Advanced
DevOps Lab
Experiment 3

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

Reference: https://www.youtube.com/watch?v=Cz7hSJNq2GU

Theory:

Container-based microservices architectures have profoundly changed the way development and operations teams test and deploy modern software. Containers help companies modernize by making it easier to scale and deploy applications, but containers have also introduced new challenges and more complexity by creating an entirely new infrastructure ecosystem.

Large and small software companies alike are now deploying thousands of container instances daily, and that's a complexity of scale they have to manage. So how do they do it?

Enter the age of Kubernetes.

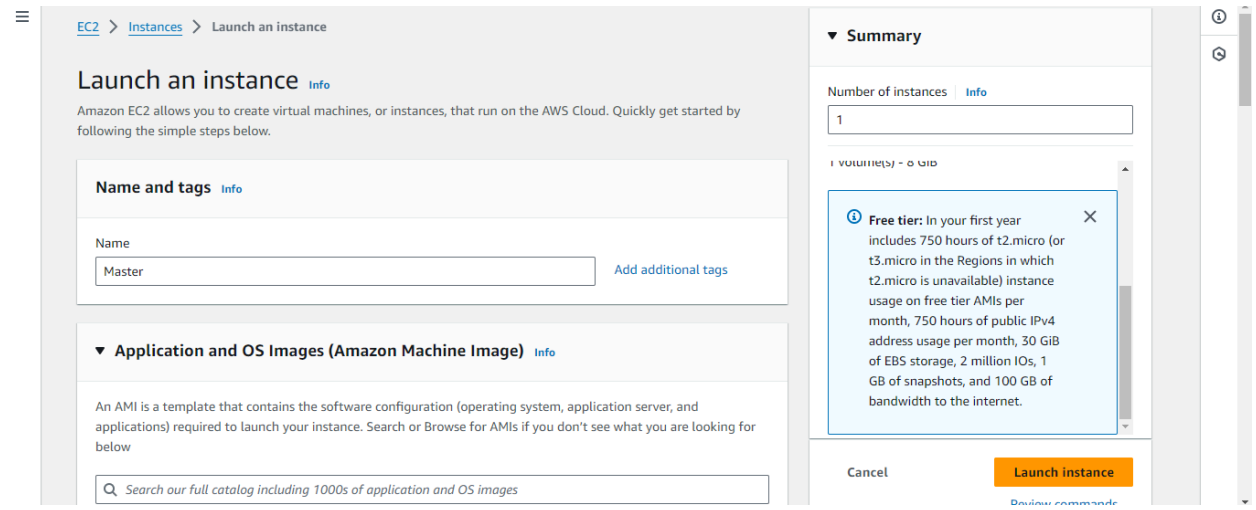
Originally developed by Google, Kubernetes is an open-source container orchestration platform designed to automate the deployment, scaling, and management of containerized applications. In fact, Kubernetes has established itself as the defacto standard for container orchestration and is the flagship project of the Cloud Native Computing Foundation (CNCF), backed by key players like Google, AWS, Microsoft, IBM, Intel, Cisco, and Red Hat.

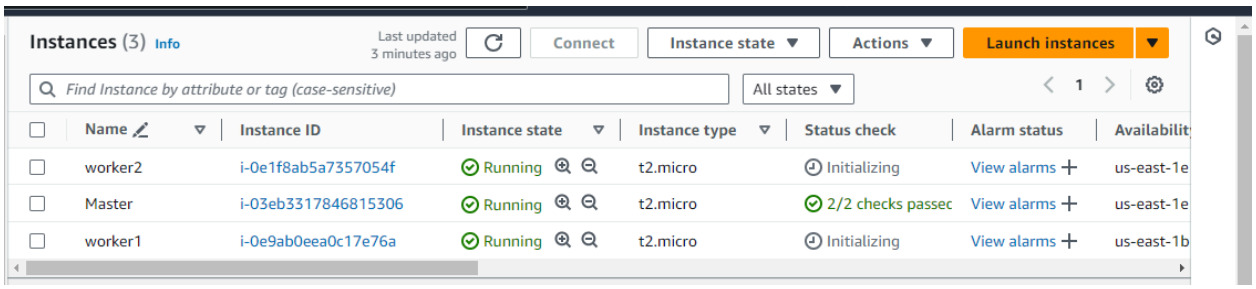
Kubernetes makes it easy to deploy and operate applications in a microservice architecture. It does so by creating an abstraction layer on top of a group of hosts so that development teams can deploy their applications and let Kubernetes manage the following activities:

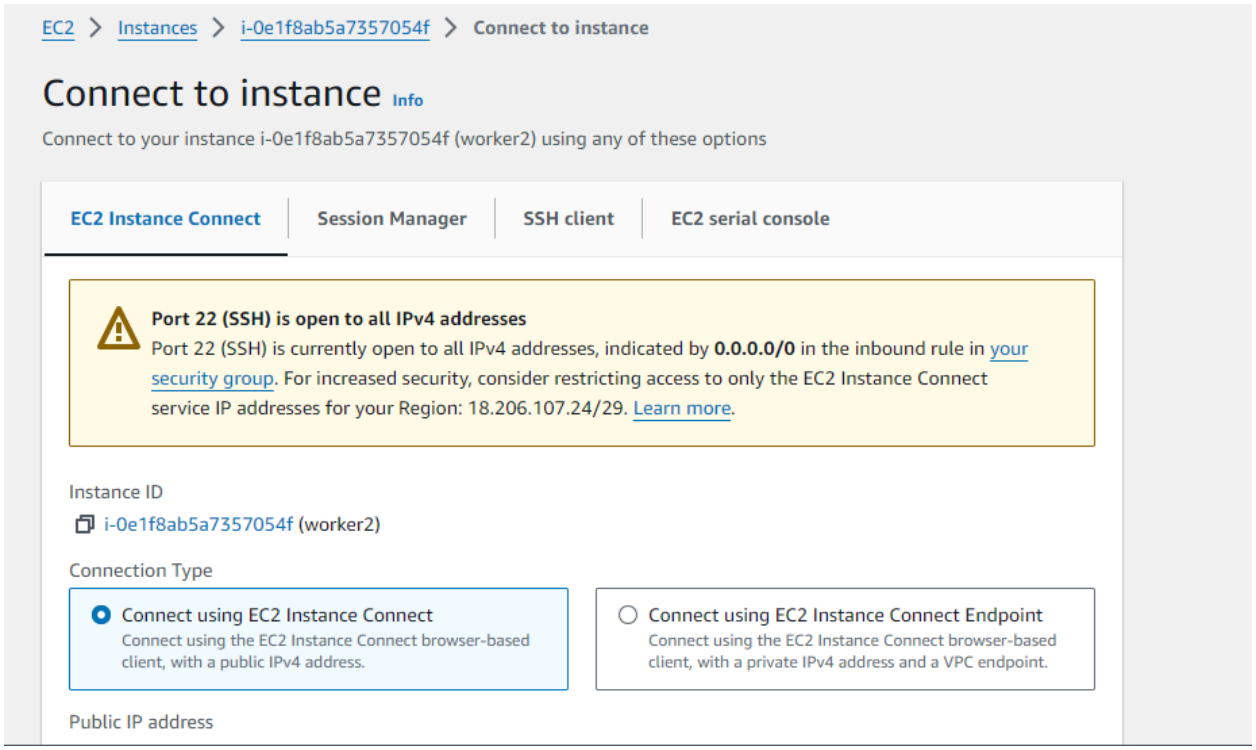
- Controlling resource consumption by application or team
- Evenly spreading application load across a hosting infrastructure
- Automatically load balancing requests across the different instances of an application

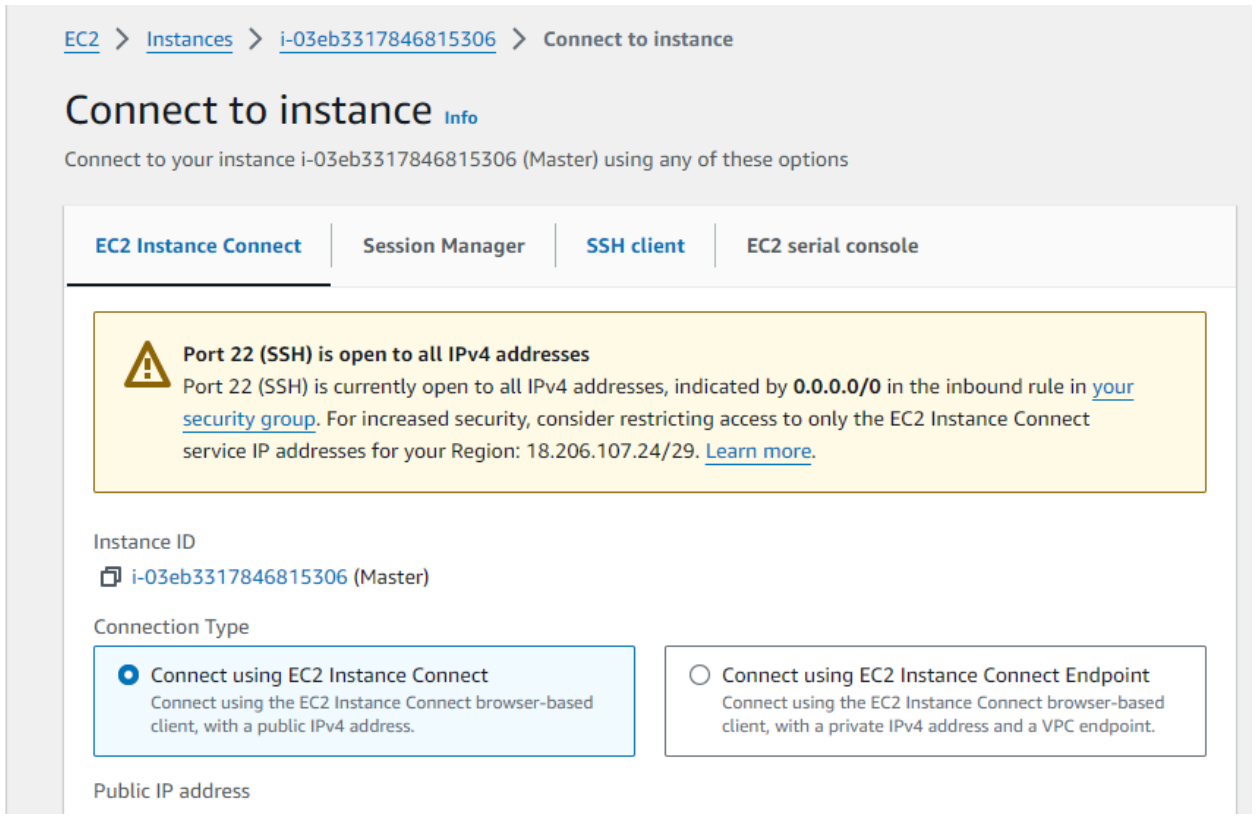
- Monitoring resource consumption and resource limits to automatically stop applications from consuming too many resources and restarting the applications again
- Moving an application instance from one host to another if there is a shortage of resources in a host, or if the host dies
- Automatically leveraging additional resources made available when a new host is added to the cluster
- Easily performing canary deployments and rollbacks

Steps:



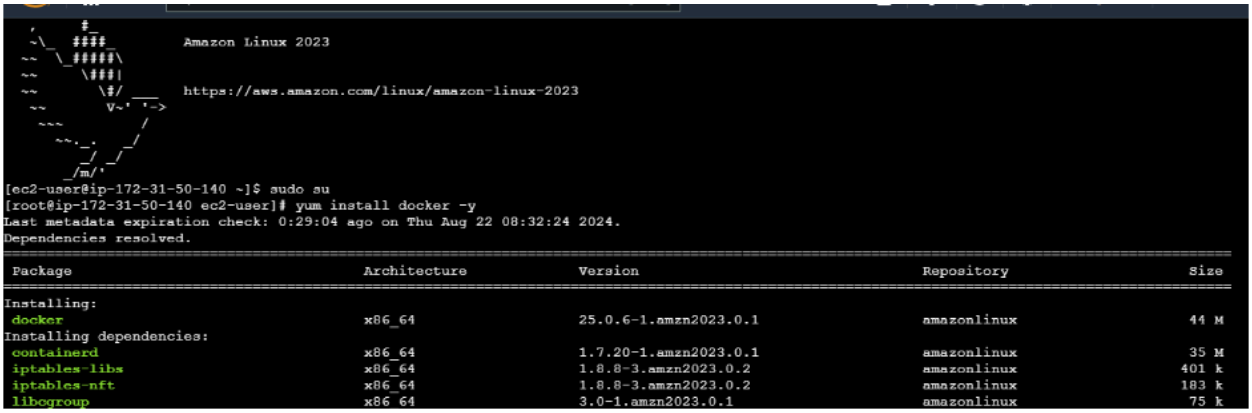


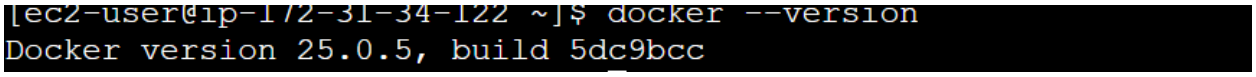




Docker install commands :

sudo dnf update -y
sudo dnf install -y docker
sudo systemctl start docker
sudo systemctl enable docker





Kubernetes commands :

curl -LO "https://dl.k8s.io/release/v1.26.1/bin/linux/amd64/kubeadm"
curl -LO "https://dl.k8s.io/release/v1.26.1/bin/linux/amd64/kubectl"
curl -LO "https://dl.k8s.io/release/v1.26.1/bin/linux/amd64/kubelet"
sudo install -o root -g root -m 0755 kubeadm /usr/local/bin/kubeadm
sudo install -o root -g root -m 0755 kubectl /usr/local/bin/kubectl
sudo install -o root -g root -m 0755 kubelet /usr/local/bin/kubelet
kubeadm version
kubectl version --client
kubelet --version
sudo tee /etc/systemd/system/kubelet.service <<EOF
[Unit]
Description=Kubernetes Kubelet
Documentation=https://kubernetes.io/docs/home/
After=network.target
[Service]
ExecStart=/usr/local/bin/kubelet
Restart=always
RestartSec=10
LimitNOFILE=65536
LimitNPROC=4096
TimeoutStartSec=0
KillMode=process
[Install]
WantedBy=multi-user.target
EOF
sudo systemctl daemon-reload
sudo systemctl start kubelet
sudo systemctl enable kubelet
sudo kubeadm init

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

```
[ec2-user@ip-172-31-34-122 ~]$ kubeadm version
kubectl version --client
kubelet --version
kubeadm version: &version.Info{Major:"1", Minor:"26", GitVersion:"v1.26.1", GitCommit:"8f94681cd294aa8cfd3407b8191f6c70214973a4", GitTre
eState:"clean", BuildDate:"2023-01-18T15:56:50Z", GoVersion:"go1.19.5", Compiler:"gc", Platform:"linux/amd64"}
WARNING: This version information is deprecated and will be replaced with the output from kubectl version --short.  Use --output=yaml|js
on to get the full version.
Client Version: version.Info{Major:"1", Minor:"26", GitVersion:"v1.26.1", GitCommit:"8f94681cd294aa8cfd3407b8191f6c70214973a4", GitTreeS
tate:"clean", BuildDate:"2023-01-18T15:58:16Z", GoVersion:"go1.19.5", Compiler:"gc", Platform:"linux/amd64"}
Kustomize Version: v4.5.7
Kubernetes v1.26.1
```

To clean:

sudo dnf clean all
sudo dnf makecache
sudo dnf update -y