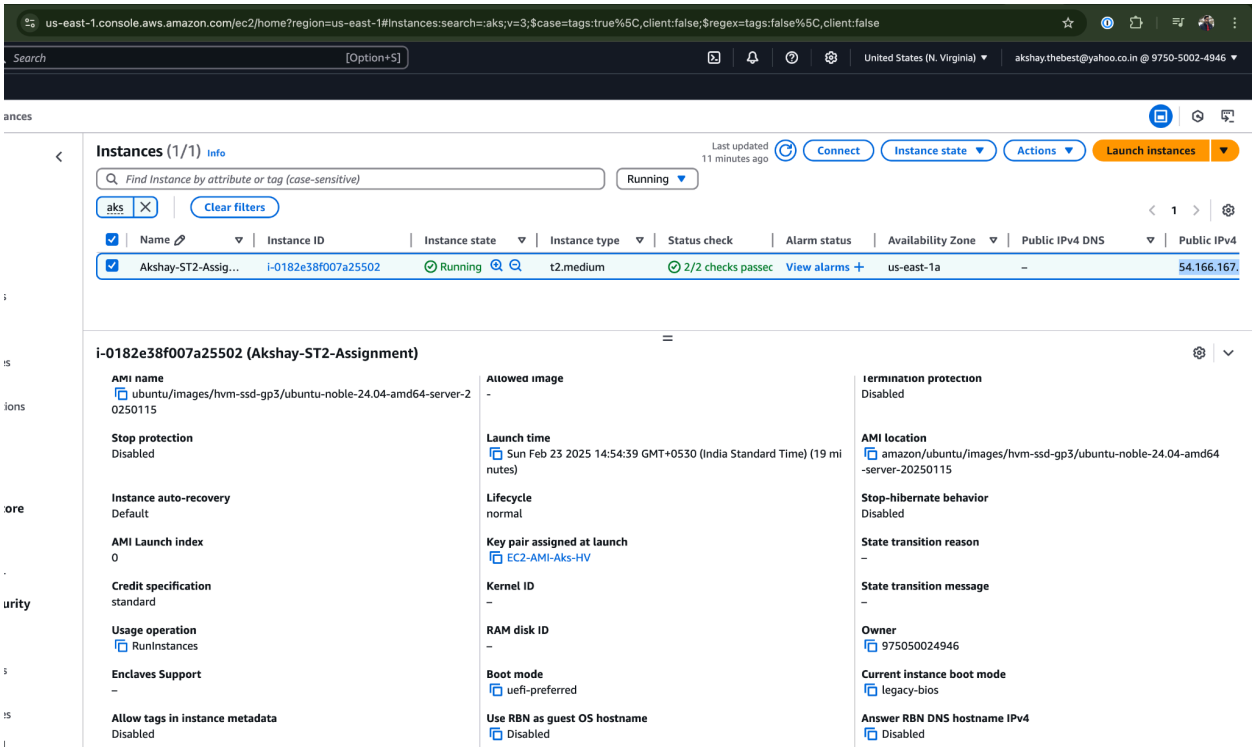
Microservices Kubernetes Deployment Assessment (SKILL TEST-2)

1. **Creating AWS EC2 instance:**

- Ubuntu 24.04
- t2.medium or larger (2 CPU, 4GB RAM minimum)
- Allow inbound traffic so using existing SG named Aks-SecurityGroup.



2. **Login and install dependencies like Docker/Kubectl/Minikube, etc.**

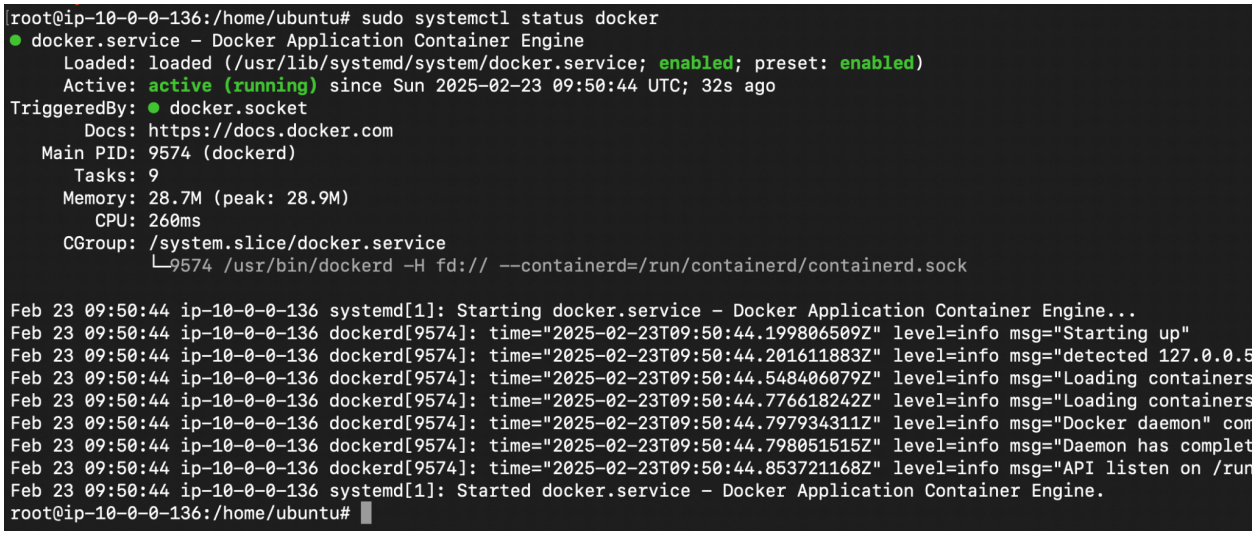
ssh -i "EC2-AMI-Aks-HV.pem" ubuntu@54.166.167.139

– Update server

sudo apt-get update
sudo apt-get upgrade -y

– Install Docker

- *sudo apt-get install docker.io -y*
- *sudo usermod -aG docker ubuntu*
- *sudo systemctl start docker*
- *sudo systemctl enable docker*
- *sudo systemctl status docker*



– Install kubectl

- sudo curl -LO "https://dl.k8s.io/release/$(curl -L -s https://dl.k8s.io/release/stable.txt)/bin/linux/amd64/kubectl"
- sudo install -o root -g root -m 0755 kubectl /usr/local/bin/kubectl

– Install Minikube

- curl -LO https://storage.googleapis.com/minikube/releases/latest/minikube-linux-amd64
- sudo install minikube-linux-amd64 /usr/local/bin/minikube

```
root@ip-10-0-0-136:/home/ubuntu# sudo curl -LO "https://dl.k8s.io/release/$(curl -L -s https://dl.k8s.io/release/stable.txt)/bin/linux/amd64/kubectl"
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100   138  100   138    0     0   2156      0 --:--:-- --:--:-- --:--:--  2190
100 54.6M  100 54.6M    0     0  94.3M      0 --:--:-- --:--:-- --:--:-- 94.3M
root@ip-10-0-0-136:/home/ubuntu# sudo install -o root -g root -m 0755 kubectl /usr/local/bin/kubectl
root@ip-10-0-0-136:/home/ubuntu#
root@ip-10-0-0-136:/home/ubuntu# curl -LO https://storage.googleapis.com/minikube/releases/latest/minikube-linux-amd64
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100  119M  100  119M    0     0  87.0M      0  0:00:01  0:00:01 --:--:-- 87.0M
root@ip-10-0-0-136:/home/ubuntu# sudo install minikube-linux-amd64 /usr/local/bin/minikube

root@ip-10-0-0-136:/home/ubuntu#
```

Install conntrack
sudo apt install conntrack -y

```
root@ip-10-0-0-136:/home/ubuntu#
root@ip-10-0-0-136:/home/ubuntu# sudo apt install conntrack -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  conntrack
0 upgraded, 1 newly installed, 0 to remove and 0 not upgraded.
Need to get 37.9 kB of archives.
After this operation, 119 kB of additional disk space will be used.
Get:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 conntrack amd64 1:1.4.8-1ubuntu1 [37.9 kB]
Fetched 37.9 kB in 0s (1777 kB/s)
Selecting previously unselected package conntrack.
(Reading database ... 70923 files and directories currently installed.)
Preparing to unpack .../conntrack_1%3a1.4.8-1ubuntu1_amd64.deb ...
Unpacking conntrack (1:1.4.8-1ubuntu1) ...
Setting up conntrack (1:1.4.8-1ubuntu1) ...
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning candidates...
Scanning linux images...

Running kernel seems to be up-to-date.

Restarting services...

Service restarts being deferred:
 /etc/needrestart/restart.d/dbus.service
 systemctl restart getty@tty1.service
 systemctl restart networkd-dispatcher.service
 systemctl restart serial-getty@ttyS0.service
 systemctl restart systemd-logind.service
 systemctl restart unattended-upgrades.service

No containers need to be restarted.

User sessions running outdated binaries:
 ubuntu @ session #3: sshd[1170,1284], su[1332]
 ubuntu @ user manager service: systemd[1175]

No VM guests are running outdated hypervisor (qemu) binaries on this host.
root@ip-10-0-0-136:/home/ubuntu#
root@ip-10-0-0-136:/home/ubuntu# which conntrack
/usr/sbin/conntrack
```

Start Minikube:

minikube start --driver=docker --force

```
root@ip-10-0-0-136:/home/ubuntu# minikube start --driver=docker
😄  minikube v1.35.0 on Ubuntu 24.04 (xen/amd64)
✨  Using the docker driver based on user configuration
🛑  The "docker" driver should not be used with root privileges. If you wish to continue as root, use --force.
💡  If you are running minikube within a VM, consider using --driver=none:
📘    https://minikube.sigs.k8s.io/docs/reference/drivers/none/

❌  Exiting due to DRV_AS_ROOT: The "docker" driver should not be used with root privileges.

root@ip-10-0-0-136:/home/ubuntu# minikube start --driver=docker --force
😄  minikube v1.35.0 on Ubuntu 24.04 (xen/amd64)
❗  minikube skips various validations when --force is supplied; this may lead to unexpected behavior
✨  Using the docker driver based on user configuration
🛑  The "docker" driver should not be used with root privileges. If you wish to continue as root, use --force.
💡  If you are running minikube within a VM, consider using --driver=none:
📘    https://minikube.sigs.k8s.io/docs/reference/drivers/none/
📌  Using Docker driver with root privileges
👍  Starting "minikube" primary control-plane node in "minikube" cluster
🚜  Pulling base image v0.0.46 ...
💾  Downloading Kubernetes v1.32.0 preload ...
    > preloaded-images-k8s-v18-v1...:  333.57 MiB / 333.57 MiB  100.00% 62.14 M
    > gcr.io/k8s-minikube/kicbase...:  500.31 MiB / 500.31 MiB  100.00% 68.75 M
🔥  Creating docker container (CPUs=2, Memory=2200MB) ...
🐳  Preparing Kubernetes v1.32.0 on Docker 27.4.1 ...
    ▪ Generating certificates and keys ...
    ▪ Booting up control plane ...
    ▪ Configuring RBAC rules ...
🔗  Configuring bridge CNI (Container Networking Interface) ...
🔎  Verifying Kubernetes components...
    ▪ Using image gcr.io/k8s-minikube/storage-provisioner:v5
🌟  Enabled addons: storage-provisioner, default-storageclass
🏄  Done! kubectl is now configured to use "minikube" cluster and "default" namespace by default
root@ip-10-0-0-136:/home/ubuntu#
```

Enable ingress addon on K8S:

minikube addons enable ingress

```
root@ip-10-0-0-136:/home/ubuntu#
root@ip-10-0-0-136:/home/ubuntu# minikube addons enable ingress
💡  ingress is an addon maintained by Kubernetes. For any concerns contact minikube on GitHub.
You can view the list of minikube maintainers at: https://github.com/kubernetes/minikube/blob/master/OWNERS
    ▪ Using image registry.k8s.io/ingress-nginx/kube-webhook-certgen:v1.4.4
    ▪ Using image registry.k8s.io/ingress-nginx/controller:v1.11.3
    ▪ Using image registry.k8s.io/ingress-nginx/kube-webhook-certgen:v1.4.4
🔎  Verifying ingress addon...
🌟  The 'ingress' addon is enabled
root@ip-10-0-0-136:/home/ubuntu#
root@ip-10-0-0-136:/home/ubuntu#
```

3. Clone git repository and work on manifest files:

– Fork repo https://github.com/mohanDevOps-arch/Microservices-Task

– Forked github repo https://github.com/akshaybhu/Microservices-Task

Create ssh key and add to your github repository

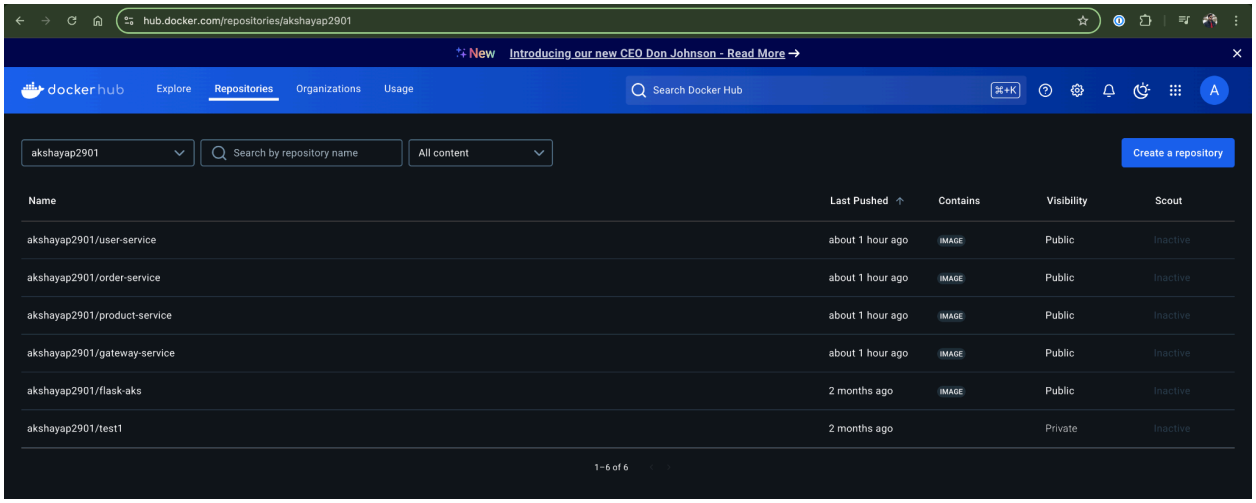
```
root@ip-10-0-0-136:/home/ubuntu# ssh-keygen -t ed25519 -C "Akshay.thebest@yahoo.co.in"
Generating public/private ed25519 key pair.
Enter file in which to save the key (/root/.ssh/id_ed25519):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_ed25519
Your public key has been saved in /root/.ssh/id_ed25519.pub
The key fingerprint is:
SHA256:cMyV39Lqqx0CuLIq0rZXvZKPPkYgD5V5ojDVO6aIoI8 Akshay.thebest@yahoo.co.in
The key's randomart image is:
+--[ED25519 256]--+
| ... o    ..     |
|o   * .o ..      |
| o o +. +  . o   |
|. + =  +    o o  |
|+. * o..S    o   |
|+ . . o...  .    |
| +  .o.. ....    |
|E + .o=..  o..   |
|.oo+.oo+. ..o.   |
+----[SHA256]-----+
root@ip-10-0-0-136:/home/ubuntu# cat /root/.ssh/id_ed25519.pub
```

4. Created docker images for 4 services

docker build -t akshayap2901/gateway-service:latest .
docker build -t akshayap2901/user-service:latest .
docker build -t akshayap2901/product-service:latest .
docker build -t akshayap2901/order-service:latest .

```
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices#
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices# docker images
REPOSITORY                       TAG             IMAGE ID       CREATED         SIZE
akshayap2901/order-service       latest          9c19e3754892   3 minutes ago   125MB
akshayap2901/product-service     latest          49b0040c4650   3 minutes ago   125MB
akshayap2901/user-service        latest          76aa9eef8b7d   4 minutes ago   125MB
akshayap2901/gateway-service     latest          3603b5d99b9a   5 minutes ago   174MB
node                             23-alpine3.20   376057dfd4ca   9 days ago      164MB
gcr.io/k8s-minikube/kicbase      v0.0.46         e72c4cbe9b29   5 weeks ago     1.31GB
node                             16-alpine       2573171e0124   18 months ago   118MB
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices#
```

Push images to docker Hub:




```
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices# docker push akshayap2901/gateway-service:latest
The push refers to repository [docker.io/akshayap2901/gateway-service]
39d8e4e52188: Pushed
e8210234ed73: Pushed
f03fe3b98272: Pushed
8ad5d243031c: Pushed
e88bf9aa3d9f: Mounted from library/node
49c82d8b337d: Mounted from library/node
9e4187464845: Mounted from library/node
994456c4fd7b: Mounted from library/node
latest: digest: sha256:f37d113d54e9c829f54ddb6e47846daa366f6d578a45bd7b4256a2fc2e0c885f size: 1990
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices#
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices#
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices# docker push akshayap2901/product-service:latest
The push refers to repository [docker.io/akshayap2901/product-service]
f4207646f85a: Pushed
fed8e3d1082e: Pushed
9a9dec96257a: Pushed
0d1e55ea2ef4: Pushed
365ccd918307: Mounted from library/node
1bba629c69e9: Mounted from library/node
139c1270acf1: Mounted from library/node
4693057ce236: Mounted from library/node
latest: digest: sha256:47aa86b80ce4aa8baad6a9d27b583544e445c1e791c51194e03bed4f5915e409 size: 1989
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices#
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices#
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices# docker push akshayap2901/order-service:latest
The push refers to repository [docker.io/akshayap2901/order-service]
a68a2d707ccb: Pushed
fed8e3d1082e: Mounted from akshayap2901/product-service
9a9dec96257a: Mounted from akshayap2901/product-service
0d1e55ea2ef4: Mounted from akshayap2901/product-service
365ccd918307: Mounted from akshayap2901/product-service
1bba629c69e9: Mounted from akshayap2901/product-service
139c1270acf1: Mounted from akshayap2901/product-service
4693057ce236: Mounted from akshayap2901/product-service
latest: digest: sha256:8ef6de747d8086979c6743906fa7fe8da75e4897208179dde9bf1ea6aa35e987 size: 1990
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices# docker push akshayap2901/user-service:latest
The push refers to repository [docker.io/akshayap2901/user-service]
fcfa8667d3db: Pushed
fed8e3d1082e: Mounted from akshayap2901/order-service
9a9dec96257a: Mounted from akshayap2901/order-service
0d1e55ea2ef4: Mounted from akshayap2901/order-service
365ccd918307: Mounted from akshayap2901/order-service
1bba629c69e9: Mounted from akshayap2901/order-service
139c1270acf1: Mounted from akshayap2901/order-service
4693057ce236: Mounted from akshayap2901/order-service
latest: digest: sha256:700e53cb14443b448202ee933c555986156e66b0144d66a02a75ec7b5c103203 size: 1989
```

Create and run apply for manifest yaml files to create pods/deployment and services.

kubectl apply -f product-svc.yml
kubectl apply -f gateway-svc.yml
kubectl apply -f user-svc.yml
kubectl apply -f order-svc.yml

```
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices/user-service# kubectl get pods
NAME                               READY   STATUS    RESTARTS   AGE
gateway-service-6fd8d79d4d-pvmct   1/1     Running   0          46s
order-service-cbcfc69bb-gfhhs      1/1     Running   0          100s
product-service-85fb57f987-h4gpl   1/1     Running   0          59s
user-service-77d88dccfc-97ndt      1/1     Running   0          26s
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices/user-service# kubectl get deployment
NAME              READY   UP-TO-DATE   AVAILABLE   AGE
gateway-service   1/1     1            1           48s
order-service     1/1     1            1           102s
product-service   1/1     1            1           61s
user-service      1/1     1            1           28s
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices/user-service# kubectl get svc
NAME              TYPE        CLUSTER-IP       EXTERNAL-IP   PORT(S)    AGE
gateway-service   ClusterIP   10.104.93.200    <none>        3003/TCP   52s
kubernetes        ClusterIP   10.96.0.1        <none>        443/TCP    78m
order-service     ClusterIP   10.109.129.57    <none>        3002/TCP   106s
product-service   ClusterIP   10.100.35.196    <none>        3001/TCP   65s
user-service      ClusterIP   10.107.163.168   <none>        3000/TCP   32s
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices/user-service#
```

Create ingress file and apply

kubectl apply -f ingress.yaml

```
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices#
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices# kubectl apply -f ingress.yaml
ingress.networking.k8s.io/microservices-ingress created
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices#
```

kubectl get services -n ingress-nginx

kubectl get service ingress-nginx-controller -n ingress-nginx

```
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices#
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices# kubectl get services -n ingress-nginx
NAME                                 TYPE           CLUSTER-IP       EXTERNAL-IP   PORT(S)                      AGE
ingress-nginx-controller             LoadBalancer   10.99.111.41     <pending>     80:32680/TCP,443:31672/TCP   32m
ingress-nginx-controller-admission   ClusterIP      10.101.187.196   <none>        443/TCP                      32m
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices#
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices# kubectl get ingress
NAME                    CLASS   HOSTS                  ADDRESS   PORTS   AGE
microservices-ingress   nginx   microservices.local             80      48m
```

```
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices#
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices# sudo echo "54.166.167.139 microservices.local" | sudo tee -a /etc/hosts

54.166.167.139 microservices.local
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices#
root@ip-10-0-0-136:/home/ubuntu/Microservices-Task/Microservices# minikube ip
192.168.49.2
```

ALB: