none>          34s     v1.29.0
ip-172-31-45-227   Ready    control-plane   5m17s   v1.29.0
```