DevSecOps Training

DAY – 3

Today's IP Address details:

S.No	Ip Address- Day3	User Name	Password	Participants Name
Trainer	54.145.123.246	**root**	**redhat**	**Trainer**
1	3.88.0.246	root	redhat	alpana
2	3.83.174.192	root	redhat	baljeet
3	52.91.28.139	root	redhat	Devaraj
4	3.84.20.57	root	redhat	ganesh
5	3.91.155.119	root	redhat	kaustubh
6	3.95.13.210	root	redhat	manish
7	44.204.159.220	root	redhat	manoj
8	54.234.219.215	root	redhat	naveen
9	44.201.228.47	root	redhat	neha
10	54.172.176.72	root	redhat	pravallika
11	18.212.73.246	root	redhat	ramanand sai
12	52.70.92.37	root	redhat	revanth
13	54.157.202.235	root	redhat	rohit
14	3.91.200.184	root	redhat	rudra
15	54.161.183.202	root	redhat	sahitya
16	3.88.0.178	root	redhat	sampat
17	3.87.72.137	root	redhat	sangamesh
18	54.146.194.73	root	redhat	sashi
19	34.227.151.48	root	redhat	shashidhar
20	52.90.62.11	root	redhat	shweta
21	54.175.233.148	root	redhat	sudheer
22	34.226.246.88	root	redhat	uday
23	54.172.190.13	root	redhat	vaishnavi
24	3.88.196.199	root	redhat	vishali
25	44.204.172.209	root	redhat	sankalp
26	18.212.164.28	root	redhat	balakrishna

Trainer IP: 54.145.123.246

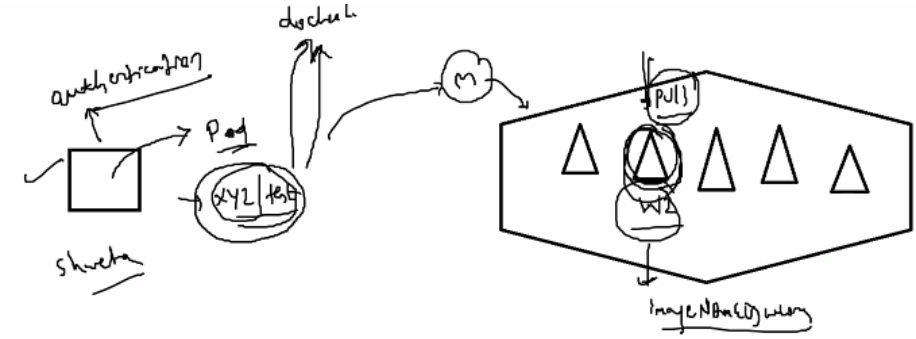
Details of my machine:

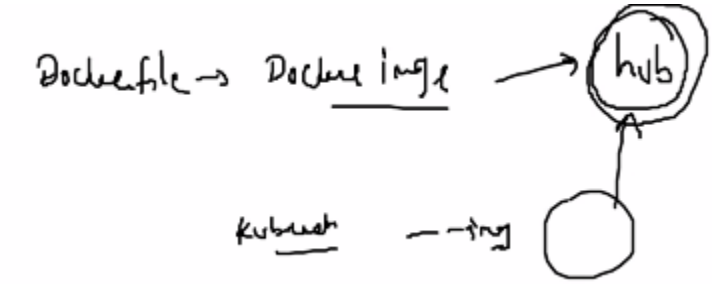
IP Address: 3.88.196.199

Username: root

Password: redhat

Flow – How to create a custom image from the docker file and deploy it into Kubernetes cluster:





Trainer is trying to upload authentication file in all the machine to make the kubernetes cluster up and ready:

```
https://aws.amazon.com/amazon-linux-2/
[ec2-user@node3 ~]$ sudo -i
[root@node3 ~]#  systemctl enable --now docker kubelet
Created symlink from /etc/systemd/system/multi-user.target.wants/docker.service to /usr
```

```
[root@node2 ~]# systemctl enable --now docker kubelet
Created symlink from /etc/systemd/system/multi-user.target.wants/docker.servic
cker.service.
```

Nodes are now seen:

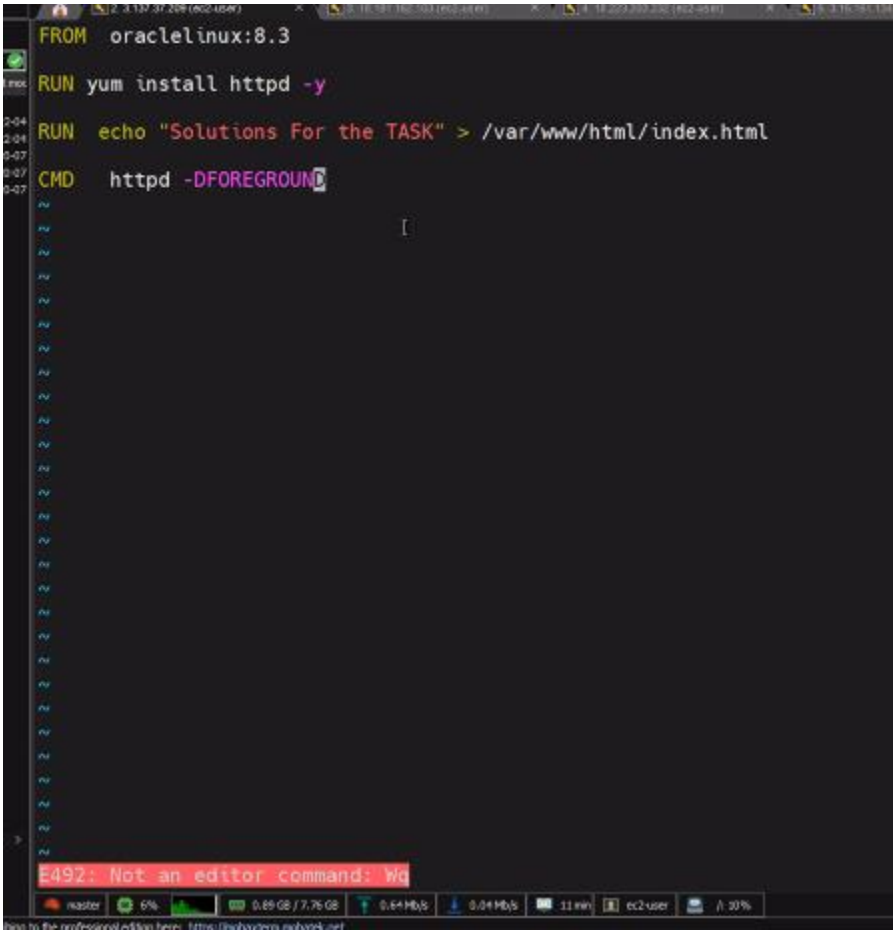
```
[root@master ~]# kubectl get nodes
NAME     STATUS   ROLES                  AGE   VERSION
master   Ready    control-plane,master   21h   v1.23.6
node1    Ready    <none>                 20h   v1.23.6
node2    Ready    <none>                 20h   v1.23.6
node3    Ready    <none>                 20h   v1.23.6
node4    Ready    <none>                 20h   v1.23.6
node5    Ready    <none>                 20h   v1.23.6
[root@master ~]#
```

Yesterday's post task is being explained by the trainer:

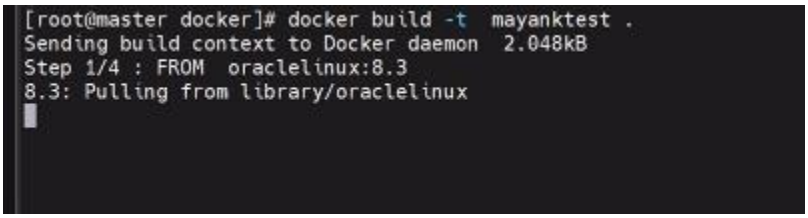
Create a folder to have a dockerfile:

```
node5    Ready    <none>                 20h   v1.23.6
[root@master ~]# mkdir docker
[root@master ~]# cd docker
[root@master docker]# vim Dockerfile
```

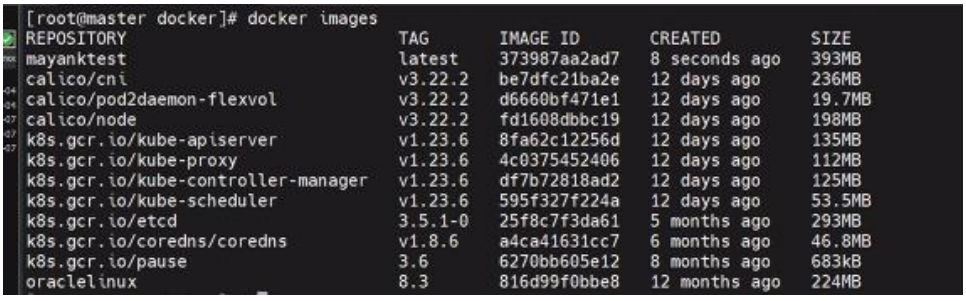
Docker file:



Build the image using the docker file



Check for the docker images: mayank test



Tag the image:

```
[root@master docker]# docker tag  mayanktest   docker.io/mdhack/collinsimage
[root@master docker]# docker images
REPOSITORY                                TAG       IMAGE ID       CREATED          SIZE
mayanktest                                latest    373987aa2ad7   42 seconds ago   393MB
mdhack/collinsimage                       latest    373987aa2ad7   42 seconds ago   393MB
calico/cni                                v3.22.2   be7dfc21ba2e   12 days ago      236MB
calico/pod2daemon-flexvol                 v3.22.2   d6660bf471e1   12 days ago      19.7MB
calico/node                               v3.22.2   fd1608dbbc19   12 days ago      198MB
k8s.gcr.io/kube-apiserver                 v1.23.6   8fa62c12256d   12 days ago      135MB
k8s.gcr.io/kube-proxy                     v1.23.6   4c0375452406   12 days ago      112MB
k8s.gcr.io/kube-scheduler                 v1.23.6   595f327f224a   12 days ago      53.5MB
k8s.gcr.io/kube-controller-manager        v1.23.6   df7b72818ad2   12 days ago      125MB
k8s.gcr.io/etcd                           3.5.1-0   25f8c7f3da61   5 months ago     293MB
k8s.gcr.io/coredns/coredns                v1.8.6    a4ca41631cc7   6 months ago     46.8MB
k8s.gcr.io/pause                          3.6       6270bb605e12   8 months ago     683kB
oraclelinux                               8.3       816d99f0bbe8   12 months ago    224MB
[root@master docker]#
```

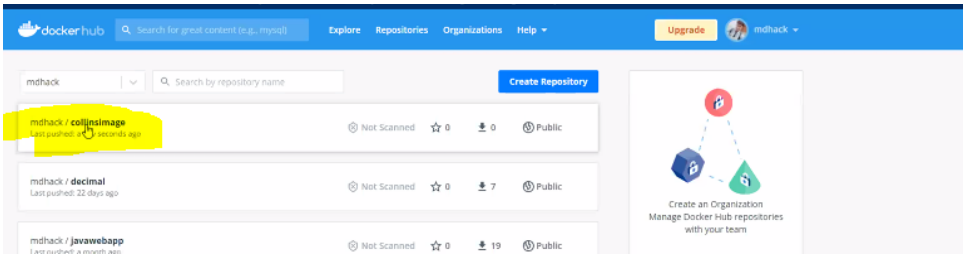
Docker login:

```
[root@master docker]# docker login
Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID, head over
er.com to create one.
Username: mdhack
Password:
WARNING! Your password will be stored unencrypted in /root/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store

Login Succeeded
[root@master docker]#
```

Push the image into the docker hub:

```
[root@master docker]# docker push mdhack/collinsimage
Using default tag: latest
The push refers to repository [docker.io/mdhack/collinsimage]
491700d43e7c: Pushed
2bdb5feb5d9a: Pushing [==========>                                        ]  39.35MB/168.8MB
02a3a073ed48: Mounted from library/oraclelinux
```

You can see the image in the docker hub now:



This is optional: Recommended not to do this

```
[root@master docker]# kubectl delete  all --all --force
warning: Immediate deletion does not wait for confirmation that the running resource has been terminated. The resource may cont
inue to run on the cluster indefinitely.
pod "mayank-9c4f4b955-lnsxs" force deleted
[root@master docker]# kubeccr
```

Create the deployment:

```
[root@master docker]# kubectl  create deployment  modi    --image mdhack/collinsimage
deployment.apps/modi created
[root@master docker]#
```

Get pods:

```
[root@master docker]# kubectl get pods
NAME                     READY   STATUS              RESTARTS   AGE
mayank-9c4f4b955-w8rs5   1/1     Running             0          28s
modi-7d498cd976-49862    0/1     ContainerCreating   0          4s
[root@master docker]# kubectl get pods
NAME                     READY   STATUS    RESTARTS   AGE
mayank-9c4f4b955-w8rs5   1/1     Running   0          32s
modi-7d498cd976-49862    1/1     Running   0          8s
[root@master docker]# kubectl get del
```

Get all:

```
[root@master docker]# kubectl get all
NAME                         READY   STATUS    RESTARTS   AGE
pod/modi-7d498cd976-49862    1/1     Running   0          32s

NAME                   READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/modi   1/1     1            1           32s

NAME                                DESIRED   CURRENT   READY   AGE
replicaset.apps/modi-7d498cd976     1         1         1       32s
```

To find the IP address of that pod and perform curl:

```
[root@master docker]# kubectl get all  -o wide
NAME                         READY   STATUS    RESTARTS   AGE   IP              NODE    NOMINATED NODE   READINESS GATES
pod/modi-7d498cd976-49862    1/1     Running   0          36s   192.168.0.36    node2   <none>           <none>

NAME                   READY   UP-TO-DATE   AVAILABLE   AGE   CONTAINERS     IMAGES                  SELECTOR
deployment.apps/modi   1/1     1            1           36s   collinsimage   mdhack/collinsimage     app=modi

NAME                                DESIRED   CURRENT   READY   AGE   CONTAINERS     IMAGES                  SELECTOR
replicaset.apps/modi-7d498cd976     1         1         1       36s   collinsimage   mdhack/collinsimage     app=modi,pod-template-
hash=7d498cd976
[root@master docker]# curl 192.168.0.26
<body bgcolor='blue'>

        <h1>Welcome</h1>
        <h2>Hello From MDhack/Mayank  Server</h2>
        <h3>Apache Server</h3>

[root@master docker]# curl 192.168.0.36
Solutions For the TASK
[root@master docker]#
```

Check in node 2:

```
[root@node2 ~]# systemctl enable --now docker kubelet
Created symlink from /etc/systemd/system/multi-user.target.wants/docker.service to /usr/lib/syste
cker.service.
[root@node2 ~]# docker images
REPOSITORY                   TAG       IMAGE ID       CREATED          SIZE
mdhack/collinsimage          latest    373987aa2ad7   4 minutes ago    393MB
vishali007/postimage         1.0       60e49d69ed90   17 hours ago     393MB
shwetabansal05/firstimage    latest    729721f6d3d8   22 hours ago     393MB
alpana87/firstimage          latest    1da998ca7116   23 hours ago     393MB
pravallikagunda/pravalimage  latest    f8a6c8f108b6   23 hours ago     393MB
nginx                        latest    fa5269854a5e   6 days ago       142MB
calico/kube-controllers      v3.22.2   a1a88662416b   12 days ago      132MB
calico/cni                   v3.22.2   be7dfc21ba2e   12 days ago      236MB
calico/pod2daemon-flexvol    v3.22.2   d6660bf471e1   12 days ago      19.7MB
calico/node                  v3.22.2   fd1608dbbc19   12 days ago      198MB
k8s.gcr.io/kube-proxy        v1.23.6   4c0375452406   12 days ago      112MB
k8s.gcr.io/coredns/coredns   v1.8.6    a4ca41631cc7   6 months ago     46.8MB
k8s.gcr.io/pause             3.6       6270bb605e12   8 months ago     683kB
[root@node2 ~]#
```

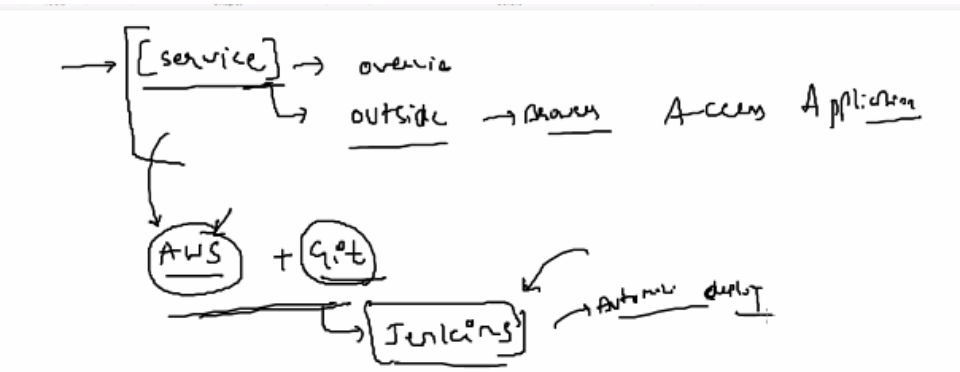
Agenda:

- Service

  -> Overview

-> Outside the browser how to access the application.

- AWS
- Git
- Jenkins – Whatever you do now, it can be automated!

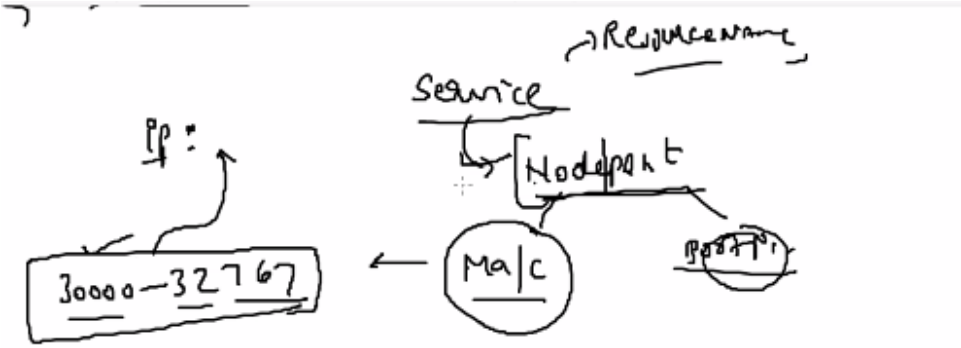


Embedded System Security:

Access:

Expose deployment: In docker we use –p (port expose)

Service -> Node port -> Machine port number -> Range is fixed – 3000 –32767 (ip address)



If container is working on 80 port number, you have to tell that container is working on 80 port. If 8080 – port, you have to tell 8080 port number.

In production environment, we can't use this command:

```
[root@master docker]# kubectl delete  all --all --force
warning: Immediate deletion does not wait for confirmation that the runn
ce may continue to run on the cluster indefinitely.
pod "modi-7d498cd976-49862" force deleted
deployment.apps "modi" force deleted
replicaset.apps "modi-7d498cd976" force deleted
[root@master docker]#
```

We will create a deployment with simple image:

```
[root@master docker]# kubectl create  deployment  mayank --image=mdhack/mayanknginximage
deployment.apps/mayank created
[root@master docker]# kube
```

Get the pod details:

```
[root@master docker]# kubectl  get pods
NAME                      READY   STATUS    RESTARTS   AGE
mayank-6876cf4c88-q2j2l   1/1     Running   0          7s
[root@master docker]# kubectl  get all
NAME                          READY   STATUS    RESTARTS   AGE
pod/mayank-6876cf4c88-q2j2l   1/1     Running   0          9s

NAME                     READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/mayank   1/1     1            1           9s

NAME                                DESIRED   CURRENT   READY   AGE
replicaset.apps/mayank-6876cf4c88   1         1         1       9s
[root@master docker]#
```

Service name of the cloud will be different, but service will be same. It is pretty much same to adapt other cloud vendor.

Take IP address of cluster: using kubectl get pods –o wide

Expose the deployment on port 80:

```
[root@master docker]# kubectl expose  deployment  mayank  --port 80
service/mayank exposed
[root@master docker]# k
```

Get service:

```
service/mayank exposed
[root@master docker]# kubectl get service
NAME     TYPE        CLUSTER-IP    EXTERNAL-IP   PORT(S)   AGE
mayank   ClusterIP   10.98.5.49    <none>        80/TCP    4s
[root@master docker]#
```

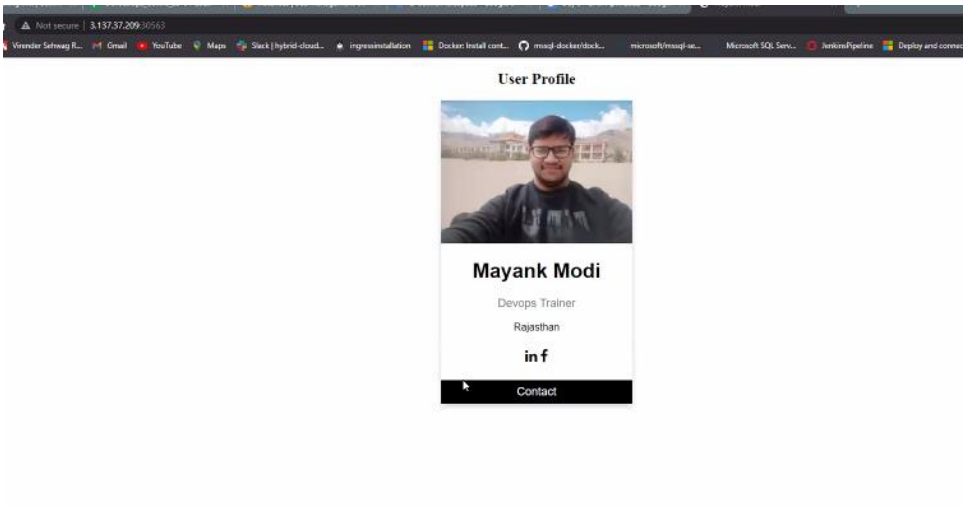
We want Type: node port. So delete the service

```
mayank   ClusterIP   10.98.5.49    <none>        80/TCP    4s
[root@master docker]# kubectl delete  service mayank
service "mayank" deleted
[root@master docker]# kubectl expose  deployment  mayank  --por
```

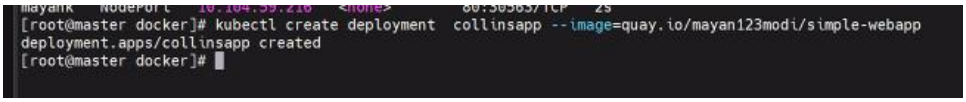
Expose they deployment in port 80:

```
[root@master docker]# kubectl expose  deployment  mayank  --port 80  --type NodePort
service/mayank exposed
[root@master docker]# kubectl get service
NAME     TYPE       CLUSTER-IP      EXTERNAL-IP   PORT(S)        AGE
mayank   NodePort   10.104.59.216   <none>        80:30568/TCP   2s
[root@master docker]#
```

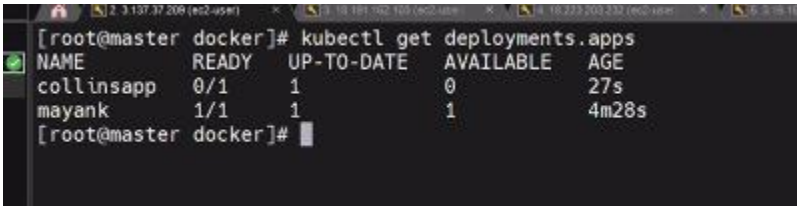
Check the website:



Taking an ip address and exposing your application in a port number.



This work on 80 port number by default:



Edit the deployment:

```
  progressDeadlineSeconds: 600
  replicas: 1
  revisionHistoryLimit: 10
  selector:
    matchLabels:
      app: collinsapp
  strategy:
    rollingUpdate:
      maxSurge: 25%
      maxUnavailable: 25%
    type: RollingUpdate
  template:
    metadata:
      creationTimestamp: null
      labels:
        app: collinsapp
    spec:
      containers:
      - image: quay.io/mayan123modi/simple-webapp
        imagePullPolicy: Always
        name: simple-webapp
        resources: {}
        terminationMessagePath: /dev/termination-log
        terminationMessagePolicy: File
      dnsPolicy: ClusterFirst
      restartPolicy: Always
      schedulerName: default-scheduler
      securityContext: {}
      terminationGracePeriodSeconds: 30
status:
  conditions:
  - lastTransitionTime: "2022-04-27T04:30:59Z"
    lastUpdateTime: "2022-04-27T04:30:59Z"
    message: Deployment does not have minimum availability.
    reason: MinimumReplicasUnavailable
```

Get pod command:

```
[root@master docker]# kubectl get pods
NAME                       READY   STATUS             RESTARTS   AGE
collinsapp-7847bb86f6-hc2tn   0/1     ImagePullBackOff   0          85s
collinsapp-7c455fbb89-tngxn   0/1     ContainerCreating   0          3s
mayank-6876cf4c88-q2j2l       1/1     Running            0          5m26s
[root@master docker]# kubectl get pods
NAME                       READY   STATUS    RESTARTS   AGE
collinsapp-7c455fbb89-tngxn   1/1     Running   0          10s
mayank-6876cf4c88-q2j2l       1/1     Running   0          5m33s
[root@master docker]#
```

Check the IP address:

```
collinsapp-7c455fbb89-tngxn   1/1     Running   0          10s
mayank-6876cf4c88-q2j2l       1/1     Running   0          5m33s
[root@master docker]# kubectl get pods -o wide
NAME                       READY   STATUS    RESTARTS   AGE     IP              NODE    NOMINA
S GATES
collinsapp-7c455fbb89-tngxn   1/1     Running   0          13s     192.168.0.14    node5   <none>
mayank-6876cf4c88-q2j2l       1/1     Running   0          5m36s   192.168.0.252   node3   <none>
[root@master docker]# curl 192.168.0.14
```

Curl:

```
mayank-6876cf4c88-q2j2t        1/1     Running   0          5m36s   192
[root@master docker]# curl 192.168.0.14:8080
<!doctype html>
<title>Hello from Flask</title>
<body style="background: #e74c3c;"></body>
<div style="color: #e4e4e4;
    text-align:  center;
    height: 90px;
    vertical-align:  middle;">

  <h1>Hello from collinsapp-7c455fbb89-tngxn!</h1>



</div>[root@master docker]#
```

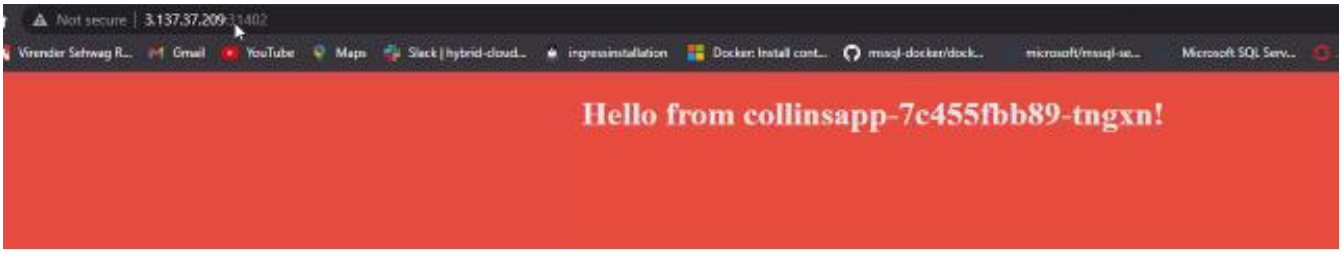
To expose a node port type:

```
</div>[root@master docker]# kubectl expose deployment  collinsapp  --port 8080 --type NodePort
service/collinsapp exposed
[root@master docker]# ku
```

Get service:

```
[root@master docker]# kubectl get service
NAME         TYPE       CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
collinsapp   NodePort   10.96.169.244   <none>        8080:31402/TCP   3s
mayank       NodePort   10.104.59.216   <none>        80:30563/TCP     3m40s
[root@master docker]#
```

Check the website:



Get the details of deployments:

```
mayank       NodePort   10.104.59.216   <none>        80:30563/TCP     3m40s
[root@master docker]# kubectl get deployments.apps  collinsapp
NAME         READY   UP-TO-DATE   AVAILABLE   AGE
collinsapp   1/1     1            1           2m44s
[root@master docker]#
```

To scale the application: increase in load

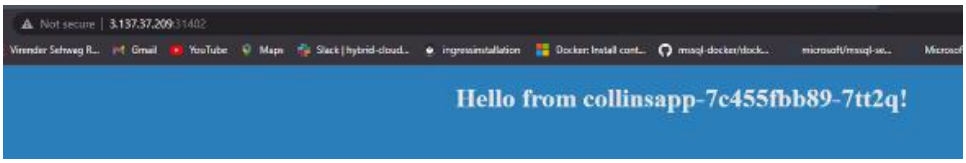
```
[root@master docker]# kubectl get pods
NAME                          READY   STATUS    RESTARTS   AGE
collinsapp-7c455fbb89-tngxn   1/1     Running   0          87s
mayank-6876cf4c88-q2j2l       1/1     Running   0          6m50s
[root@master docker]# kubectl
alpha          autoscale      create         exec           logs           rollout        version
annotate       certificate    debug          explain        options        run            wait
api-resources  cluster-info   delete         expose         patch          scale
api-versions   completion     describe       get            plugin         set
apply          config         diff           help           port-forward   taint
attach         cordon         drain          kustomize      proxy          top
auth           cp             edit           label          replace        uncordon
[root@master docker]# kubectl
```

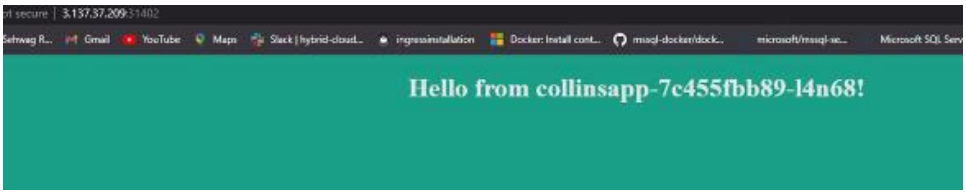
Get pods:

```
[root@master docker]# kubectl get pods
NAME                          READY   STATUS              RESTARTS   AGE
collinsapp-7c455fbb89-2pdkb   1/1     Running             0          5s
collinsapp-7c455fbb89-4w6qx   0/1     ContainerCreating   0          5s
collinsapp-7c455fbb89-7tt2q   0/1     ContainerCreating   0          5s
collinsapp-7c455fbb89-jdf2s   0/1     ContainerCreating   0          5s
collinsapp-7c455fbb89-l4n68   0/1     ContainerCreating   0          5s
collinsapp-7c455fbb89-pqz94   0/1     ContainerCreating   0          5s
collinsapp-7c455fbb89-pzl4g   1/1     Running             0          5s
collinsapp-7c455fbb89-r6kst   0/1     ContainerCreating   0          5s
collinsapp-7c455fbb89-tngxn   1/1     Running             0          2m3s
collinsapp-7c455fbb89-z5kvq   1/1     Running             0          5s
mayank-6876cf4c88-q2j2l       1/1     Running             0          7m26s
[root@master docker]#
```

Now, total 9 pods are running

In these 10 pods, where will my request go? It can go anywhere; it works by Round Robin Fashion.

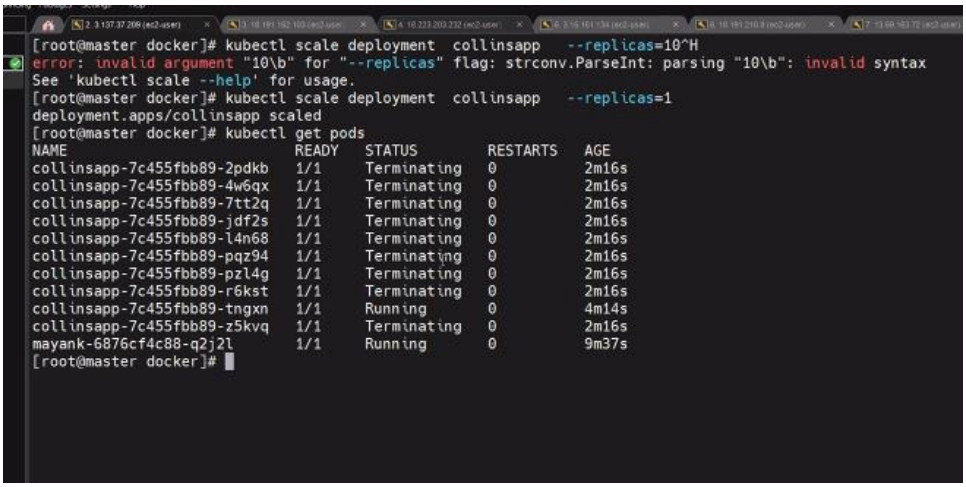




Whenever I refresh, it takes different number? Since its Round Robin

```
>  Round Robbin -- one by one - my req is only on every pod --- INternal Load BALANCER
```

This is how you can scale up the application:



Commands shared by the Trainer:

173 kubectl get all

174 kubectl get pods -o wide

175 curl 192.168.0.33

176 kubectl describe deployments.apps mayank

177 history

178 cat deployment.yaml

179 curl 192.168.0.52

180 kubectl get pods -o wide -n sangamesh

181 kubectl describe pod -n sangamesh sangameshhub-df8c768dd-mklq4

182 curl 192.168.0.56

183 curl 192.168.0.58

184 kubectl get nodes

185 ip a

186 kubectl get nodes

187 ip a

188 vim .kube/config

189 kubectl get nodes

190 systemctl status kubelt

191 systemctl status kubelet

192 systemctl start kubelet

193 systemctl status kubelet
194 kubectl get nodes
195 systemctl status kubelet
196 kubectl get nodes
197 systemctl status docker
198 systemctl enable --now docker
199 systemctl enable --now kubelet
200 systemctl status docker
201 kubectl get nodes
202 mkdir docker
203 cd docker
204 vim Dockerfile
205 docker build -t mayanktest .
206 docker images
207 docker tag mayanktest   docker.io/mdhack/collinsimage
208 docker images
209 docker login
210 docker push mdhack/collinsimage
211 kubectl get all
212 kubectl delete all --all --force
213 kubectl create deployment modi   --image mdhack/collinsimage
214 kubectl get pods
215 kubectl get depl
216 kubectl get deployments.apps
217 kubectl delete deployments.apps mayank
218 kubectl get all
219 kubectl get all -o wide
220 curl 192.168.0.26
221 curl 192.168.0.36
222 kubectl get all

```
  223  kubectl get all -o wide
  224  hsi
  225  history
-----------------------------------------------------------------------------------------------
  213  kubectl  create deployment  modi    --image mdhack/collinsimage
  214  kubectl get pods
  215  kubectl get depl
  216  kubectl get deployments.apps
  217  kubectl delete  deployments.apps  mayank
  218  kubectl get all
  219  kubectl get all  -o wide
  220  curl 192.168.0.26
  221  curl 192.168.0.36
  222  kubectl get all
  223  kubectl get all -o wide
  224  hsi
  225  history
  226  kubectl delete  all --all --force
  227  kubectl create  deployment  mayank --image=mdhack/mayanknginximage
  228  kubectl  get pods
  229  kubectl  get all
  230  kubectl  get all  -o wide
  231  curl 192.168.0.252
  232  kubectl expose  deployment  mayank  --port 80
  233  kubectl get service
  234  kubectl delete  service mayank
  235  kubectl expose  deployment  mayank  --port 80  --type NodePort
  236  kubectl get service
  237  kubectl create deployment  collinsapp --image=quay.io/mayan123modi/simple-webapp
  238  kubectl get all
```

```
239  kubectl get deployments.apps
240  kubectl get pods
241  kubectl describe  pod collinsapp-7847bb86f6-hc2tn
242  kubectl edit deployments.apps  collinsapp
243  kubectl get pods
244  kubectl get pods -o wide
245  curl 192.168.0.14:8080
246  kubectl expose deployment  collinsapp  --port 8080 --type NodePort
247  kubectl get service
248  kubectl get deployments.apps  collinsapp
249  kubectl get pods
250  kubectl scale deployment  collinsapp   --replicas=10
251  kubectl get pods
252  <<X
253  kubectl scale deployment  collinsapp   --replicas=10
254  kubectl scale deployment  collinsapp   --replicas=1
255  kubectl get pods
256  history
```

TASK 1:

Q.1 CREATE A deployment using your own image and scale that upto 5 replicas and expose it on node port and access it from browser and the ip that u need to use is 3.137.37.209: port no.

Create deployment:

```
[root@vishali task3]# kubectl create deployment vishalideploy --image=vishali007
/vishaliimage:1.0
deployment.apps/vishalideploy created
```

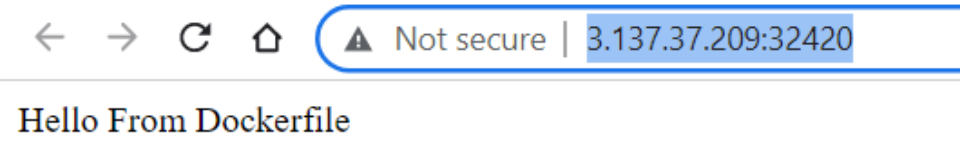
Scale:

```
[root@vishali task3]# kubectl scale deployment vishalideploy --replicas=5
deployment.apps/vishalideploy scaled
```

Expose it

```
[root@vishali task3]# kubectl expose deployment vishalideploy --port 80 --type N
odePort
service/vishalideploy exposed
[root@vishali task3]# kubectl get service
NAME           TYPE       CLUSTER-IP      EXTERNAL-IP   PORT(S)        AGE
vishalideploy   NodePort   10.105.86.135   <none>        80:32420/TCP   3s
```

Check the website: http://3.137.37.209:32420/



Hello From Dockerfile

Q.2 create a deployment using quay.io/mayank123modi/simple-webapp image and expose it using nodeport and share the url with me

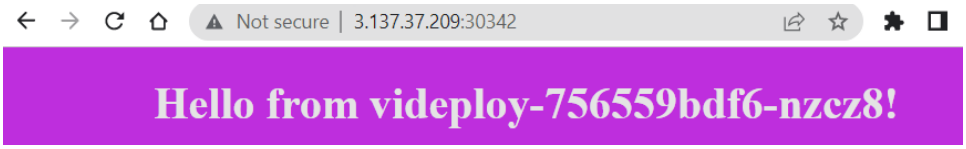
Create the deployment and expose it:

```
[root@vishali task3]# kubectl create deployment videploy --image=quay.io/mayank1
/simple-webapp
deployment.apps/videploy created
[root@vishali task3]# kubectl expose deployment videploy --port 80 --type NodePo
service/videploy exposed
[root@vishali task3]# kubectl get service
NAME           TYPE       CLUSTER-IP      EXTERNAL-IP   PORT(S)        AGE
videploy       NodePort   10.99.61.33     <none>        80:31434/TCP   4s
vishalideploy   NodePort   10.105.86.135   <none>        80:32420/TCP   5m18s
vishdeploy     NodePort   10.111.217.91   <none>        80:30427/TCP   2m27s
[root@vishali task3]# kubectl get pods -o wide
NAME                            READY   STATUS             RESTARTS      AGE
 IP              NODE    NOMINATED NODE   READINESS GATES
pod1                            1/1     Running            1 (16h ago)   19h
 192.168.0.180   node1   <none>           <none>
pod2                            1/1     Running            1 (16h ago)   19h
 192.168.0.245   node3   <none>           <none>
postimagetask-6f4db4bcd5-vqjd7  0/1     ImagePullBackOff   0             17h
 192.168.0.244   node3   <none>           <none>
postimagetask3-db9b9dd8d-p8kf7  1/1     Running            1 (16h ago)   17h
 192.168.0.6     node2   <none>           <none>
posttask-59b9548d4c-qhxs7       0/1     ImagePullBackOff   0             17h
 192.168.0.53    node2   <none>           <none>
posttask3-7ff7f9b799-g22p2      0/1     ImagePullBackOff   0             17h
 192.168.0.15    node2   <none>           <none>
test1-6db788bdd4-mccwb          1/1     Running            1 (16h ago)   17h
 192.168.0.165   node1   <none>           <none>
test2-744cdc6c89-dvpgb          1/1     Running            1 (16h ago)   17h
 192.168.0.104   node4   <none>           <none>
videploy-756559bdf6-nzcz8       1/1     Running            0             82s
 192.168.0.207   node5   <none>           <none>
```

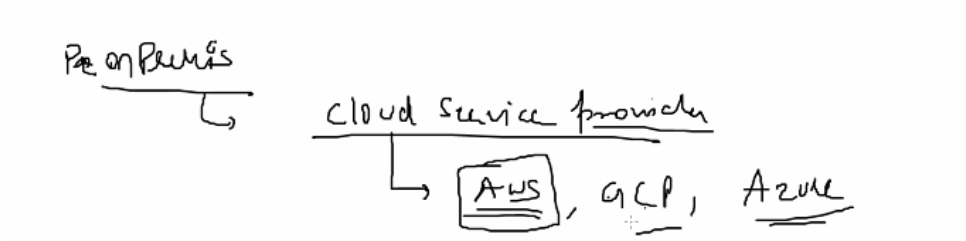
The problem why it is not working was – might be due to overload. So, I have exposed it into 8080 port.

```
[root@vishali task3]# kubectl delete service videploy
service "videploy" deleted
[root@vishali task3]# kubectl get service
NAME            TYPE       CLUSTER-IP      EXTERNAL-IP   PORT(S)        AGE
vishalideploy   NodePort   10.105.86.135   <none>        80:32420/TCP   14m
vishdeploy      NodePort   10.111.217.91   <none>        80:30427/TCP   11m
[root@vishali task3]# kubectl expose deployment videploy --port 8080 --type Node
Port
service/videploy exposed
[root@vishali task3]# kubectl get service
NAME            TYPE       CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
videploy        NodePort   10.100.218.22   <none>        8080:30342/TCP   4s
vishalideploy   NodePort   10.105.86.135   <none>        80:32420/TCP     14m
vishdeploy      NodePort   10.111.217.91   <none>        80:30427/TCP     11m
[root@vishali task3]#
```

Check the site: http://3.137.37.209:30342/



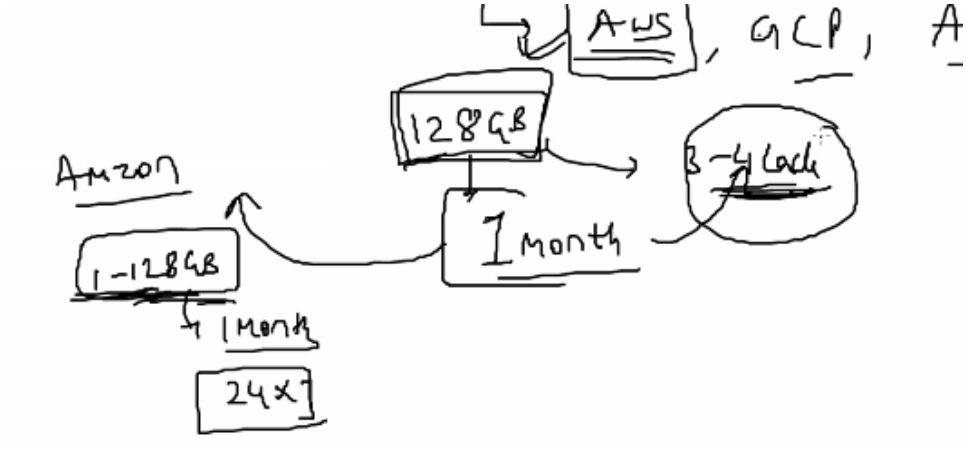
Cloud Service Provider:



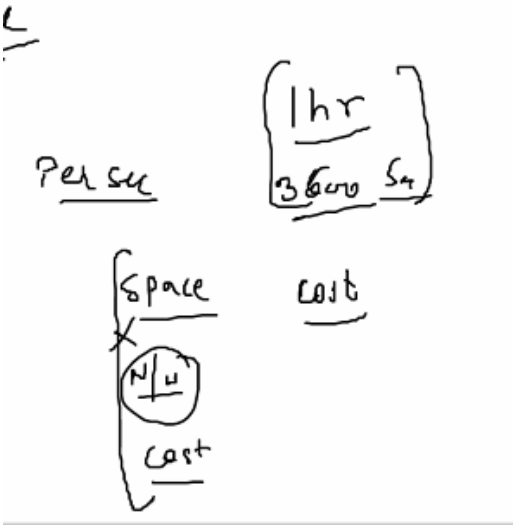
AWS is recommended – as it contains everything

What is the cost of 128GB RAM Laptop –>Approx. 3 –4 Lakh cost

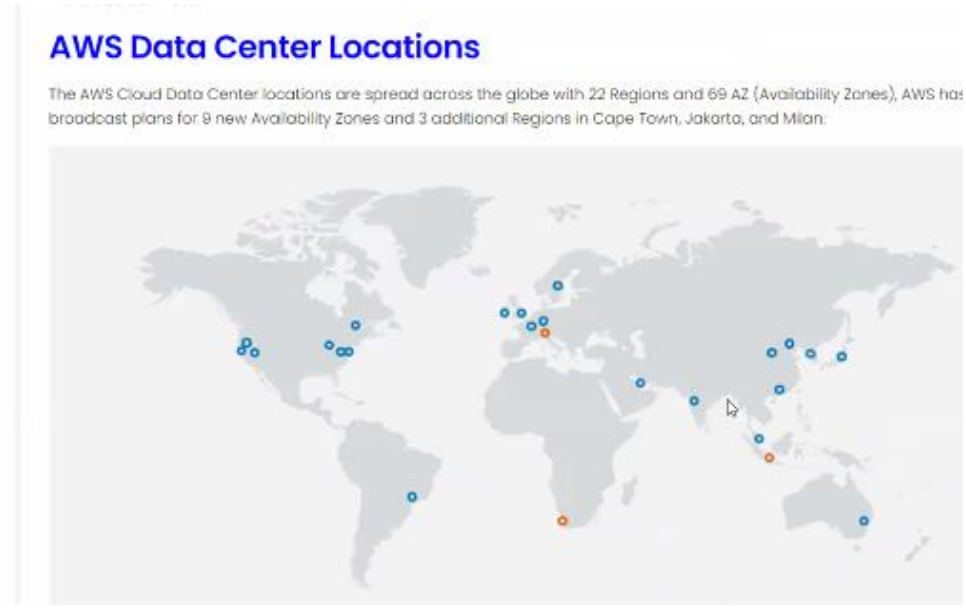
But if you need only for one month, then its waste of money.



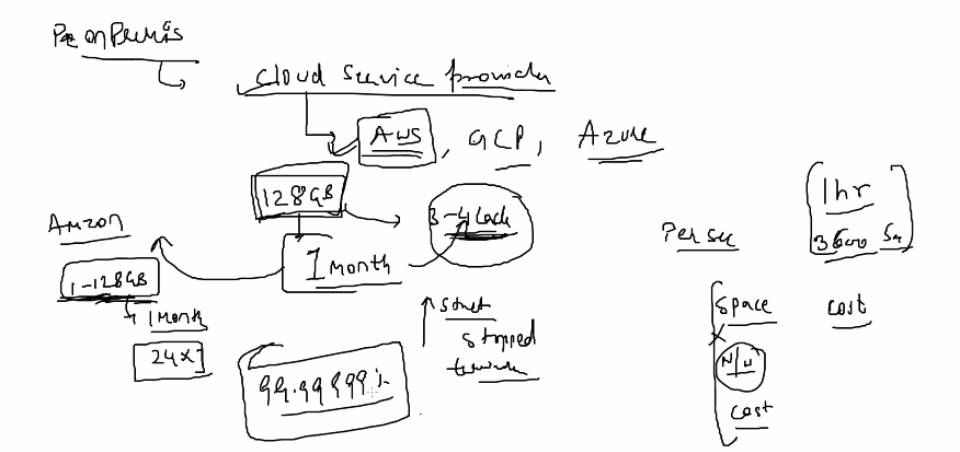
Cloud is very flexible. Whenever we need it, we can create it and we can terminate it. Bill will come – whatever the time you used it.
We will save the space money; cost is saved in network and server.



AWS Data Center:



In every region, we can see the datacenter. Try to give the guarantee of data – 99.99%



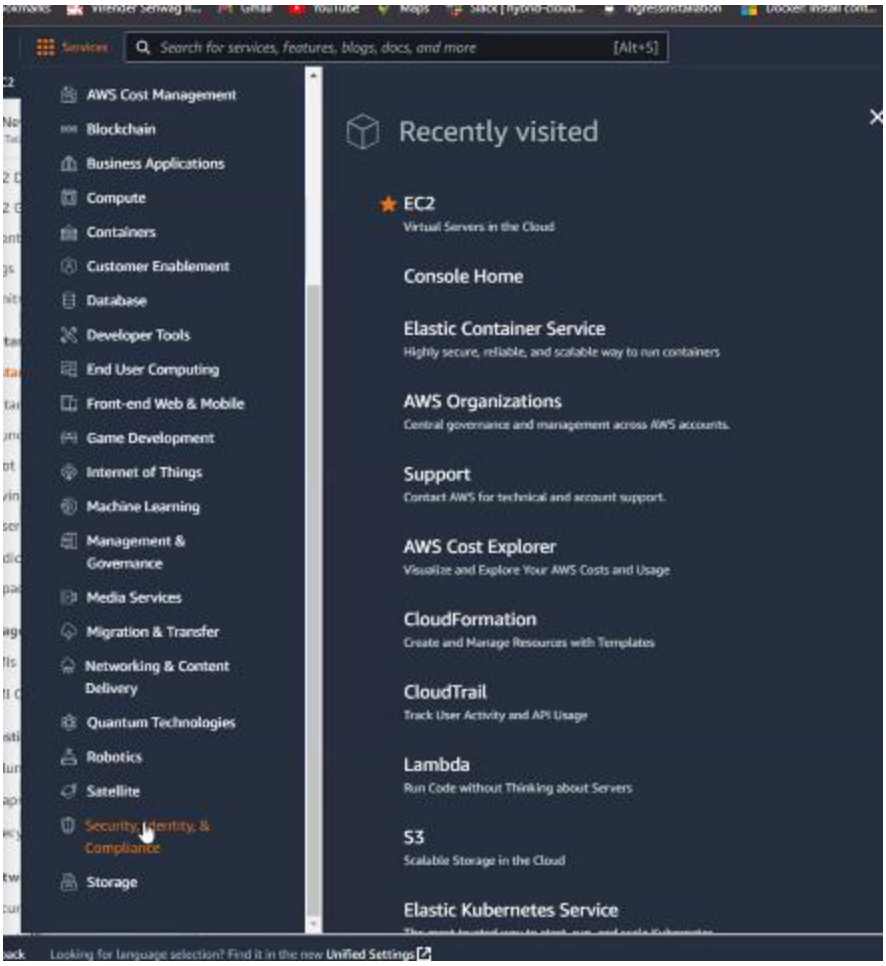
Services:

- ELB: Elastic Load Balancing
- EC2: Amazon Elastic Compute Cloud

Storage:

- S3: Simple storage
- EBS: Elastic Block Storage

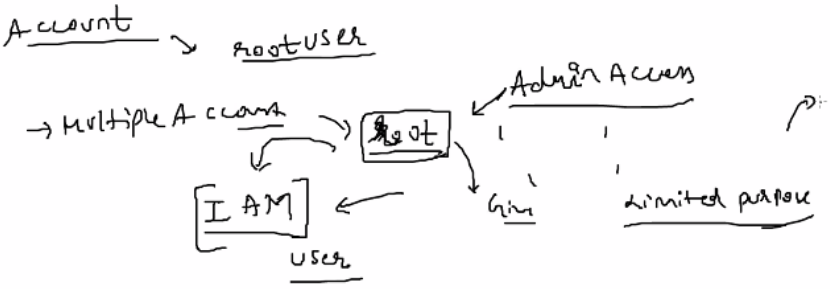
So many services:



The problem is whenever you create the account, the environment can have multiple account.

Whether they will give you the root access? (admin)? NO!

They will give the access of limited participants. (group the participant)

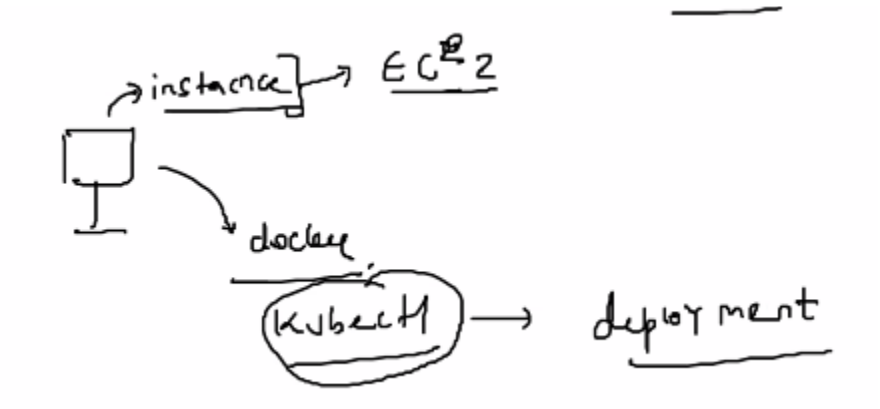


Different group get different access – that is called IAM entity – Identity Admin Management

What will you do inside?

We need a machine(instance) -> In AWS we will get by EC2.

For docker, we will get it by kubectl -> Deployment.



Terraform tool:

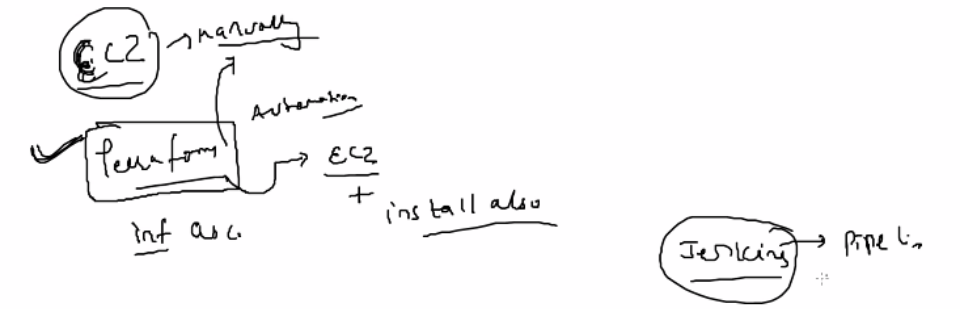
IAC –Infrastructure anywhere in Code tool – Automatically create infrastructure anywhere!

If you are good in this tool, can you use this terraform tool to create automation?
Logically no!

(Without having a knowledge of EC2 & AWS)

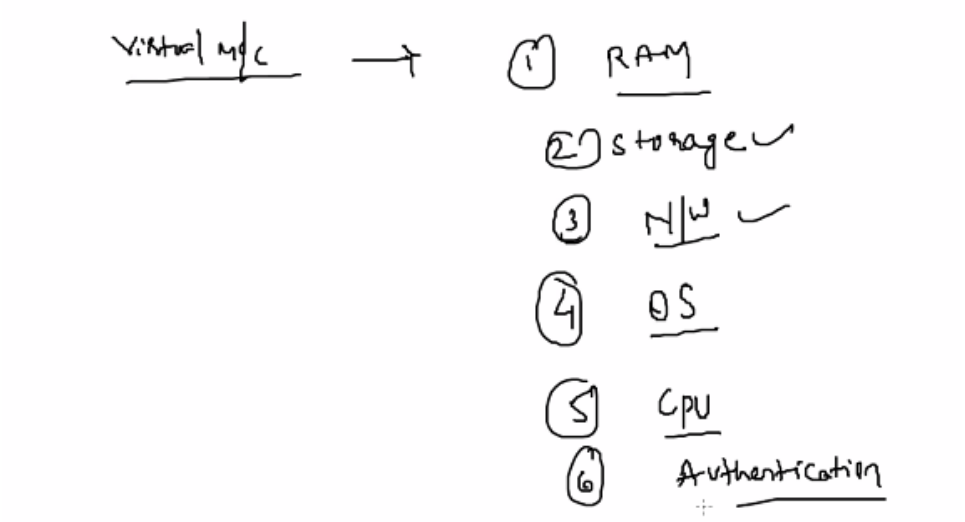
How to use EC2 manually?

Using terraform, we can automate it. - using this we can create instance and install anything automatically.

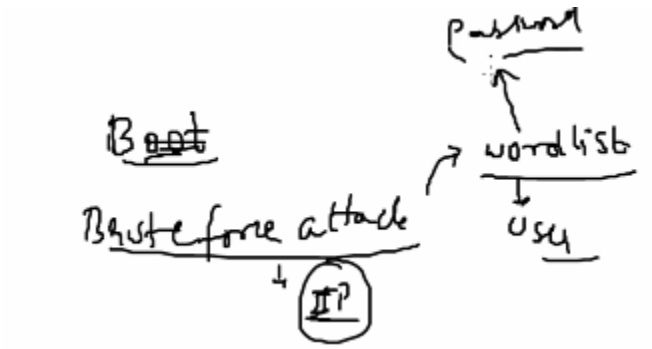


Simple virtual machine – if you want to create – what are the basic things you need?

1. RAM
2. Storage
3. Networking
4. OS
5. How much CPU
6. Authentication



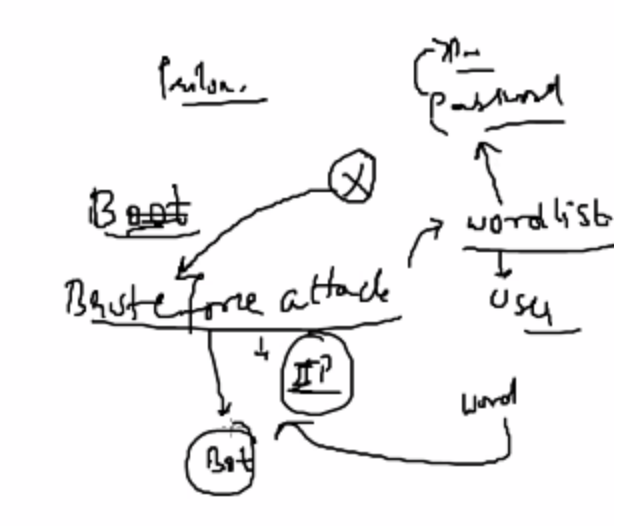
Tool to hack a thing using multiple passwords very second using a bot – this thing is called what? **Brute Force Attack**



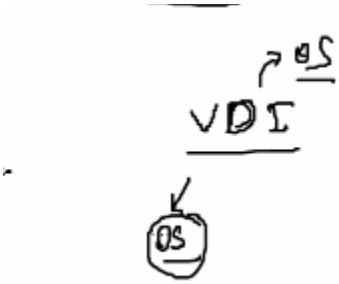
Trillions of users and passwords.

Will the hacker take one by one and use it? No!

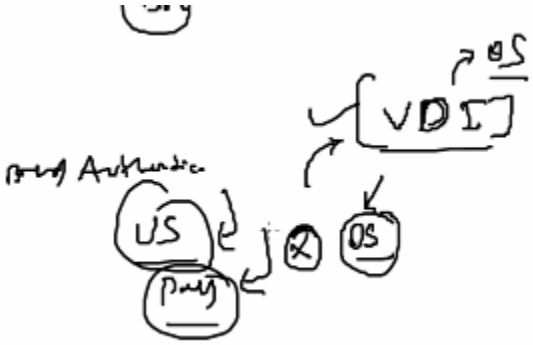
Using bot, they can automatically use user and password together.



Do the company provide VDI OS? Yes, our company uses the same



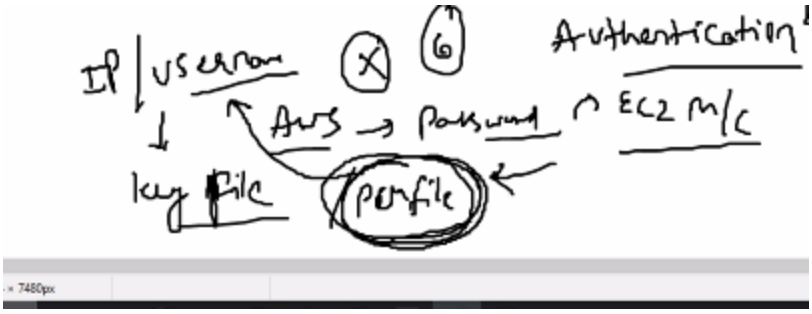
A different OS, that is created in cloud on premises – you can connect this OS/VDI using VPN. When you try to access this machine – you use user and password.



If I get the VPN by other means, then how it is secure?

Security in these times we can enhance it. But we can break it.

AWS – won't provide password to access EC2. Here, they provide key –pair file. Brute Force



But the key file can be shared? - Attack can't be done here. Brute Force can't happen here.

Fishing might happen – we need to be careful while someone is accessing emails and Pen drive.

EC2 Machine:

We will do it manually now.

The lab which we are using right now is enabled by password.

Do you know how many attempts one has done?

W command:

w command in Linux is **used to show who is logged on and what they are doing**. This command shows the information about the users currently on the machine and their processes

```
[root@trainer ~]# w
 05:36:32 up  1:58,  1 user,  load average: 0.05, 0.01, 0.00
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
root     pts/0    59.91.129.50     05:35    0.00s  0.03s  0.00s w
[root@trainer ~]#
```

Last command:

```
[root@trainer ~]# last
root     pts/0        59.91.129.50     Wed Apr 27 05:35   still logged in
root     pts/0        223.178.58.150   Wed Apr 27 04:43 - 04:56  (00:13)
reboot   system boot  5.10.109-104.500 Wed Apr 27 03:37 - 05:36  (01:59)
root     pts/0        117.199.170.131  Tue Apr 26 06:13 - down   (06:32)
root     pts/0        117.199.170.131  Tue Apr 26 04:34 - 06:12  (01:38)
reboot   system boot  5.10.109-104.500 Tue Apr 26 03:34 - 12:45  (09:10)
root     pts/1        117.199.171.96   Mon Apr 25 06:55 - 12:55  (05:59)
root     pts/0        1.39.212.61      Mon Apr 25 04:48 - 06:56  (02:08)
reboot   system boot  5.10.109-104.500 Mon Apr 25 04:36 - 12:45 (1+08:09)

wtmp begins Mon Apr 25 04:36:17 2022
[root@trainer ~]#
```

Lastb command:

```
[root@trainer ~]# lastb
[root@trainer ~]# lastb
pi       ssh:notty    82-65-211-222.su Wed Apr 27 04:44 - 04:44  (00:00)
pi       ssh:notty    82-65-211-222.su Wed Apr 27 04:44 - 04:44  (00:00)
pi       ssh:notty    82-65-211-222.su Wed Apr 27 04:44 - 04:44  (00:00)
pi       ssh:notty    82-65-211-222.su Wed Apr 27 04:44 - 04:44  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:14 - 07:14  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:14 - 07:14  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:13 - 07:13  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:13 - 07:13  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:13 - 07:13  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:13 - 07:13  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:12 - 07:12  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:12 - 07:12  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:12 - 07:12  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:12 - 07:12  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:12 - 07:12  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:12 - 07:12  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:11 - 07:11  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:11 - 07:11  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:11 - 07:11  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:11 - 07:11  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:10 - 07:10  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:10 - 07:10  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:10 - 07:10  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:10 - 07:10  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:09 - 07:09  (00:00)
user     ssh:notty    68.183.77.86     Tue Apr 26 07:09 - 07:09  (00:00)
root     ssh:notty    185.28.39.119    Tue Apr 26 06:27 - 06:27  (00:00)
```

To see the count of how many times they have tried. This is the Brute Force Attack

```
Usage: lastb [-num | -n num] [-f file] [-t Y
[root@trainer ~]# lastb | wc -l
90
[root@trainer ~]#
```

Password authentication error will be seen when tried with different username

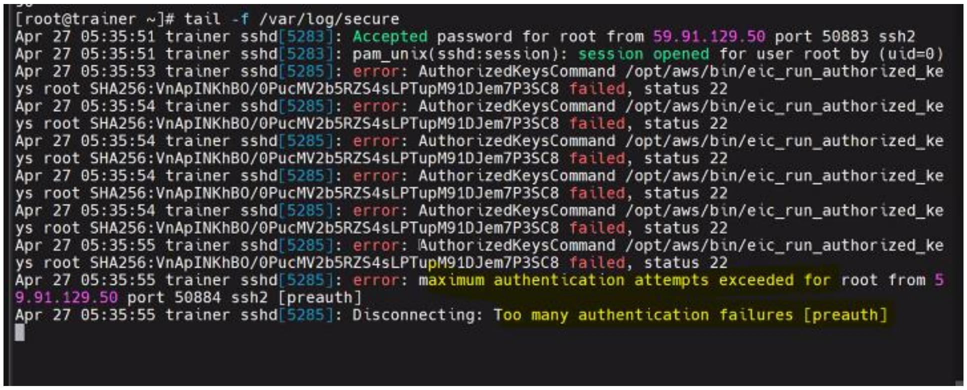
```
[root@master docker]# lastb
deploy   ssh:notty    164.92.215.30    Tue Apr 26 12:45 - 12:45  (00:00)
deploy   ssh:notty    164.92.215.30    Tue Apr 26 12:44 - 12:44  (00:00)
deploy   ssh:notty    164.92.215.30    Tue Apr 26 12:44 - 12:44  (00:00)
demo     ssh:notty    164.92.215.30    Tue Apr 26 12:43 - 12:43  (00:00)
data     ssh:notty    164.92.215.30    Tue Apr 26 12:42 - 12:42  (00:00)
centos   ssh:notty    164.92.215.30    Tue Apr 26 12:41 - 12:41  (00:00)
bot      ssh:notty    164.92.215.30    Tue Apr 26 12:41 - 12:41  (00:00)
ansible  ssh:notty    64.227.175.194   Tue Apr 26 12:40 - 12:40  (00:00)
bigdata  ssh:notty    164.92.215.30    Tue Apr 26 12:40 - 12:40  (00:00)
appuser  ssh:notty    164.92.215.30    Tue Apr 26 12:39 - 12:39  (00:00)
app      ssh:notty    164.92.215.30    Tue Apr 26 12:38 - 12:38  (00:00)
app      ssh:notty    164.92.215.30    Tue Apr 26 12:37 - 12:37  (00:00)
app      ssh:notty    164.92.215.30    Tue Apr 26 12:37 - 12:37  (00:00)
app      ssh:notty    164.92.215.30    Tue Apr 26 12:36 - 12:36  (00:00)
admin    ssh:notty    164.92.215.30    Tue Apr 26 12:34 - 12:34  (00:00)
admin    ssh:notty    164.92.215.30    Tue Apr 26 12:33 - 12:33  (00:00)
admin    ssh:notty    164.92.215.30    Tue Apr 26 12:32 - 12:32  (00:00)
awsgui   ssh:notty    164.92.215.30    Tue Apr 26 12:31 - 12:31  (00:00)
user     ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
admin    ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
test     ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
admin    ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
oracle   ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
admin    ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
admin    ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
support  ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
usuario  ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
admin    ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
admin    ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
admin    ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
1234     ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
admin    ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
ubnt     ssh:notty    137.184.214.165  Tue Apr 26 11:26 - 11:26  (00:00)
username ssh:notty    111.127.99.186   Tue Apr 26 11:05 - 11:05  (00:00)
```

To get Logs:

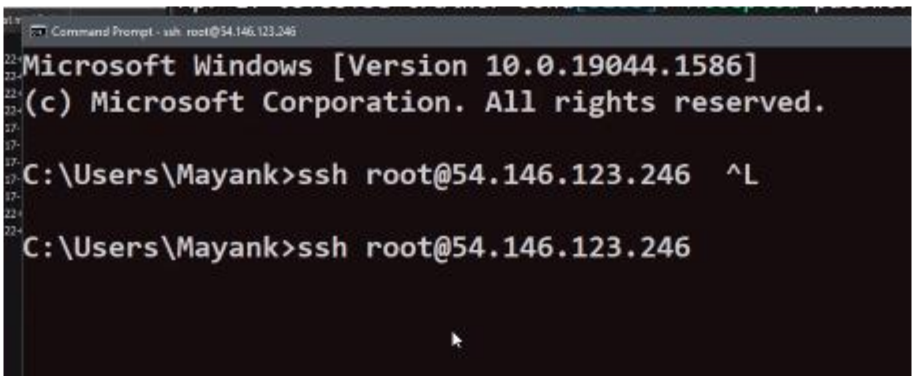
```
[root@master docker]# ls -l /var/log/secure
-rw------- 1 root root 25296 Apr 27 04:42 /var/log/secure
[root@master docker]#
```

Live logs:

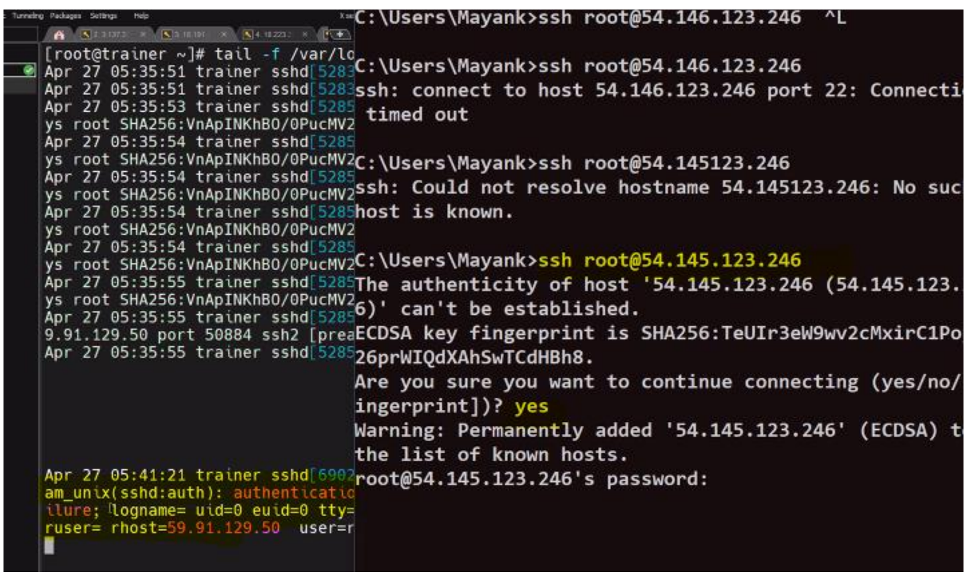
```
[root@master docker]# tail -f  /var/log/secure
Apr 27 04:04:24 master sshd[3450]: Accepted publickey for ec2-user from 59.91.129.50 port 50219 ssh2: RSA SHA256:VnA
pINKhBO/0PucMV2b5RZS4sLPTupM91DJem7P3SC8
Apr 27 04:04:24 master sshd[3450]: pam_unix(sshd:session): session opened for user ec2-user by (uid=0)
Apr 27 04:04:24 master sudo: ec2-user : TTY=pts/0 ; PWD=/home/ec2-user ; USER=root ; COMMAND=/bin/bash
Apr 27 04:04:24 master sudo: pam_unix(sudo-i:session): session opened for user root by ec2-user(uid=0)
Apr 27 04:15:05 master sshd[9952]: Connection closed by 167.248.133.117 port 41830 [preauth]
Apr 27 04:33:56 master sshd[29280]: Bad protocol version identification '\026\003\001' from 202.95.12.44 port 50864
Apr 27 04:34:36 master sshd[29293]: Did not receive identification string from 202.95.12.44 port 51084
Apr 27 04:37:55 master sshd[1004]: Connection closed by 202.95.12.44 port 34790 [preauth]
Apr 27 04:37:56 master sshd[1025]: Protocol major versions differ for 202.95.12.44 port 34858: SSH-2.0-OpenSSH_7.4 v
s. SSH-1.5-Server
Apr 27 04:42:14 master sshd[5049]: Connection closed by 162.142.125.220 port 44488 [preauth]
```



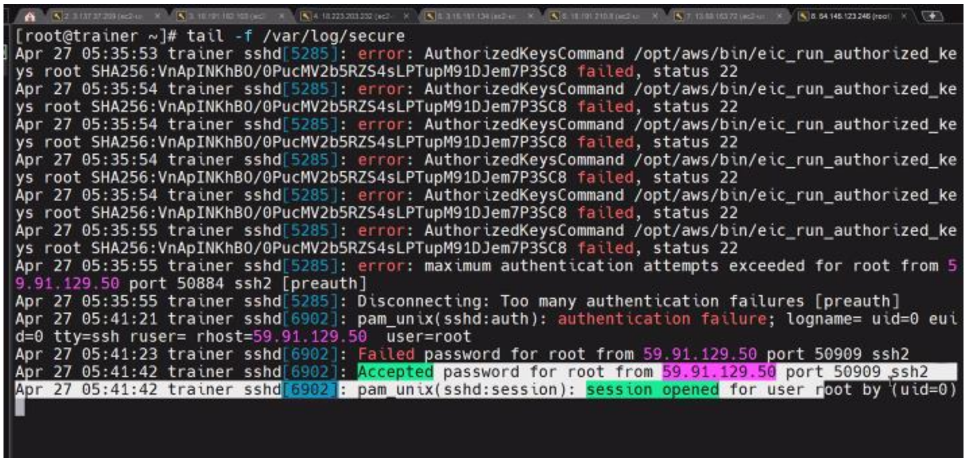
When I try to access it from the local machine? (Command prompt)



You can see the message – password wrong! Permission denied.

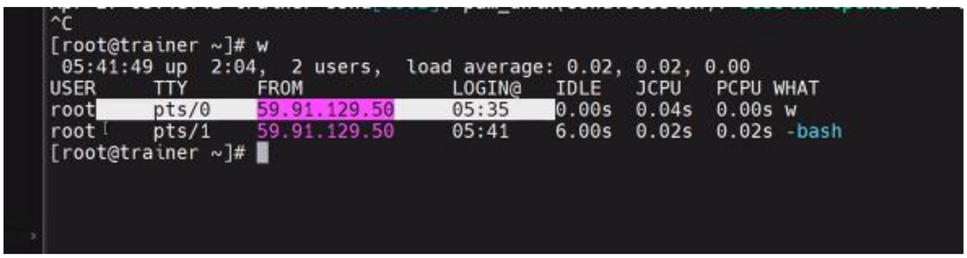


Accepted authentication:



```
[root@trainer ~]# tail -f /var/log/secure
Apr 27 05:35:53 trainer sshd[5285]: error: AuthorizedKeysCommand /opt/aws/bin/eic_run_authorized_keys root SHA256:VnApINKhBO/0PucMV2b5RZS4sLPTupM91DJem7P3SC8 failed, status 22
Apr 27 05:35:54 trainer sshd[5285]: error: AuthorizedKeysCommand /opt/aws/bin/eic_run_authorized_keys root SHA256:VnApINKhBO/0PucMV2b5RZS4sLPTupM91DJem7P3SC8 failed, status 22
Apr 27 05:35:54 trainer sshd[5285]: error: AuthorizedKeysCommand /opt/aws/bin/eic_run_authorized_keys root SHA256:VnApINKhBO/0PucMV2b5RZS4sLPTupM91DJem7P3SC8 failed, status 22
Apr 27 05:35:54 trainer sshd[5285]: error: AuthorizedKeysCommand /opt/aws/bin/eic_run_authorized_keys root SHA256:VnApINKhBO/0PucMV2b5RZS4sLPTupM91DJem7P3SC8 failed, status 22
Apr 27 05:35:54 trainer sshd[5285]: error: AuthorizedKeysCommand /opt/aws/bin/eic_run_authorized_keys root SHA256:VnApINKhBO/0PucMV2b5RZS4sLPTupM91DJem7P3SC8 failed, status 22
Apr 27 05:35:55 trainer sshd[5285]: error: AuthorizedKeysCommand /opt/aws/bin/eic_run_authorized_keys root SHA256:VnApINKhBO/0PucMV2b5RZS4sLPTupM91DJem7P3SC8 failed, status 22
Apr 27 05:35:55 trainer sshd[5285]: error: maximum authentication attempts exceeded for root from 59.91.129.50 port 50884 ssh2 [preauth]
Apr 27 05:35:55 trainer sshd[5285]: Disconnecting: Too many authentication failures [preauth]
Apr 27 05:41:21 trainer sshd[6902]: pam_unix(sshd:auth): authentication failure; logname= uid=0 euid=0 tty=ssh ruser= rhost=59.91.129.50  user=root
Apr 27 05:41:23 trainer sshd[6902]: Failed password for root from 59.91.129.50 port 50909 ssh2
Apr 27 05:41:42 trainer sshd[6902]: Accepted password for root from 59.91.129.50 port 50909 ssh2
Apr 27 05:41:42 trainer sshd[6902]: pam_unix(sshd:session): session opened for user root by (uid=0)
```

Sources are same – but two different ways of access.

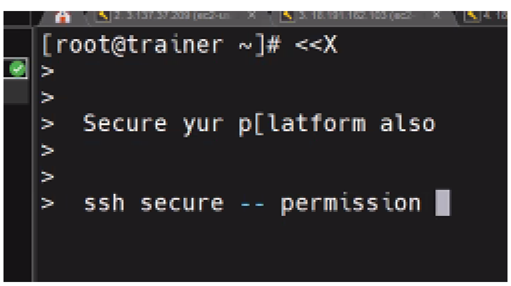


```
^C
[root@trainer ~]# w
 05:41:49 up  2:04,  2 users,  load average: 0.02, 0.02, 0.00
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
root     pts/0    59.91.129.50     05:35    0.00s  0.04s  0.00s w
root     pts/1    59.91.129.50     05:41    6.00s  0.02s  0.02s -bash
[root@trainer ~]#
```

Everywhere you have to secure your platform.

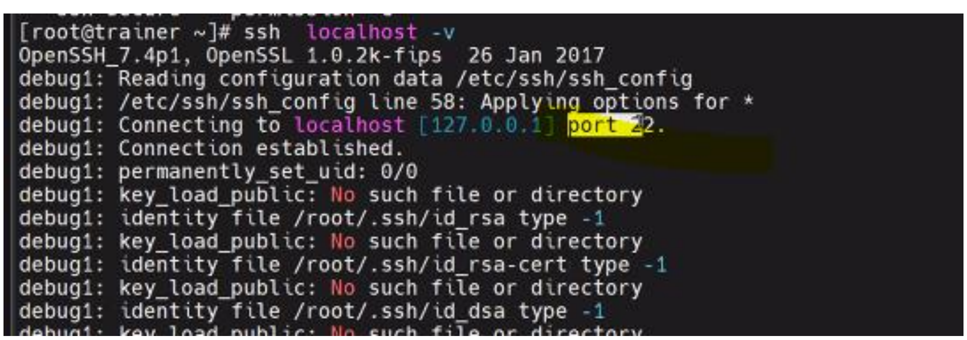
– what platform? – Suppose, the machine which you currently use it.

How our platform is secure? Let's check it!



```
[root@trainer ~]# <<X
>
>
>  Secure yur p[latform also
>
>
>  ssh secure -- permission
```

Access the ssh using default port number – It works!



```
[root@trainer ~]# ssh  localhost -v
OpenSSH_7.4p1, OpenSSL 1.0.2k-fips  26 Jan 2017
debug1: Reading configuration data /etc/ssh/ssh_config
debug1: /etc/ssh/ssh_config line 58: Applying options for *
debug1: Connecting to localhost [127.0.0.1] port 22.
debug1: Connection established.
debug1: permanently_set_uid: 0/0
debug1: key_load_public: No such file or directory
debug1: identity file /root/.ssh/id_rsa type -1
debug1: key_load_public: No such file or directory
debug1: identity file /root/.ssh/id_rsa-cert type -1
debug1: key_load_public: No such file or directory
debug1: identity file /root/.ssh/id_dsa type -1
```

Now, try to use it with different port number

```
[root@trainer ~]# ssh  localhost -v  -p 3434
OpenSSH_7.4p1, OpenSSL 1.0.2k-fips  26 Jan 2017
debug1: Reading configuration data /etc/ssh/ssh_config
debug1: /etc/ssh/ssh_config line 58: Applying options for *
debug1: Connecting to localhost [127.0.0.1] port 3434.
debug1: connect to address 127.0.0.1 port 3434: Connection refused
ssh: connect to host localhost port 3434: Connection refused
[root@trainer ~]#
```

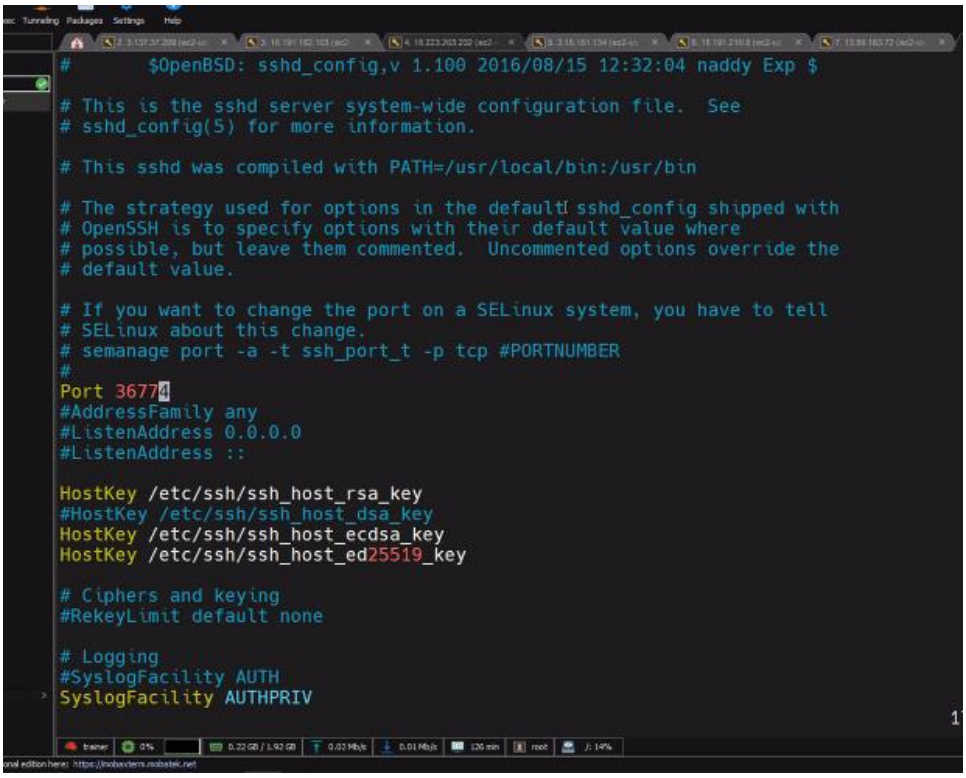
Edit the configuration file:

```
[root@trainer ~]# vi /etc/ssh/sshd_config
```

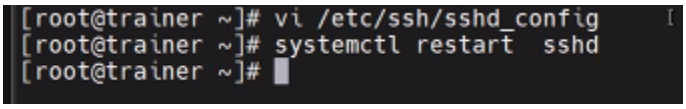
Port 22 is default:

```
#       $OpenBSD: sshd_config,v 1.100 2016/08/15 12:32:04 naddy

# This is the sshd server system-wide configuration file.  See
# sshd_config(5) for more information.

# This sshd was compiled with PATH=/usr/local/bin:/usr/bin

# The strategy used for options in the default sshd_config ship
# OpenSSH is to specify options with their default value where
# possible, but leave them commented.  Uncommented options over
# default value.

# If you want to change the port on a SELinux system, you have
# SELinux about this change.
# semanage port -a -t ssh_port_t -p tcp #PORTNUMBER
#
Port 22
#AddressFamily any
#ListenAddress 0.0.0.0
#ListenAddress ::

HostKey /etc/ssh/ssh_host_rsa_key
#HostKey /etc/ssh/ssh_host_dsa_key
HostKey /etc/ssh/ssh_host_ecdsa_key
HostKey /etc/ssh/ssh_host_ed25519_key

# Ciphers and keying
#RekeyLimit default none

# Logging
#SyslogFacility AUTH
SyslogFacility AUTHPRIV
-- INSERT --
```

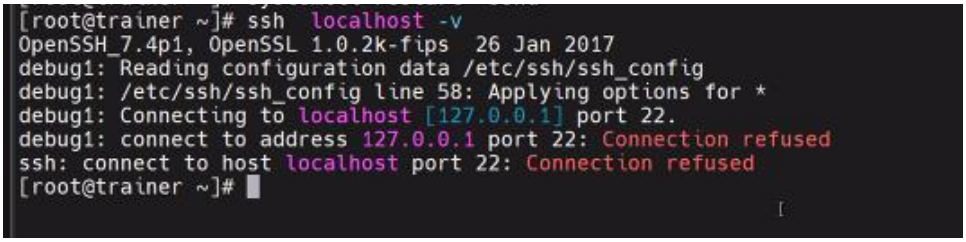
Change the port number – 36774:



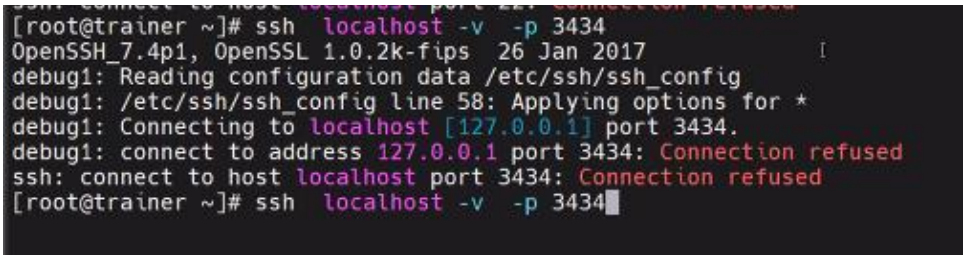
Restart the service:



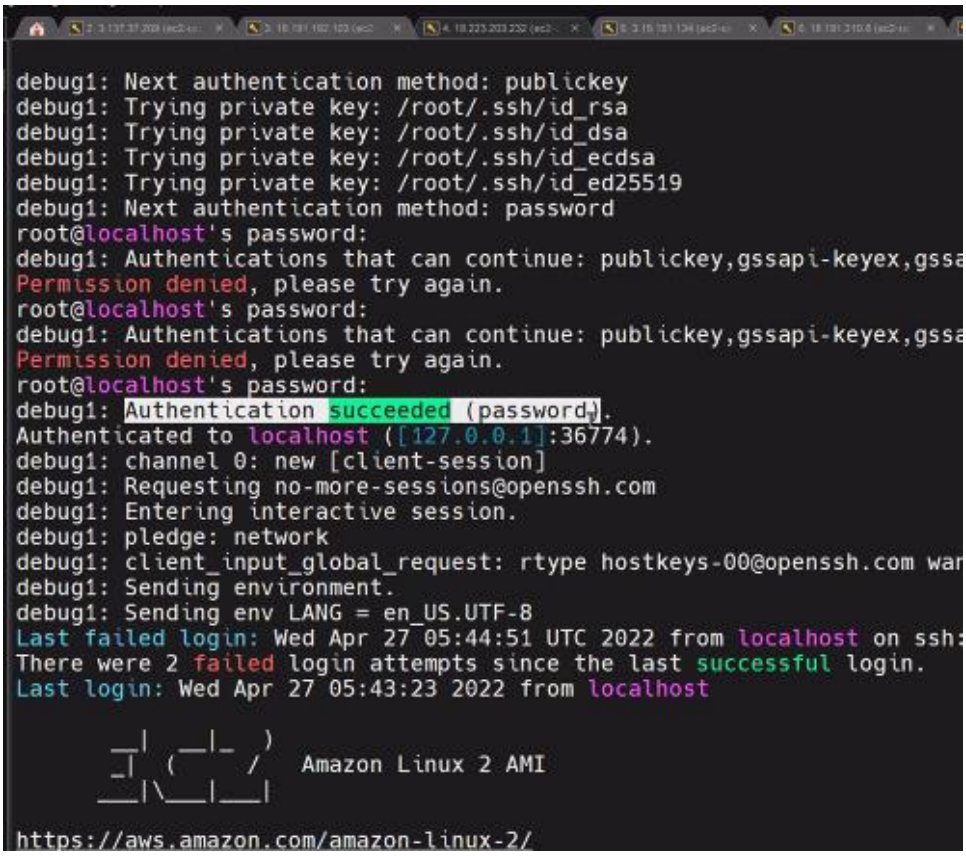
Using with port 22:



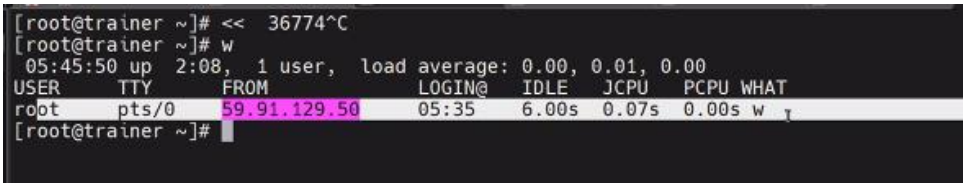
Using the wrong password:



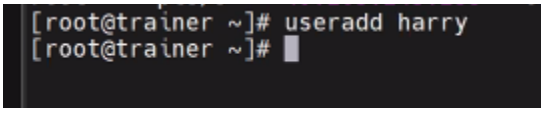
Using the right port number:



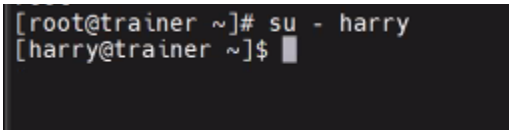
This can be brute force as the port number is limited



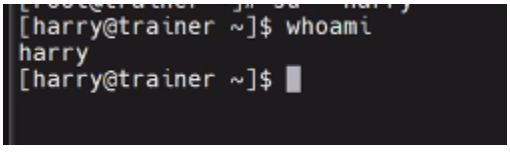
Do you know how to create user in Linux?



How to login with harry?



Verify:



Allow user: (by name or ip address we can use it)

Edit in ssh:

```
[harry@trainer ~]$ logout
[root@trainer ~]# vi /etc/ssh/sshd_config
[root@trainer ~]# vi /etc/ssh/sshd_config
```

```
#UseDNS yes
#PidFile /var/run/sshd.pid
#MaxStartups 10:30:100
#PermitTunnel no
#ChrootDirectory none
#VersionAddendum none

# no default banner path
#Banner none

# Accept locale-related environment variables
AcceptEnv LANG LC_CTYPE LC_NUMERIC LC_TIME LC_COLLATE LC_MONETARY LC_MESSAGES
AcceptEnv LC_PAPER LC_NAME LC_ADDRESS LC_TELEPHONE LC_MEASUREMENT
AcceptEnv LC_IDENTIFICATION LC_ALL LANGUAGE
AcceptEnv XMODIFIERS

# override default of no subsystems
Subsystem sftp  /usr/libexec/openssh/sftp-server

# Example of overriding settings on a per-user basis
#Match User anoncvs
#       X11Forwarding no
#       AllowTcpForwarding no
#       PermitTTY no
#       ForceCommand cvs server

AuthorizedKeysCommand /opt/aws/bin/eic_run_authorized_keys %u %f
AuthorizedKeysCommandUser ec2-instance-connect



AllowUsers   harry@54.146.194.73
-- INSERT --
```

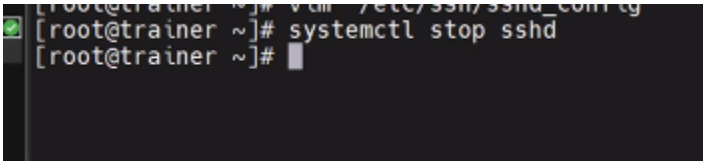
Restart the sshd and assign the password:

```
[root@trainer ~]# systemctl restart sshd
[root@trainer ~]# passwd harry
Changing password for user harry.
New password:
BAD PASSWORD: The password is a palindrome
Retype new password:
passwd: all authentication tokens updated successfully.
[root@trainer ~]#
```

IP address of Mayank – Sashi is trying to access it.

```
[root@trainer ~]# ssh   harry@54.145.123.246 -p 36774
The authenticity of host '[54.145.123.246]:36774 ([54.145.123.246]:36774)' can't be established.
ECDSA key fingerprint is SHA256:TeUIr3eW9wv2cMxirC1Pojq26prWIQdXAhSwTCdHBh8.
ECDSA key fingerprint is MD5:f7:36:f1:96:96:fd:85:ca:5d:d2:04:43:46:f4:3b:c3.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '[54.145.123.246]:36774' (ECDSA) to the list of known hosts.
harry@54.145.123.246's password:
```

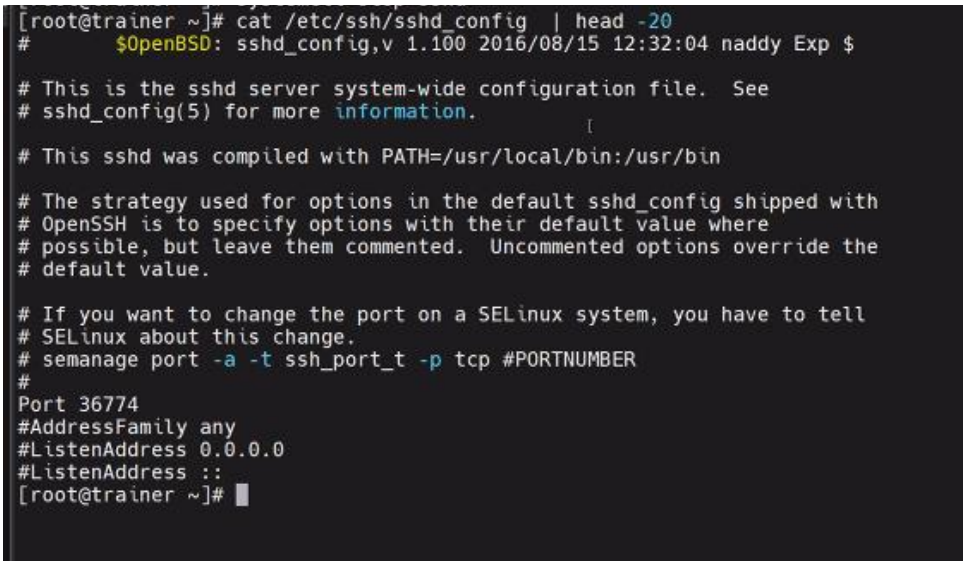
Everyone else can't access it as in the configuration file, Sashi IP is only given. For others, it will be accessing denied.



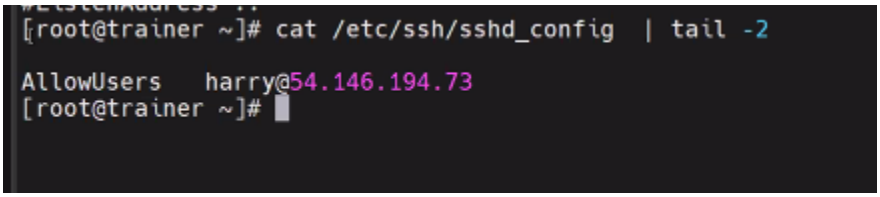
If someone took the Sashi machine, then in that case stop the service. Now no one can access it.

So, this is the security in our platform.

Top 20: (first 20 lines of that file)



Tail 2: Last two lines



Commands shared by the trainer:

[root@trainer ~]# cat /etc/ssh/sshd_config | tail -2

AllowUsers harry@54.146.194.73

300 systemctl start docker

301 docker images

302 kubectl create deployment alp --image Alpana87/collinsimage

303 systemctl start kubelet

304 kubectl get all

305 systemctl start kubelet

306 yum install wget -y ; wget 3.137.37.209/config ; mkdir $HOME/.kube/ ; cp config $HOME/.kube/ ; kubectl get nodes

307 kubectl get nodes

308 kubectl get service

309 kubectl create deployment example1 --image nginx

310 kubectl create deployment mayankimage --image nginx

311 clear

312 docker images

313 kubectl create deployment example1 --image nginx

314 w

315 last

316 lastb

317 lastb \ wc -l

318 lastb | wc -l

319 tail -f /var/log/secure

320 q

321 w

322 lastb

323 tail -f /var/log/secure

324 w

325 <<X

Secure yur p[latform also

326 ssh localhost -v

```
  327  ssh  localhost -v  -p 3434
  328  vi /etc/ssh/sshd_config
  329  systemctl restart  sshd
  330  ssh  localhost -v
  331  ssh  localhost -v  -p 3434
  332  vi /etc/ssh/sshd_config
  333  ssh  localhost -v  -p 36774
  334  w
  335  useradd harry
  336  whoami
  337  su - harry
  338  vi /etc/ssh/sshd_config
  339  systemctl restart sshd
  340  passwd harry
  341  vi /etc/ssh/sshd_config
  342  ssh   harry@54.145.123.246
  343  ssh   harry@54.145.123.246 -p 36774
  344  vim  /etc/ssh/sshd_config
  345  systemctl stop sshd
  346  cat /etc/ssh/sshd_config  | head -20
  347  cat /etc/ssh/sshd_config  | tail -2
  348  history
[root@trainer ~]#
```

How to create a EC2 instance using terraform?

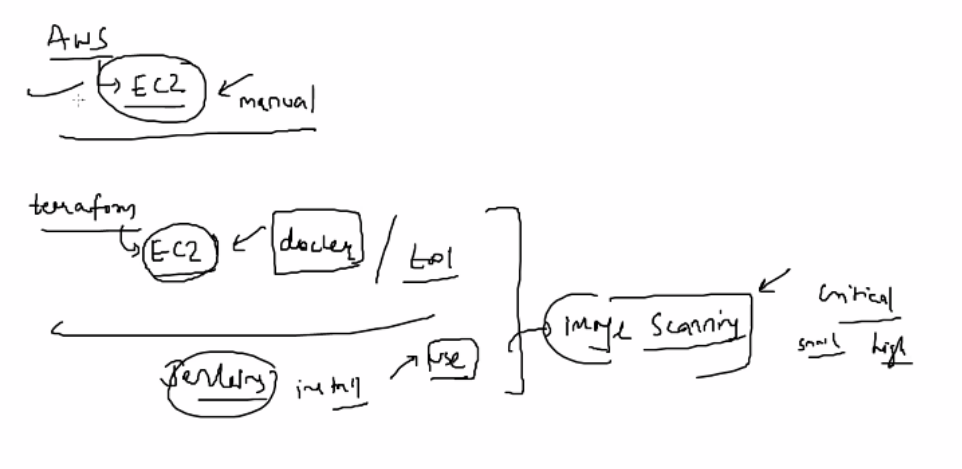
AWS service:

EC2 is created manually

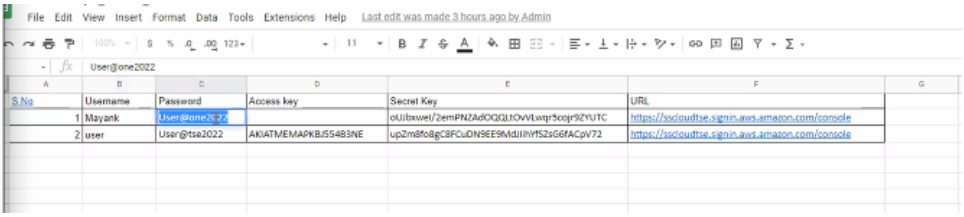
Terraform -> EC2 -> Install docker or another tool.

Jenkins

Image scanning - criticality

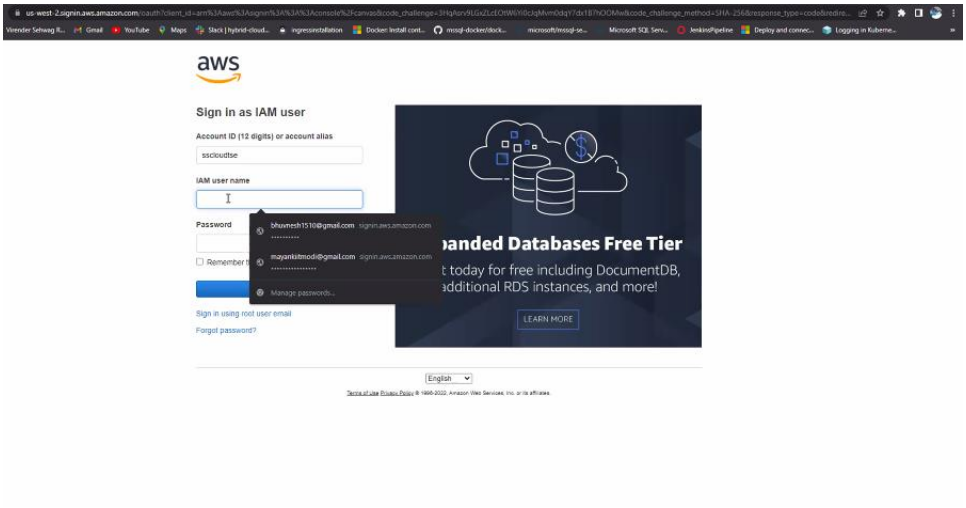


Credentials of AWS account:

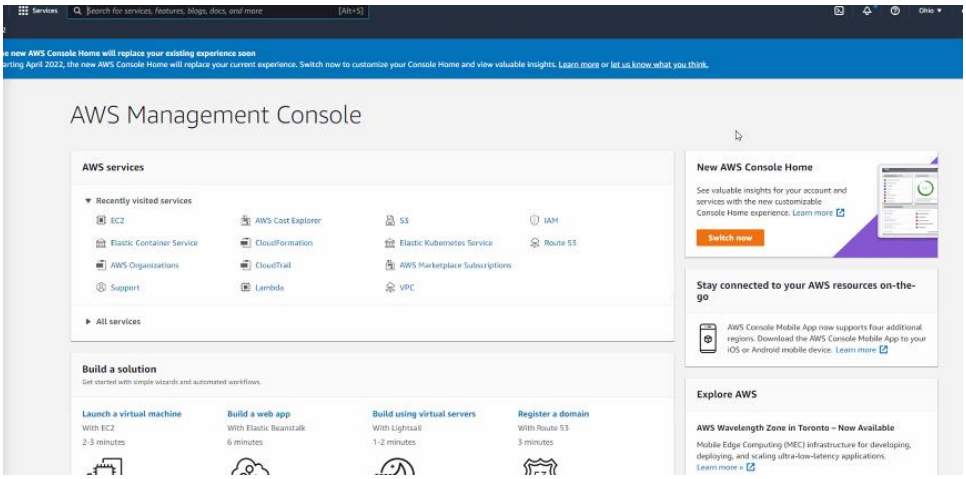


S.No	Username	Password	Access key	Secret Key	URL
1	Mayank	User@one2022		oUIbxwel/2emPNZAdOQQLtOvVLwqr5cojr9ZYUTC	https://sscloudtse.signin.aws.amazon.com/console
2	user	User@tse2022	AKIATMEMAPKBJS54B3NE	upZm8fo8gC8FCuDN9EE9MdJIhYf5ZsG6fACpV72	https://sscloudtse.signin.aws.amazon.com/console

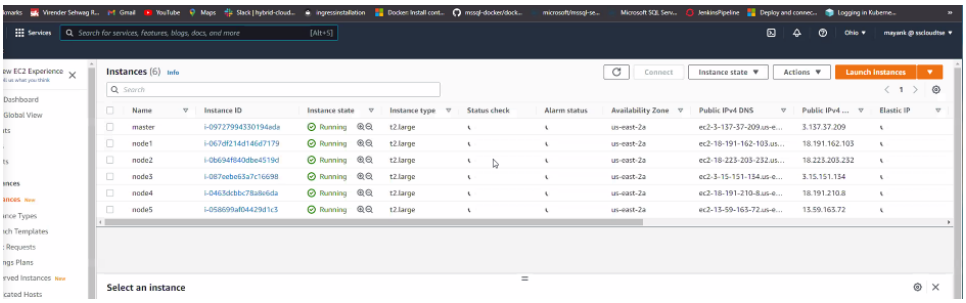
Login to AWS account:



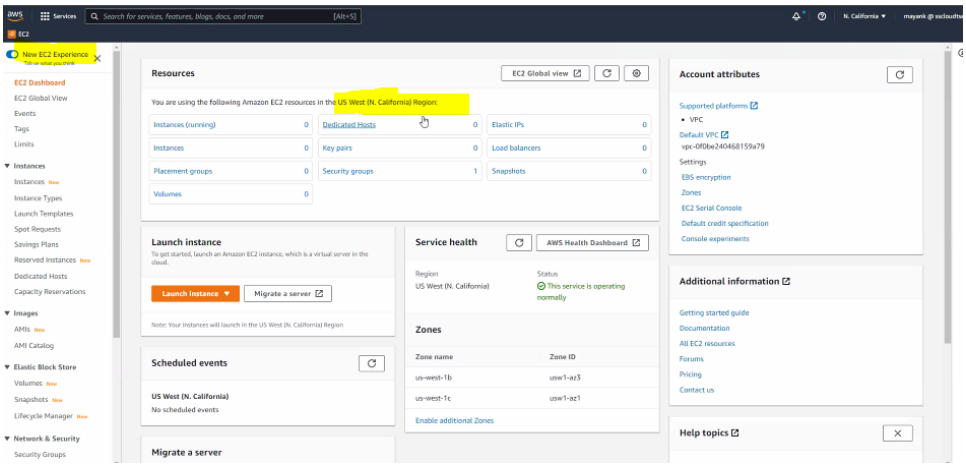
AWS home page:



EC2 service:

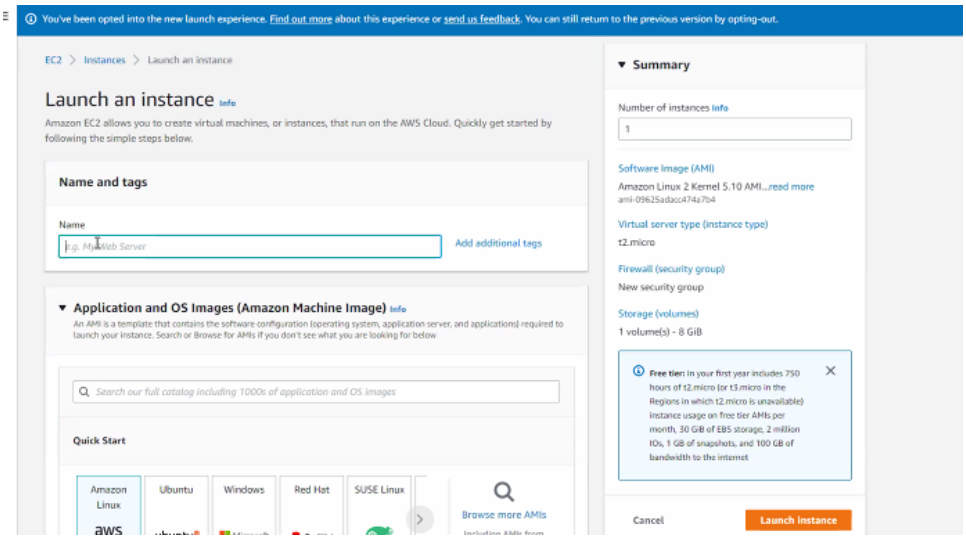


Check the region:

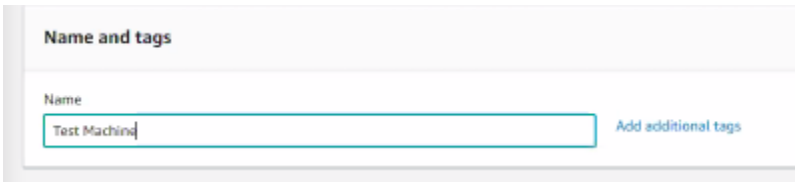


Launch instance:

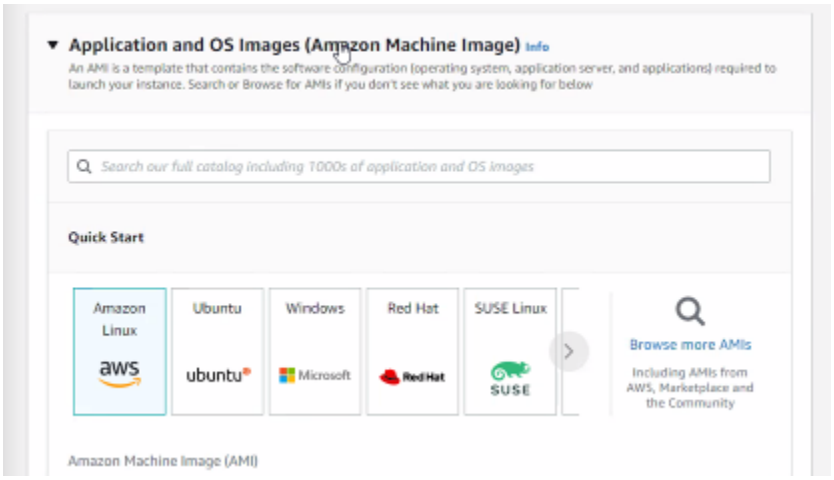
OS:



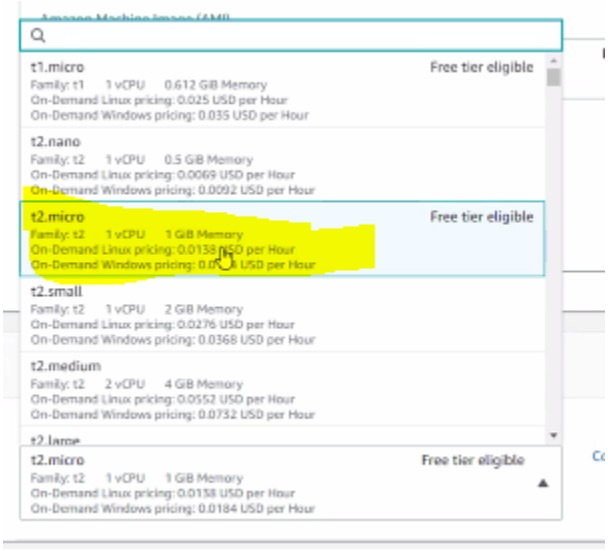
Name:



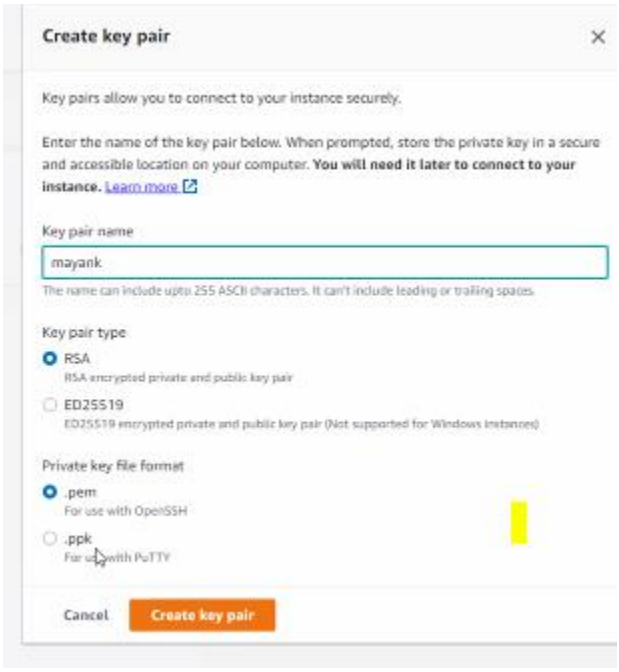
Choose - Amazon AMI:

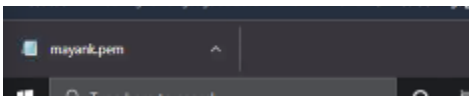


Based on the use case you can choose:

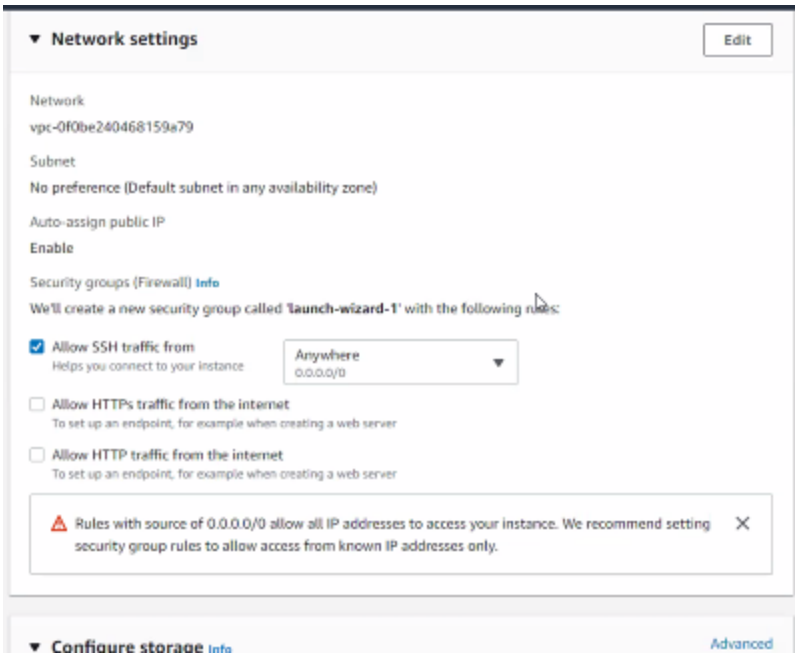


Download the key pair:

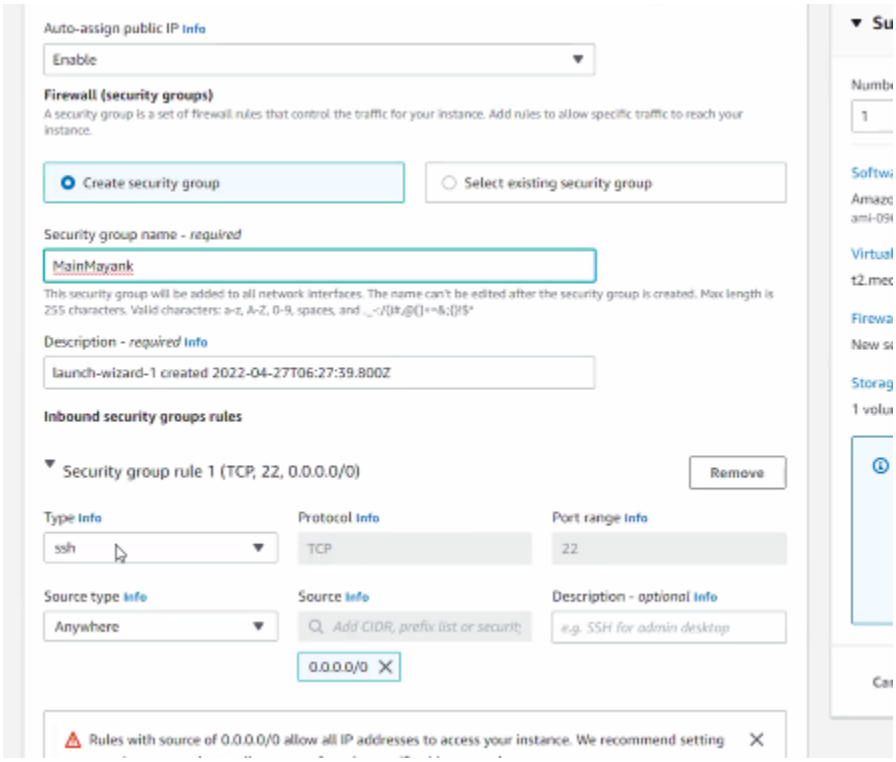




Network setting:

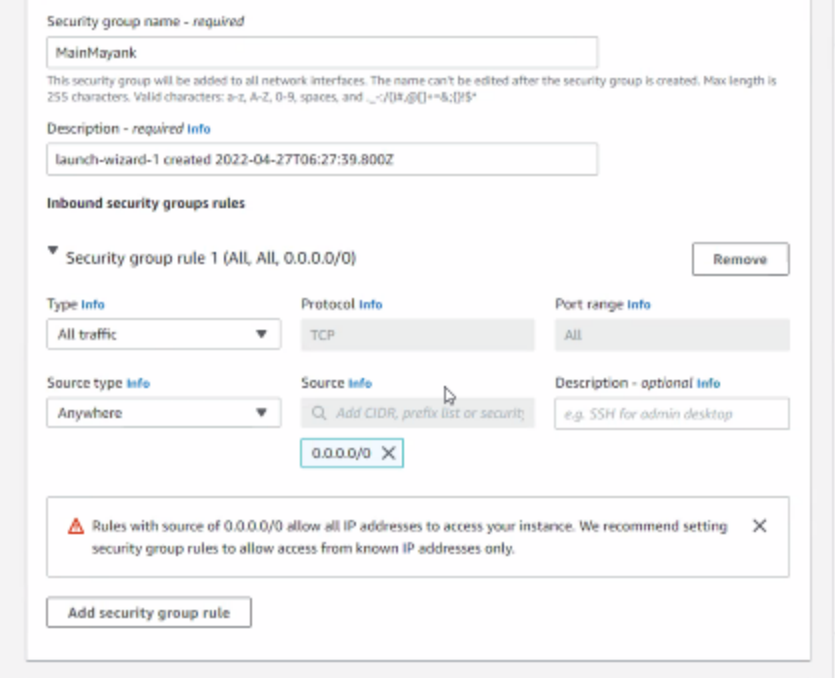


Security group:

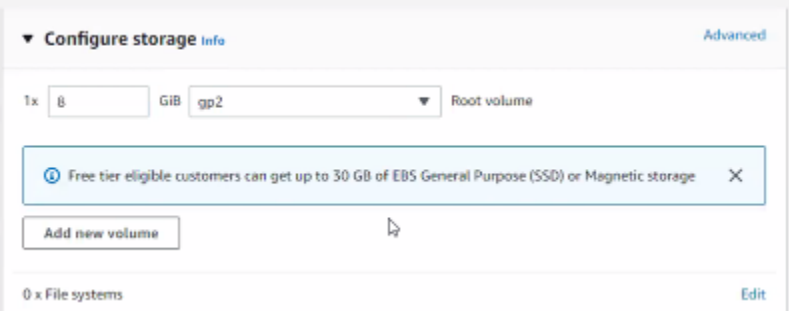


Select the type of the security group as All Traffic instead of ssh.

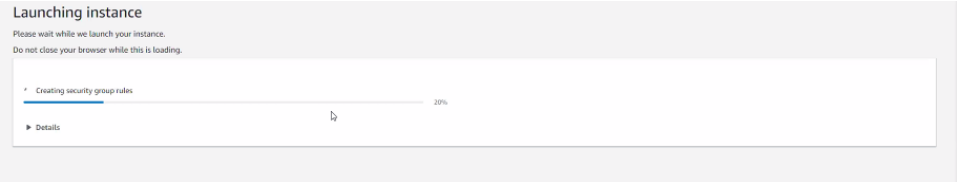
Security group:



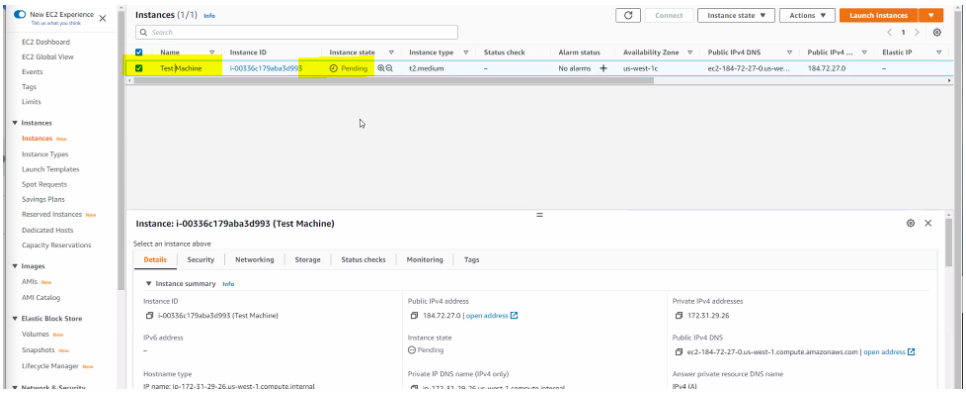
Storage:

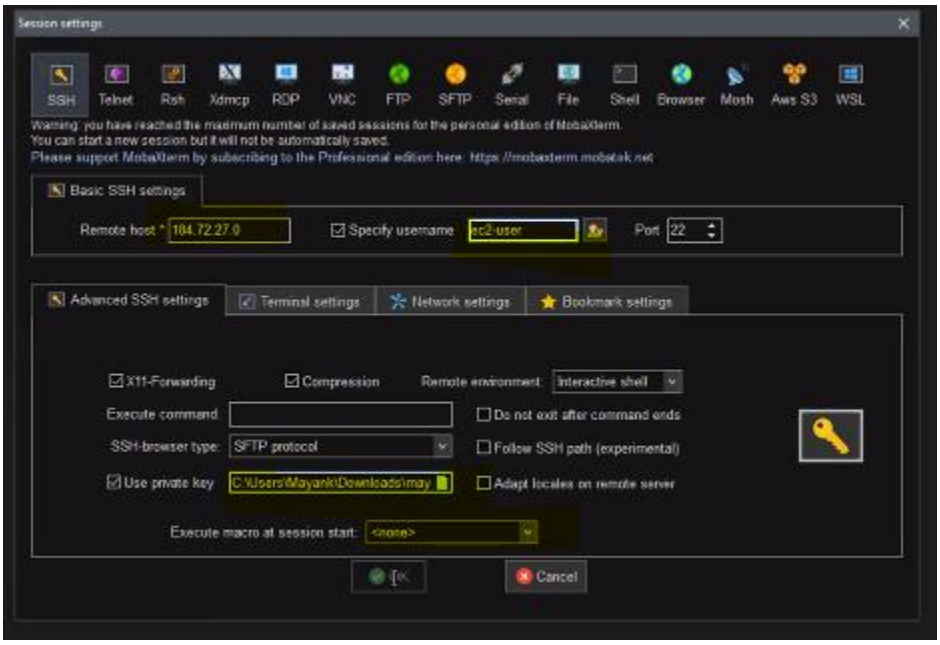


Launch Instance:



Pending state:


Instances (1/1)
Test Machine
Instance: i-00336c179aba3d993 (Test Machine)


Session settings
SSH
Telnet
Rsh
Xdmcp
RDP
VNC
FTP
SFTP
Serial
File
Shell
Browser
Mosh
Aws S3
WSL
Basic SSH settings
Remote host * 184.72.27.0
Specify username
ec2-user
Port 22
Advanced SSH settings
Terminal settings
Network settings
Bookmark settings
X11-Forwarding
Compression
Remote environment: Interactive shell
Execute command:
Do not exit after command ends
SSH-browser type: SFTP protocol
Follow SSH path (experimental)
Use private key
C:\Users\Mayank\Downloads\may
Adapt locales on remote server
Execute macro at session start: <none>
OK
Cancel

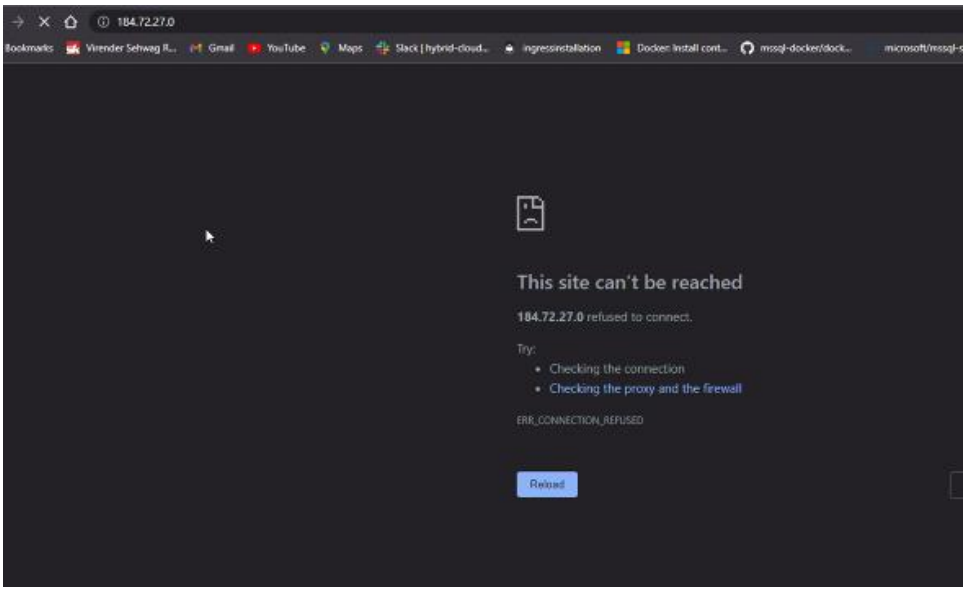
Storage: 4GB

```
[root@ip-172-31-29-26 ~]# free -G
free: invalid option -- 'G'

Usage:
 free [options]

Options:
 -b, --bytes         show output in bytes
 -k, --kilo          show output in kilobytes
 -m, --mega          show output in megabytes
 -g, --giga          show output in gigabytes
     --tera          show output in terabytes
     --peta          show output in petabytes
 -h, --human         show human-readable output
     --si            use powers of 1000 not 1024
 -l, --lohi          show detailed low and high memory statistics
 -t, --total         show total for RAM + swap
 -s N, --seconds N   repeat printing every N seconds
 -c N, --count N     repeat printing N times, then exit
 -w, --wide          wide output

     --help     display this help and exit
 -V, --version  output version information and exit

For more details see free(1).
[root@ip-172-31-29-26 ~]# free -g
              total        used        free      shared  buff/cache   available
Mem:              3           0           3           0           0           3
Swap:             0           0           0
[root@ip-172-31-29-26 ~]#
```

CPU: 2

```
[root@ip-172-31-29-26 ~]# lscpu
Architecture:        x86_64
CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              2
On-line CPU(s) list: 0,1
Thread(s) per core:  1
Core(s) per socket:  2
Socket(s):           1
NUMA node(s):        1
Vendor ID:           GenuineIntel
CPU family:          6
Model:               79
Model name:          Intel(R) Xeon(R) CPU E5-2686 v4 @ 2.30GHz
Stepping:            1
CPU MHz:             2300.099
BogoMIPS:            4600.12
Hypervisor vendor:   Xen
Virtualization type: full
L1d cache:           32K
L1i cache:           32K
L2 cache:            256K
L3 cache:            46080K
NUMA node0 CPU(s):   0,1
Flags:               fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca
2 ht syscall nx rdtscp lm constant_tsc rep_good nopl xtopology cpuid tsc_known
 sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdran
vpcid_single pti fsgsbase bmi1 avx2 smep bmi2 erms invpcid xsaveopt
[root@ip-172-31-29-26 ~]#
```

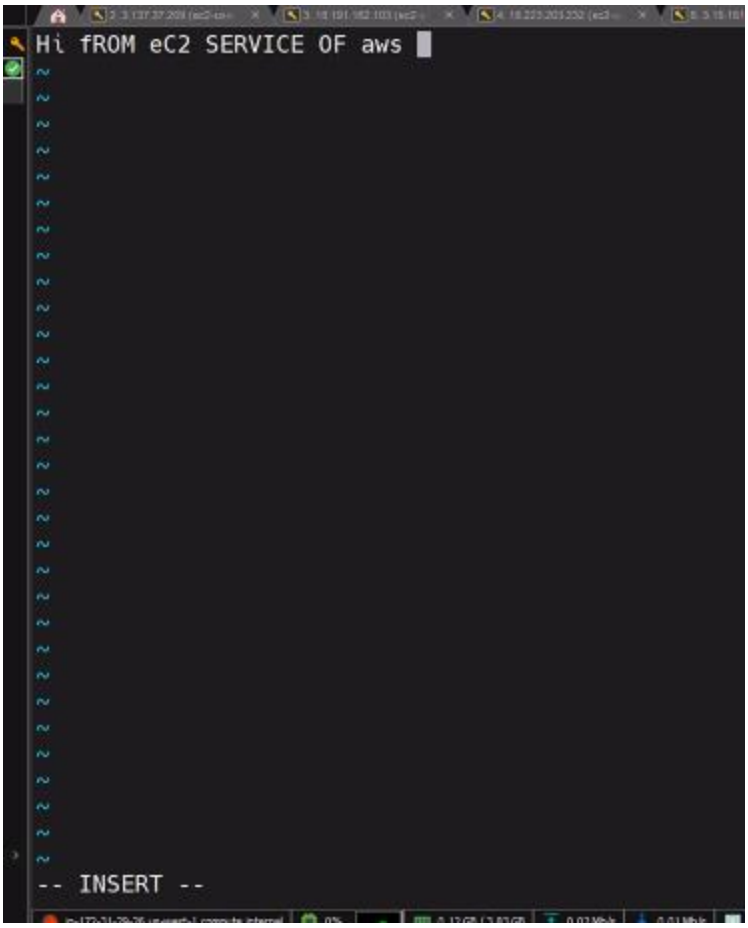
Web server: Now it is not accessible.



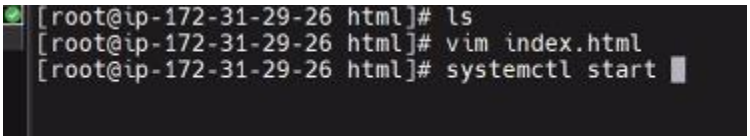
Install Apache service:

```
[root@ip-172-31-29-26 ~]# yum install httpd -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Resolving Dependencies
--> Running transaction check
---> Package httpd.x86_64 0:2.4.52-1.amzn2 will be installed
--> Processing Dependency: httpd-tools = 2.4.52-1.amzn2 for package: httpd-2.4.52-1.amzn2.
--> Processing Dependency: httpd-filesystem = 2.4.52-1.amzn2 for package: httpd-2.4.52-1.a
--> Processing Dependency: system-logos-httpd for package: httpd-2.4.52-1.amzn2.x86_64
--> Processing Dependency: mod_http2 for package: httpd-2.4.52-1.amzn2.x86_64
--> Processing Dependency: httpd-filesystem for package: httpd-2.4.52-1.amzn2.x86_64
--> Processing Dependency: /etc/mime.types for package: httpd-2.4.52-1.amzn2.x86_64
--> Processing Dependency: libaprutil-1.so.0()(64bit) for package: httpd-2.4.52-1.amzn2.x8
--> Processing Dependency: libapr-1.so.0()(64bit) for package: httpd-2.4.52-1.amzn2.x86_64
--> Running transaction check
---> Package apr.x86_64 0:1.7.0-9.amzn2 will be installed
---> Package apr-util.x86_64 0:1.6.1-5.amzn2.0.2 will be installed
--> Processing Dependency: apr-util-bdb(x86-64) = 1.6.1-5.amzn2.0.2 for package: apr-util-
---> Package generic-logos-httpd.noarch 0:18.0.0-4.amzn2 will be installed
---> Package httpd-filesystem.noarch 0:2.4.52-1.amzn2 will be installed
---> Package httpd-tools.x86_64 0:2.4.52-1.amzn2 will be installed
---> Package mailcap.noarch 0:2.1.41-2.amzn2 will be installed
---> Package mod_http2.x86_64 0:1.15.19-1.amzn2.0.1 will be installed
--> Running transaction check
---> Package apr-util-bdb.x86_64 0:1.6.1-5.amzn2.0.2 will be installed
```

Configuration:



Start the service:

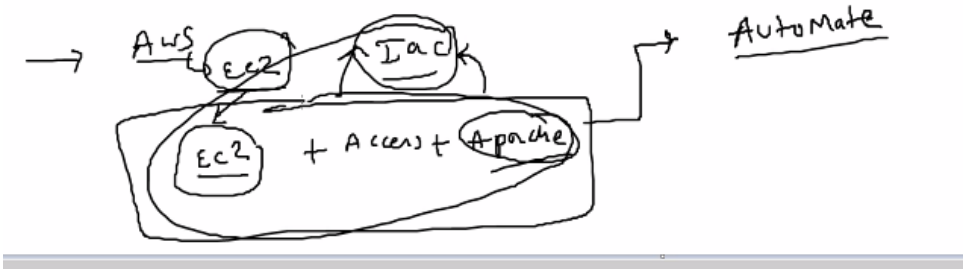


Web service accessible now:

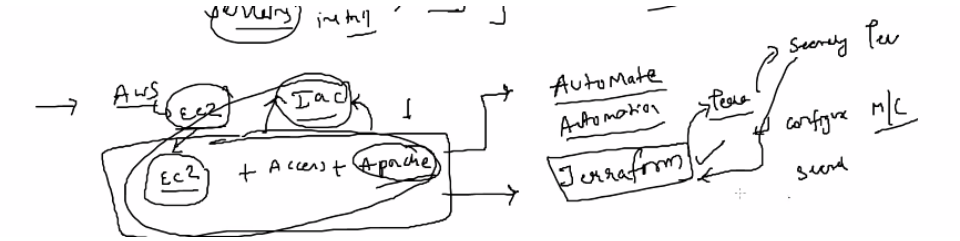
(The website showing the message in the index.html file)

This is a kind of infrastructure.

Automate:



Tool used to automate: Terraform



Task:

Link: https://sscloudtse.signin.aws.amazon.com/console

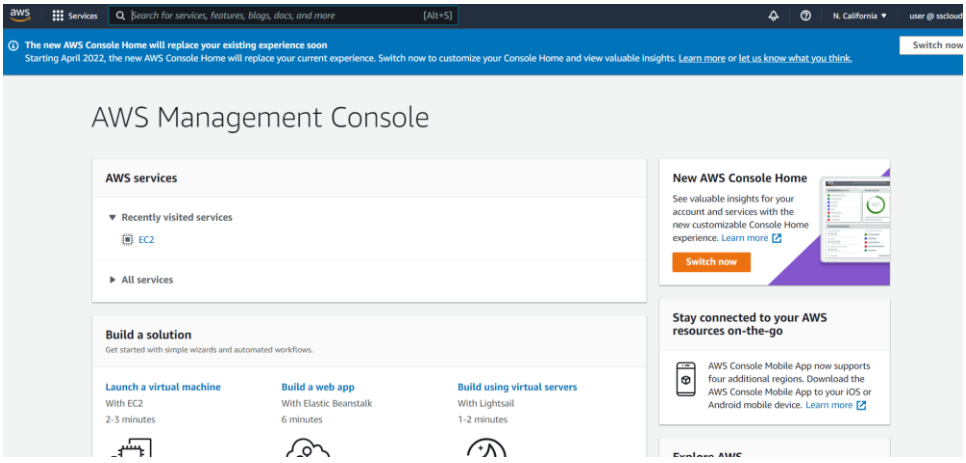
Credentials:

Username: user

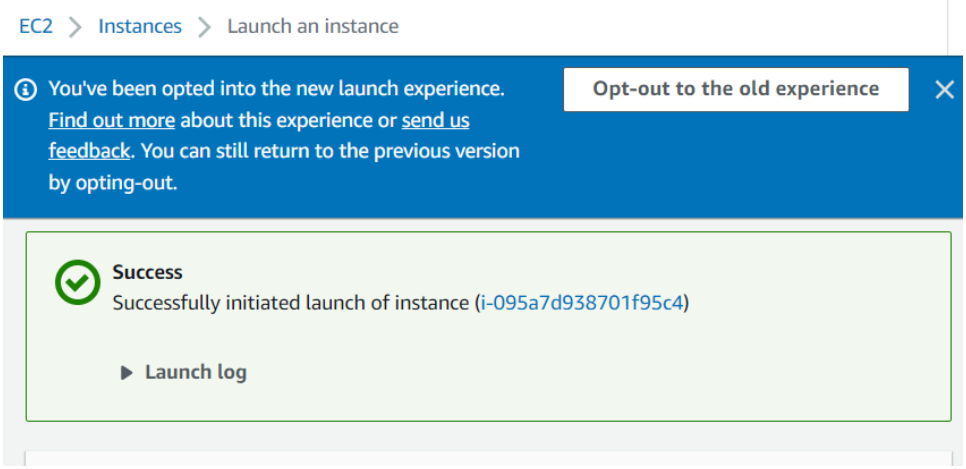
Password: User@tse2022

Use key pair for authentication.

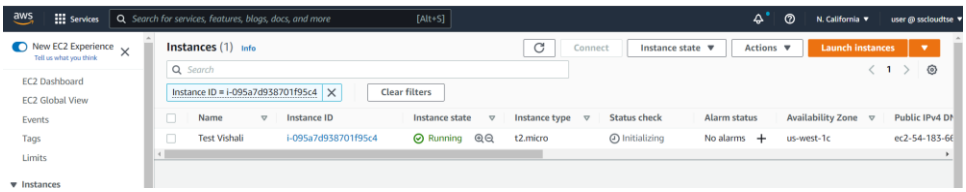
1. **Login into ur account:**



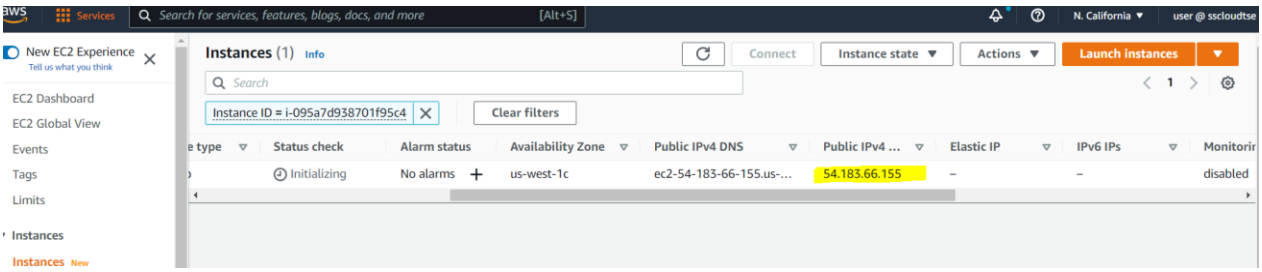
2. **Create an EC2 machine – access it by the pem file. Make sure the region should be North California.**



EC2 instance:

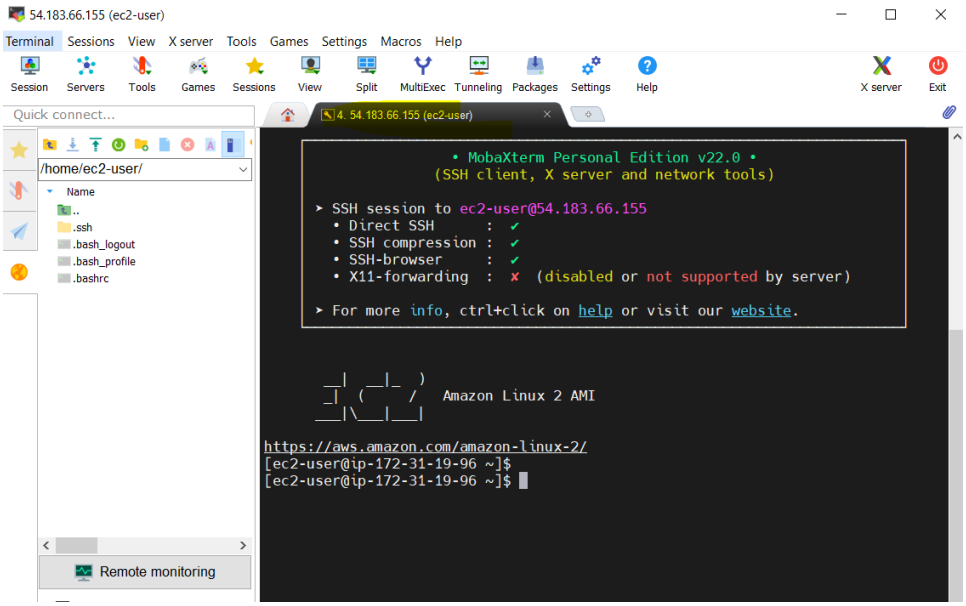


IP address: 54.183.66.155 /// 13.56.160.23



Username: ec2-user

Access the machine:



3. **Configure apache server into the ec2 machine.**

Install the apache:

Make sure you change the user to root using –> sudo -i

```
[ec2-user@ip-172-31-19-96 ~]$
[ec2-user@ip-172-31-19-96 ~]$ yum install httpd -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
You need to be root to perform this command.
[ec2-user@ip-172-31-19-96 ~]$ sudo -i
[root@ip-172-31-19-96 ~]#
```

Configuration and restart the service:

```
Complete!
[root@ip-172-31-21-69 ~]# cd /var/www/html/
[root@ip-172-31-21-69 html]# vim index.html
[root@ip-172-31-21-69 html]# systemctl start httpd
[root@ip-172-31-21-69 html]#
```

4. **After that, Install docker — create a container that should be exposed on 3434 port no. using quay.io/mayank123modi/simple-webapp**

Install the docker:

```
[root@ip-172-31-21-69 /]# yum install docker -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-mot
amzn2-core                                                | 3.7 kB
Resolving Dependencies
--> Running transaction check
---> Package docker.x86_64 0:20.10.7-5.amzn2 will be installed
--> Processing Dependency: runc >= 1.0.0 for package: docker-20.10.7-
_64
--> Processing Dependency: libcgroup >= 0.40.rc1-5.15 for package: do
7-5.amzn2.x86_64
--> Processing Dependency: containerd >= 1.3.2 for package: docker-20
n2.x86_64
--> Processing Dependency: pigz for package: docker-20.10.7-5.amzn2.x
```

Start the docker service:

```
[root@ip-172-31-21-69 /]# systemctl start docker
```

docker run -itd --name newcont2 -p 3435:8080 **quay.io/mayank123modi/simple-webapp**

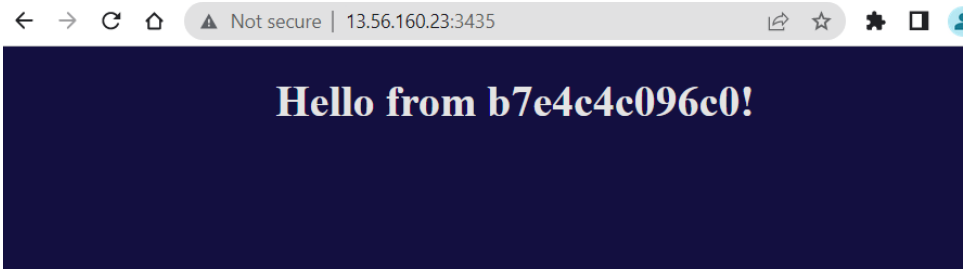
```
[root@ip-172-31-21-69 /]# docker run  -itd   --name newcont1 -p 3434:80 quay.io/
mayank123modi/simple-webapp
Unable to find image 'quay.io/mayank123modi/simple-webapp:latest' locally
latest: Pulling from mayank123modi/simple-webapp
7d0b3176f146: Pull complete
656769b42b54: Pull complete
46877b8f32e2: Pull complete
f5e790313325: Pull complete
03b307d006b6: Pull complete
a7b78dcf172f: Pull complete
cc19739c4acc: Pull complete
Digest: sha256:9a22693032c8fc8d93a4bb30b8e8d36804736c1a06d3419fc83e4a7ecb85c5f9
Status: Downloaded newer image for quay.io/mayank123modi/simple-webapp:latest
e64095b098134df726be281f1c7582f7cdf42887c062a4543f1259efb0866146
[root@ip-172-31-21-69 /]#
```

The error here is don't use port 80. It should be port 8080.

```
[root@ip-172-31-21-69 ~]# docker run  -itd  --name newcont3 -p 3435:8080 quay.io
/mayank123modi/simple-webapp
b7e4c4c096c06b3e21593006cc461c4df333fbd65ef06c4aa93b206aa1b9624b
[root@ip-172-31-21-69 ~]#
```

5. **Share me the URL**

http://13.56.160.23:3435/



Terminate the EC2 instance once the task is completed.

Understand about terraform:

Can you automate the above process using terraform? Yes!

What is terraform?

Tool which help to automate the infrastructure – it can be cloud/ on premises/ private cloud.

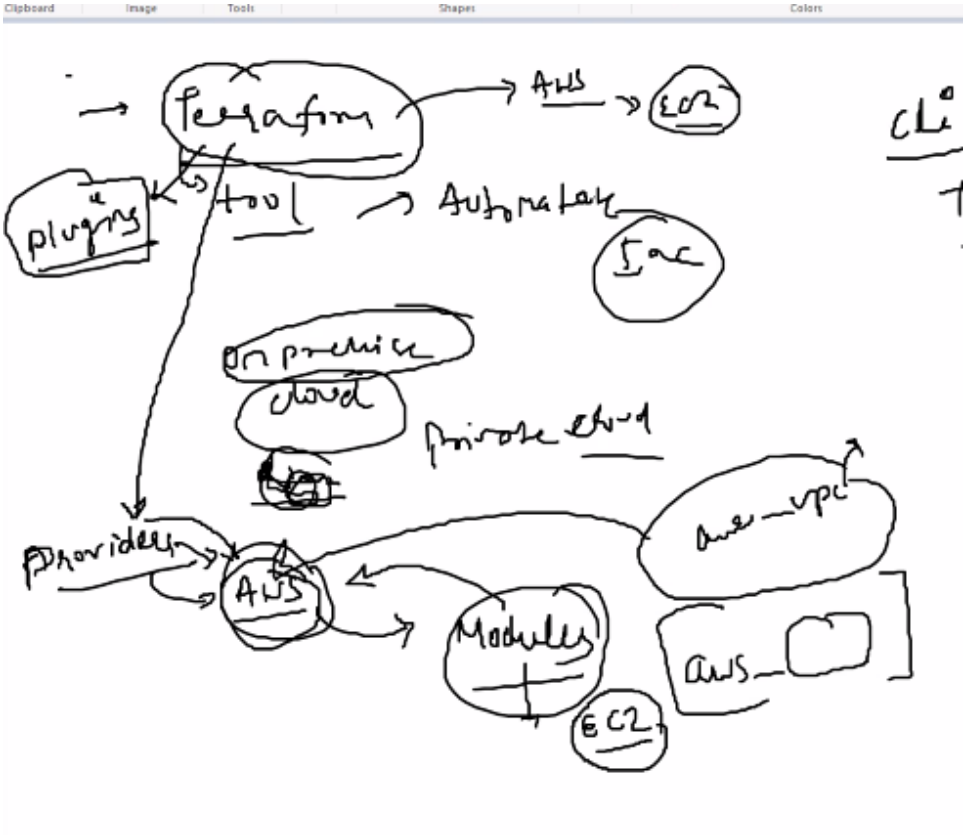
How terraform will automate the ec2 instance using AWS? Using plugins in the tools

Who is the provider here? AWS

Terraform will be using this plugins

After that, there is a certain type of modules – ec2 services (aws_<****>) - This is the module name. All the module is coming from AWS.

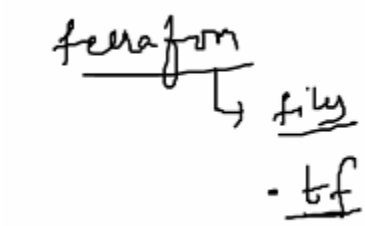
From CLI only we will access it.



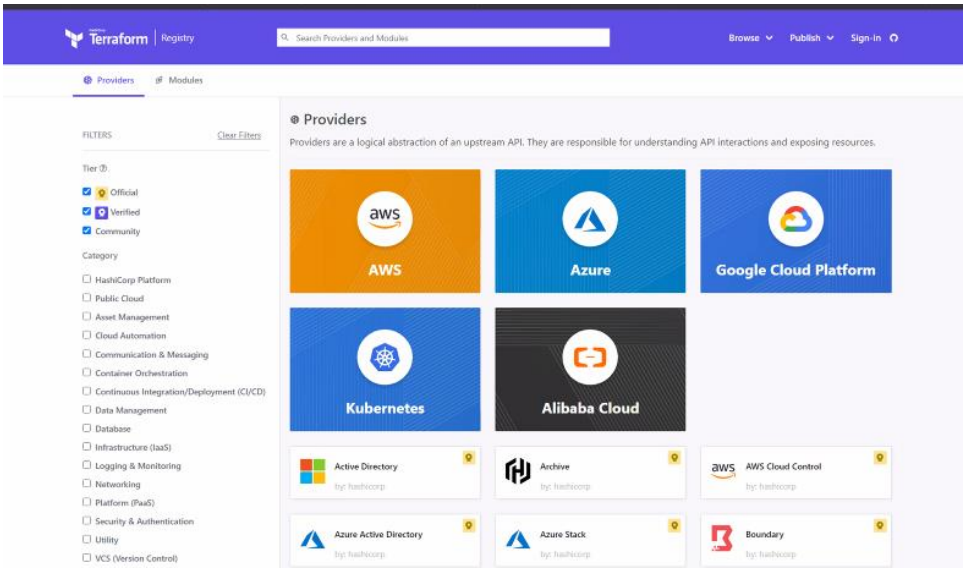
How to provide the credentials of AWS to the terraform?

First, we need to configure the AWS to give the authentication

Terraform file extension is .tf files



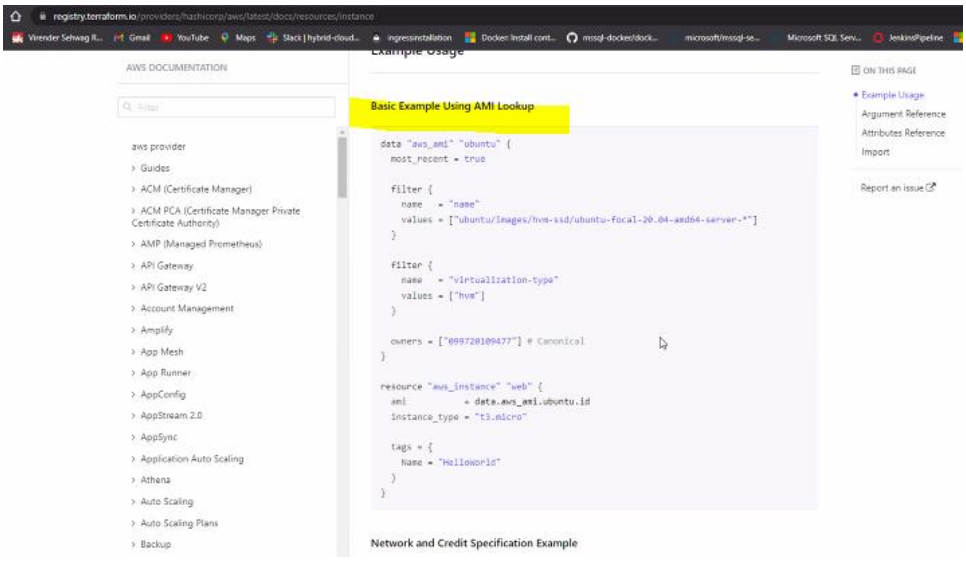
Terraform providers:



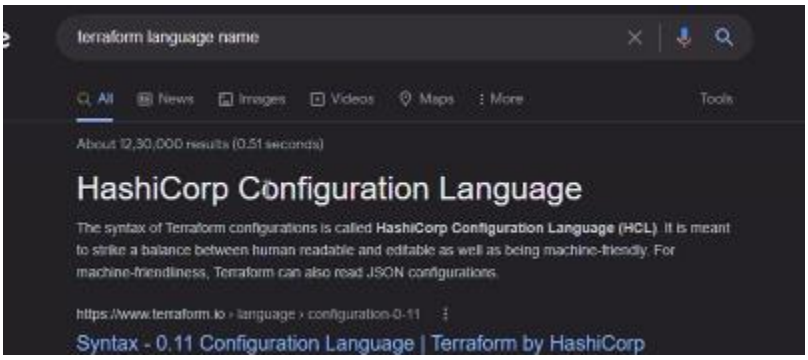
These are the terraform provides. It can automate AWS, kubernetes, Alibaba Cloud

Create ec2 instance by using terraform:

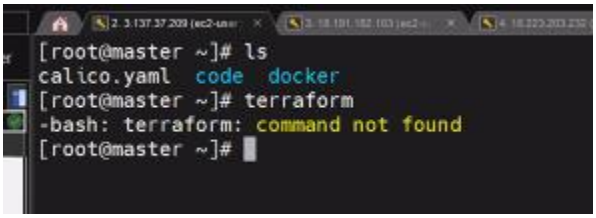
Use this command:

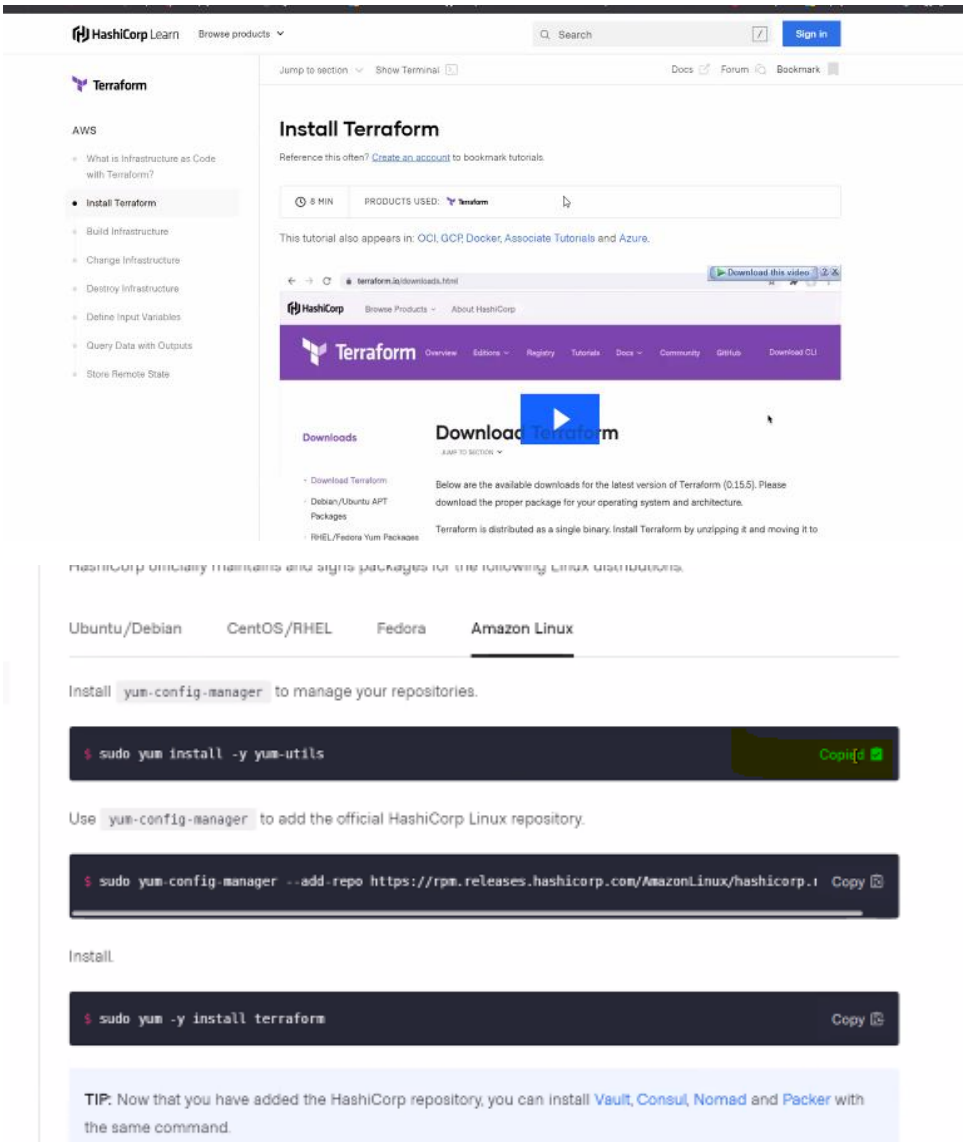


Terraform language: HashiCorp Configuration Language



Access the machine





Link: https://learn.hashicorp.com/tutorials/terraform/install-cli

```
-bash: terraform: command not found
[root@master ~]# sudo yum install -y yum-utils
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Repository 'kube' is missing name in configuration, using id
amzn2-core
Package yum-utils-1.1.31-46.amzn2.0.1.noarch already installed and latest version
Nothing to do
[root@master ~]# sudo yum-config-manager --add-repo https://rpm.releases.hashicorp.com/AmazonLinux/hashicorp.repo
```

Verify:

```
[root@master ~]# terraform  --help
[root@master ~]# terraform  --help
Usage: terraform [global options] <subcommand> [args]

The available commands for execution are listed below.
The primary workflow commands are given first, followed by
less common or more advanced commands.

Main commands:
  init          Prepare your working directory for other commands
  validate      Check whether the configuration is valid
  plan          Show changes required by the current configuration
  apply         Create or update infrastructure
  destroy       Destroy previously-created infrastructure

All other commands:
  console       Try Terraform expressions at an interactive command prompt
  fmt           Reformat your configuration in the standard style
  force-unlock  Release a stuck lock on the current workspace
  get           Install or upgrade remote Terraform modules
  graph         Generate a Graphviz graph of the steps in an operation
  import        Associate existing infrastructure with a Terraform resource
  login         Obtain and save credentials for a remote host
```

Check whether terraform command is working or not:

```
[root@master ~]# terraform
.bash_history  .bash_profile  calico.yaml    .cshrc         .docker/       .ssh/          .viminfo
.bash_logout   .bashrc        code/          docker/        .kube/         .tcshrc
[root@master ~]# terraform  terraform -install-autocomplete
Terraform has no command named "terraform".

To see all of Terraform's top-level commands, run:
  terraform -help

[root@master ~]#
```

You can see the command which can be used in terraform:

```
[root@master ~]#   terraform -install-autocomplete
[root@master ~]# terraform
.bash_history  .bash_profile  calico.yaml    .cshrc         .docker/       .ssh/          .viminfo
.bash_logout   .bashrc        code/          docker/        .kube/         .tcshrc
[root@master ~]# bash
[root@master ~]# terraform
```

Create a folder:

```
[root@master ~]# mkdir terracode
[root@master ~]# ls
calico.yaml  code  docker  terracode
[root@master ~]# cd terracode/
[root@master terracode]# ls
[root@master terracode]# ls -la
total 0
drwxr-xr-x 2 root root   6 Apr 27 08:59 .
dr-xr-x--- 9 root root 250 Apr 27 08:59 ..
[root@master terracode]#
```

Create a tf file:

```
[root@master ~]# mkdir terracode
[root@master ~]# ls
calico.yaml  code  docker  terracode
[root@master ~]# cd terracode/
[root@master terracode]# ls
[root@master terracode]# ls -la
total 0
drwxr-xr-x 2 root root   6 Apr 27 08:59 .
dr-xr-x--- 9 root root 250 Apr 27 08:59 ..
[root@master terracode]# vim ec2.tf
```

How to find the credentials of provider? Use aws command

```
[root@master terracode]# aws
Note: AWS CLI version 2, the latest major version of the AWS CLI, is now stable and recommended for gener
e the AWS CLI version 2 installation instructions at: https://docs.aws.amazon.com/cli/latest/userguide/i

usage: aws [options] <command> <subcommand> [<subcommand> ...] [parameters]
To see help text, you can run:

  aws help
  aws <command> help
  aws <command> <subcommand> help
aws: error: too few arguments
[root@master terracode]#
```

Whether this command is working or not – check it!

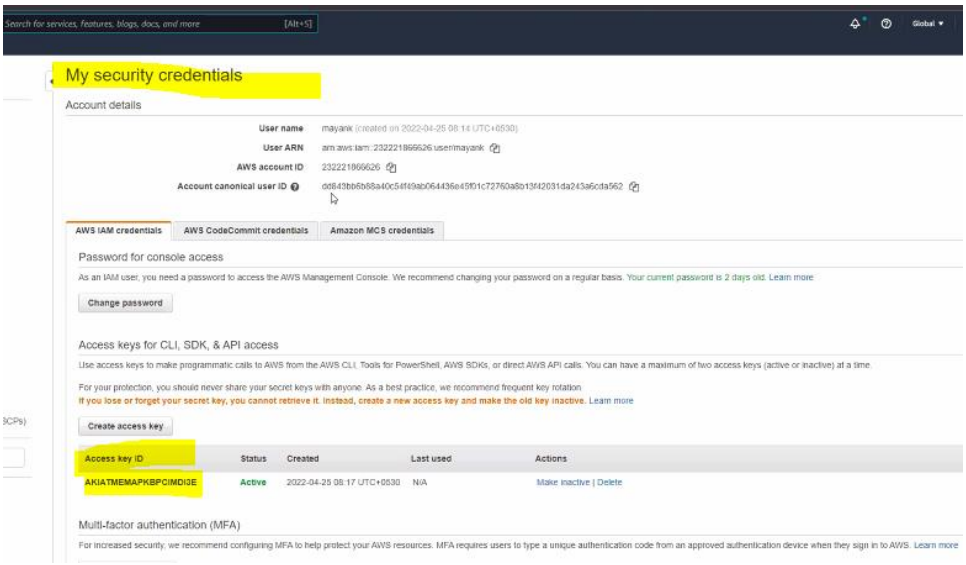
Can you find any file .aws?

```
[root@master ~]# ls -la
total 260
dr-xr-x---  9 root root    250 Apr 27 09:00 .
dr-xr-xr-x 18 root root    257 Apr 26 06:49 ..
-rw-------  1 root root   4270 Apr 26 12:45 .bash_history
-rw-r--r--  1 root root     18 Oct 18  2017 .bash_logout
-rw-r--r--  1 root root    176 Oct 18  2017 .bash_profile
-rw-r--r--  1 root root    218 Apr 27 08:57 .bashrc
-rw-r--r--  1 root root 222270 Apr 26 07:16 calico.yaml
drwxr-xr-x  2 root root     45 Apr 26 10:58 code
-rw-r--r--  1 root root    100 Oct 18  2017 .cshrc
drwxr-xr-x  2 root root     42 Apr 27 04:59 docker
drwx------  2 root root     25 Apr 27 04:16 .docker
drwxr-xr-x  3 root root     33 Apr 27 04:09 .kube
drwx------  2 root root     29 Apr 26 06:49 .ssh
-rw-r--r--  1 root root    129 Oct 18  2017 .tcshrc
drwxr-xr-x  2 root root     20 Apr 27 09:00 terracode
drwxr-xr-x  2 root root     34 Apr 27 08:57 .terraform.d
-rw-------  1 root root   9827 Apr 27 09:00 .viminfo
[root@master ~]#
```

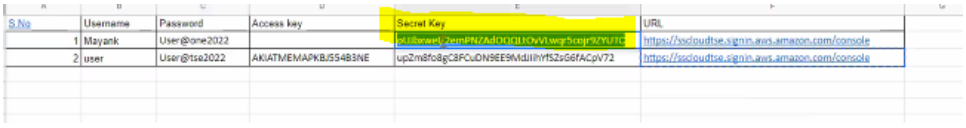
You need to tell you need to configure:

```
[root@master ~]# aws configure  --profile mayank
AWS Access Key ID [None]:
```

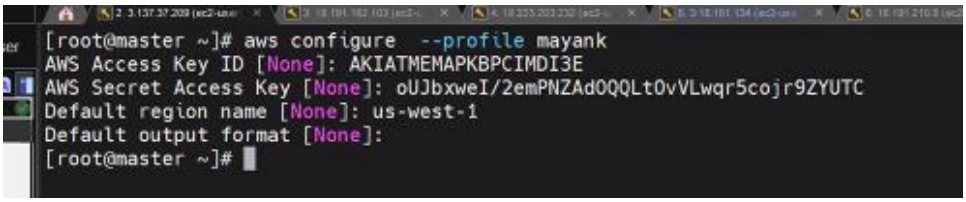
Go to security:



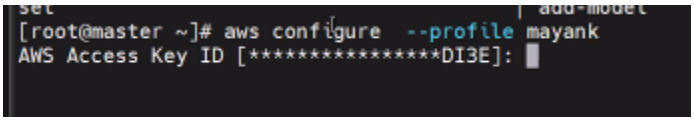
Security key:



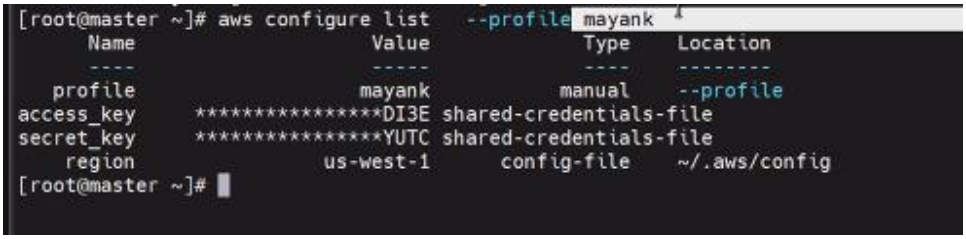
S.No	Username	Password	Access key	Secret Key	URL
1	Mayank	User@one2022		oUJbxweI/2emPNZAdOQQLtOvVLwqr5cojr9ZYUTC	https://sscloudtse.signin.aws.amazon.com/console
2	user	User@tse2022	AKIATMEMAPKBJS54B3NE	up2m8fo8gC8FCuDN9EE9MdJIIhYf5ZsG6fACpV72	https://sscloudtse.signin.aws.amazon.com/console



To check: (In case you want to change it)



List of AWS profile:



To check whether you have .aws file:

```
[root@master ~]# ls -la
total 260
dr-xr-x--- 10 root root    262 Apr 27 09:03 .
dr-xr-xr-x 18 root root    257 Apr 26 06:49 ..
drwxr-xr-x  2 root root     39 Apr 27 09:03 .aws
-rw-------  1 root root   4270 Apr 26 12:45 .bash_history
-rw-r--r--  1 root root     18 Oct 18  2017 .bash_logout
-rw-r--r--  1 root root    176 Oct 18  2017 .bash_profile
-rw-r--r--  1 root root    218 Apr 27 08:57 .bashrc
-rw-r--r--  1 root root 222270 Apr 26 07:16 calico.yaml
drwxr-xr-x  2 root root     45 Apr 26 10:58 code
-rw-r--r--  1 root root    100 Oct 18  2017 .cshrc
drwxr-xr-x  2 root root     42 Apr 27 04:59 docker
drwx------  2 root root     25 Apr 27 04:16 .docker
drwxr-xr-x  3 root root     33 Apr 27 04:09 .kube
drwx------  2 root root     29 Apr 26 06:49 .ssh
-rw-r--r--  1 root root    129 Oct 18  2017 .tcshrc
drwxr-xr-x  2 root root     20 Apr 27 09:00 terracode
drwxr-xr-x  2 root root     34 Apr 27 08:57 .terraform.d
-rw-------  1 root root   9827 Apr 27 09:00 .viminfo
[root@master ~]# cd .aws
[root@master .aws]# ls
config  credentials
[root@master .aws]# cat config
[profile mayank]
region = us-west-1
[root@master .aws]# cat cr
```

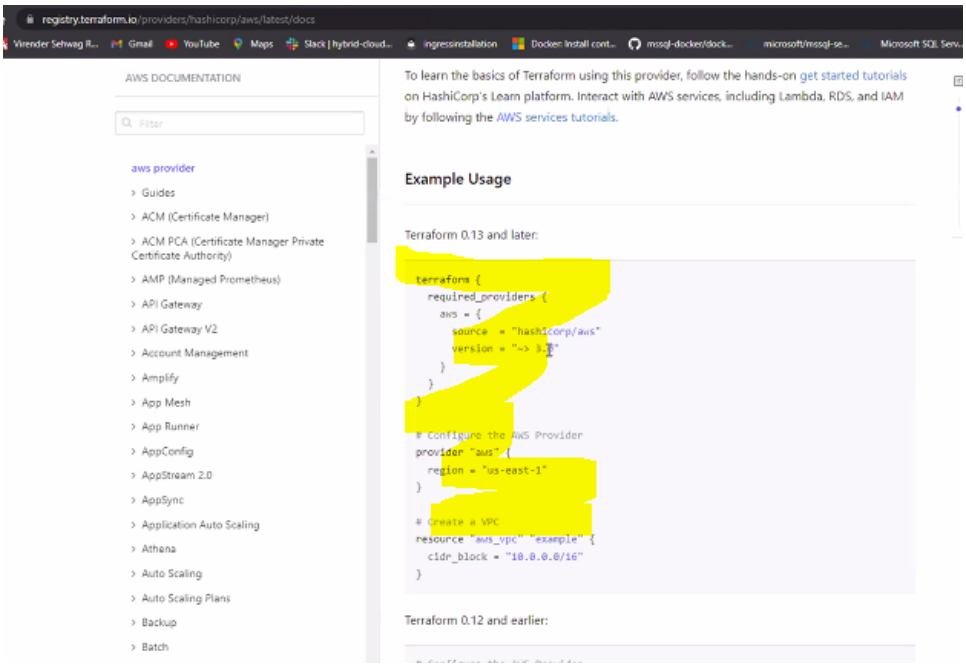
To check the credentials inside .aws folder:

```
[root@master ~]# cd .aws
[root@master .aws]# ls
config  credentials
[root@master .aws]# cat config
[profile mayank]
region = us-west-1
[root@master .aws]# cat credentials
[mayank]
aws_access_key_id = AKIATMEMAPKBPCIMDI3E
aws_secret_access_key = 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
[root@master .aws]#
```

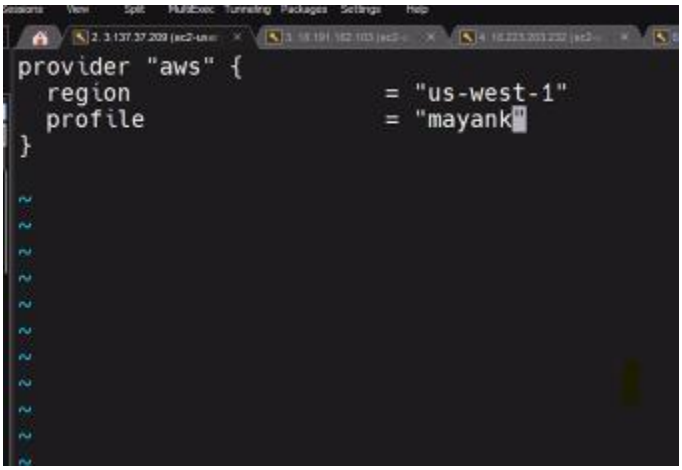
Open the terraform file:

```
[root@master ~]# cd terracode/
[root@master terracode]# ls
ec2.tf
[root@master terracode]# v
```

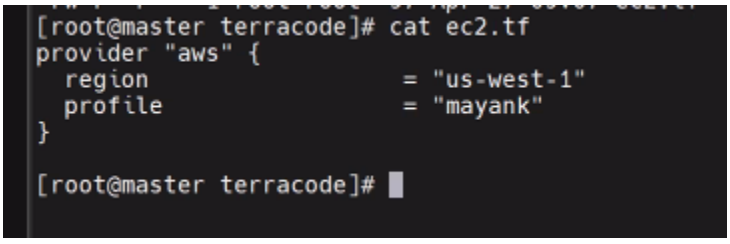
Usually, you don’t need to write the Terraform code – copy from google – you don’t need to type it.



Edit the terraform file:



View the terraform file:



Now, you don't see the .terraform file:

```
[root@master terracode]# ls -la
total 4
drwxr-xr-x  2 root root  20 Apr 27 09:07 .
dr-xr-x--- 10 root root 262 Apr 27 09:07 ..
-rw-r--r--  1 root root  97 Apr 27 09:07 ec2.tf
[root@master terracode]#
```

Download module or plugins:

This will download the AWSmodules/plugins

```
[root@master terracode]# terraform  init

Initializing the backend...

Initializing provider plugins...
- Finding latest version of hashicorp/aws...
- Installing hashicorp/aws v4.11.0...
```

You will see the .terraform folder being created

```
[root@master terracode]# ls -la
total 8
drwxr-xr-x  3 root root   65 Apr 27 09:07 .
dr-xr-x--- 10 root root  262 Apr 27 09:07 ..
-rw-r--r--  1 root root   97 Apr 27 09:07 ec2.tf
drwxr-xr-x  3 root root   23 Apr 27 09:07 .terraform
-rw-r--r--  1 root root 1152 Apr 27 09:07 .terraform.lock.hcl
[root@master terracode]# cd .terraform/
[root@master .terraform]# ls
providers
[root@master .terraform]# cd providers/registry.terraform.io/hashicorp/aws/4.11.0/linux_amd64/
[root@master linux_amd64]# s
bash: s: command not found
[root@master linux_amd64]# ls
terraform-provider-aws_v4.11.0_x5
[root@master linux_amd64]#
```

Mention the provider:

```
[root@master ~]# cd terracode/ls
bash: cd: terracode/ls: No such file or directory
[root@master ~]# cd terracode/
[root@master terracode]# cat ec2.tf
provider "aws" {
  region                  = "us-west-1"
  profile                 = "mayank"
}

[root@master terracode]#
```

What I need to do?

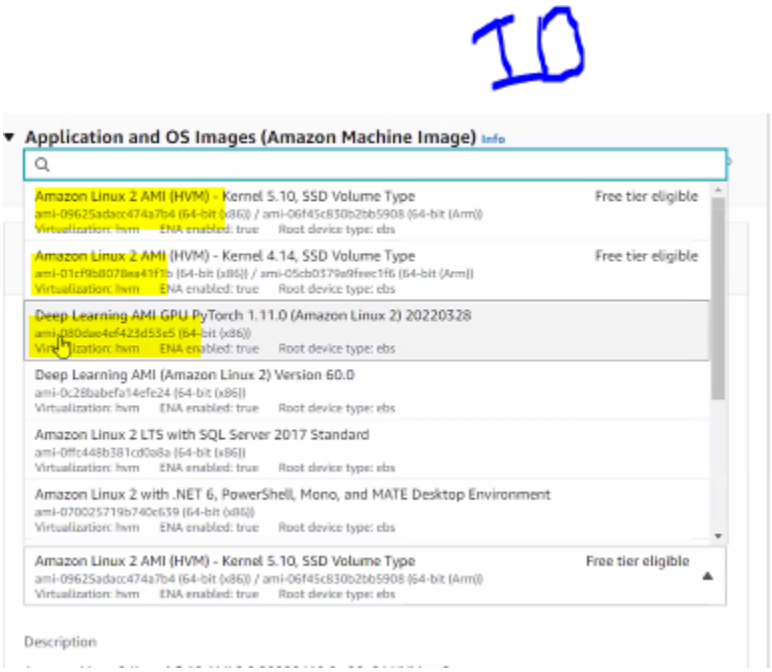
Need to create the instance:

It's a resource called aws_instance

All these should be saved in a variable – collinsterraform

In {} write whatever you want? Ami, instance type, security group, tag, key_pair

To check the ID of the AMI. (open the aws account)



Edit the terraform file:

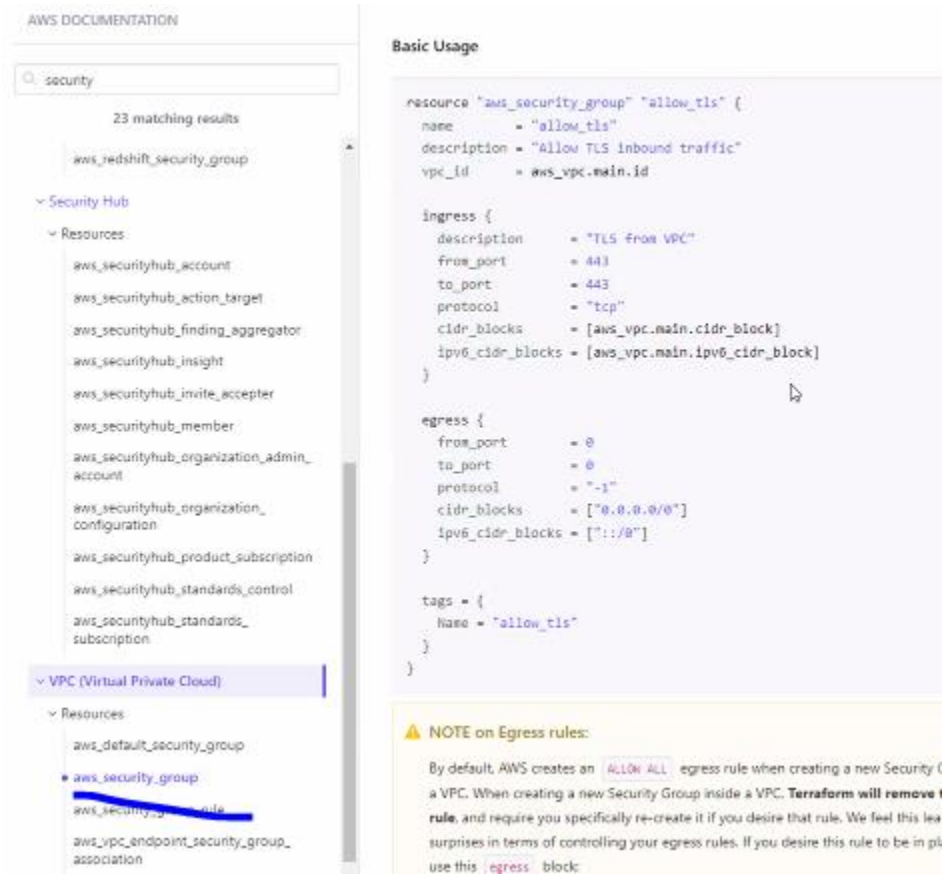
View terraform file:

Key pair: (if we need to create new): This method you can follow

Example Usage

```
resource "aws_key_pair" "deployer" {
  key_name   = "deployer-key"
  public_key = "ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQD3F6tyPEFEzV0LX3X8BsXdMsQz1x2
}
```

Security group: (need to create new)

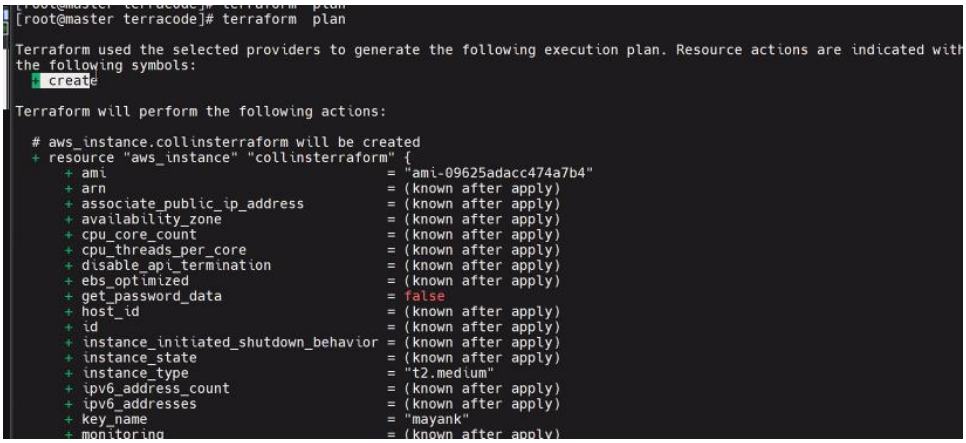


How to run this terraform file? Using attach command

Validate command:

```
[root@master terracode]# terraform  validate
Success! The configuration is valid.
```

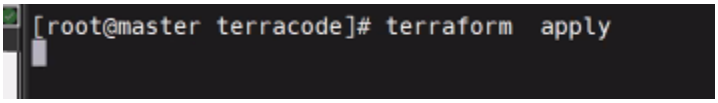
Plan command:



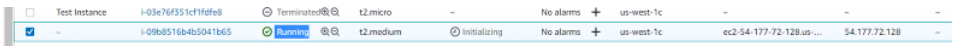
Plan: 1 to add

Type: yes

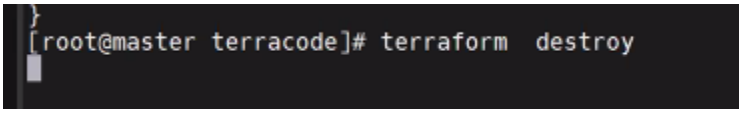
Apply:



Now, ec2 instance is created.



Destroy command:



It will ask for the permission:

```
      - enabled = false -> null
    }

  - metadata_options {
      - http_endpoint               = "enabled" -> null
      - http_put_response_hop_limit = 1 -> null
      - http_tokens                 = "optional" -> null
      - instance_metadata_tags      = "disabled" -> null
    }

  - root_block_device {
      - delete_on_termination = true -> null
      - device_name           = "/dev/xvda" -> null
      - encrypted             = false -> null
      - iops                  = 100 -> null
      - tags                  = {} -> null
      - throughput            = 0 -> null
      - volume_id             = "vol-038ea8cc12fe26030" -> null
      - volume_size           = 8 -> null
      - volume_type           = "gp2" -> null
    }
}

Plan: 0 to add, 0 to change, 1 to destroy.

Do you really want to destroy all resources?
  Terraform will destroy all your managed infrastructure, as shown above.
  There is no undo. Only 'yes' will be accepted to confirm.

  Enter a value: yes

aws_instance.collinsterraform: Destroying... [id=i-09b8516b4b5041b65]
```

How to get the output from the terraform code:

```
[root@master terracode]# vim ec2.tf
```

From where?

Output name - “PublicIP” (name can be anything)

Variable – value

Module.variablename.<what output you need>

```
[root@master terracode]# cat ec2.tf
provider "aws" {
  region                  = "us-west-1"
  profile                 = "mayank"
}



  resource    "aws_instance"  "collinsterraform"   {

                        ami =  "ami-09625adacc474a7b4"
                        instance_type = "t2.medium"
                        security_groups = ["MainMayank"]
                         key_name =  "mayank"


}


   output "PublicIP" {
                value =  aws_instance.collinsterraform.public_ip

}
[root@master terracode]#
```

Every time you run, these two files are created!

After the terraform init command – you will find these two files:

```
[root@master terracode]# ls
ec2.tf  terraform.tfstate  terraform.tfstate.backup
[root@master terracode]#
```

Verify the content of one of that file:

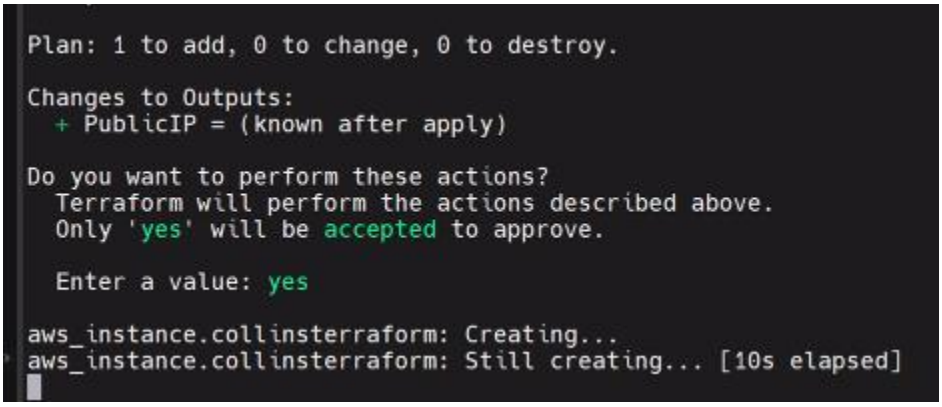
```
[root@master terracode]# cat terraform.tfstate.backup
{
  "version": 4,
  "terraform_version": "1.1.9",
  "serial": 1,
  "lineage": "8f0af8b2-3b1e-b586-5c34-b046b2343087",
  "outputs": {},
  "resources": [
    {
      "mode": "managed",
      "type": "aws_instance",
      "name": "collinsterraform",
      "provider": "provider[\"registry.terraform.io/hashicorp/aws\"]",
      "instances": [
        {
          "schema_version": 1,
          "attributes": {
            "ami": "ami-09625adacc474a7b4",
            "arn": "arn:aws:ec2:us-west-1:232221866626:instance/i-09b8516b4b5041b65",
            "associate_public_ip_address": true,
            "availability_zone": "us-west-1c",
            "capacity_reservation_specification": [
              {
                "capacity_reservation_preference": "open",
                "capacity_reservation_target": []
              }
```

```
      }
    ],
    "monitoring": false,
    "network_interface": [],
    "outpost_arn": "",
    "password_data": "",
    "placement_group": "",
    "placement_partition_number": null,
    "primary_network_interface_id": "eni-050029fafee8e74df",
    "private_dns": "ip-172-31-20-139.us-west-1.compute.internal",
    "private_ip": "172.31.20.139",
    "public_dns": "ec2-54-177-72-128.us-west-1.compute.amazonaws.
    "public_ip": "54.177.72.128",
    "root_block_device": [
      {
        "delete_on_termination": true,
        "device_name": "/dev/xvda",
        "encrypted": false,
        "iops": 100,
        "kms_key_id": "",
        "tags": {},
        "throughput": 0,
        "volume_id": "vol-038ea8cc12fe26030",
        "volume_size": 8,
        "volume_type": "gp2"
      }
    ],
    "secondary_private_ips": [],
    "security_groups": [
```

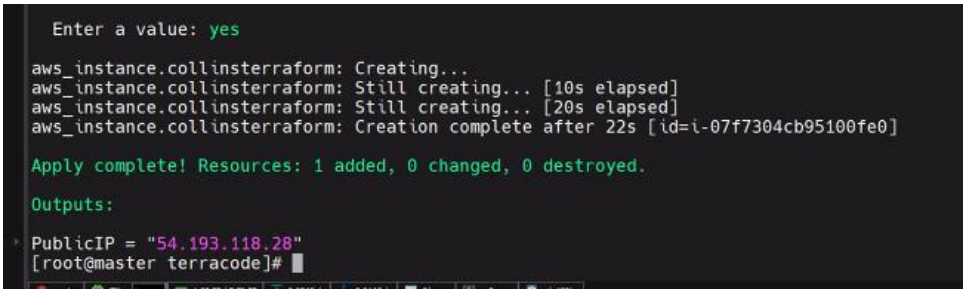

Validate:

```
      + network_interface {
          + delete_on_termination = (known after apply)
          + device_index          = (known after apply)
          + network_card_index    = (known after apply)
          + network_interface_id  = (known after apply)
        }

      + root_block_device {
          + delete_on_termination = (known after apply)
          + device_name           = (known after apply)
          + encrypted             = (known after apply)
          + iops                  = (known after apply)
          + kms_key_id            = (known after apply)
          + tags                  = (known after apply)
          + throughput            = (known after apply)
          + volume_id             = (known after apply)
          + volume_size           = (known after apply)
          + volume_type           = (known after apply)
        }
    }

Plan: 1 to add, 0 to change, 0 to destroy.

Changes to Outputs:
  + PublicIP = (known after apply)

Do you want to perform these actions?
  Terraform will perform the actions described above.
  Only 'yes' will be accepted to approve.

  Enter a value: yes
```

Apply:

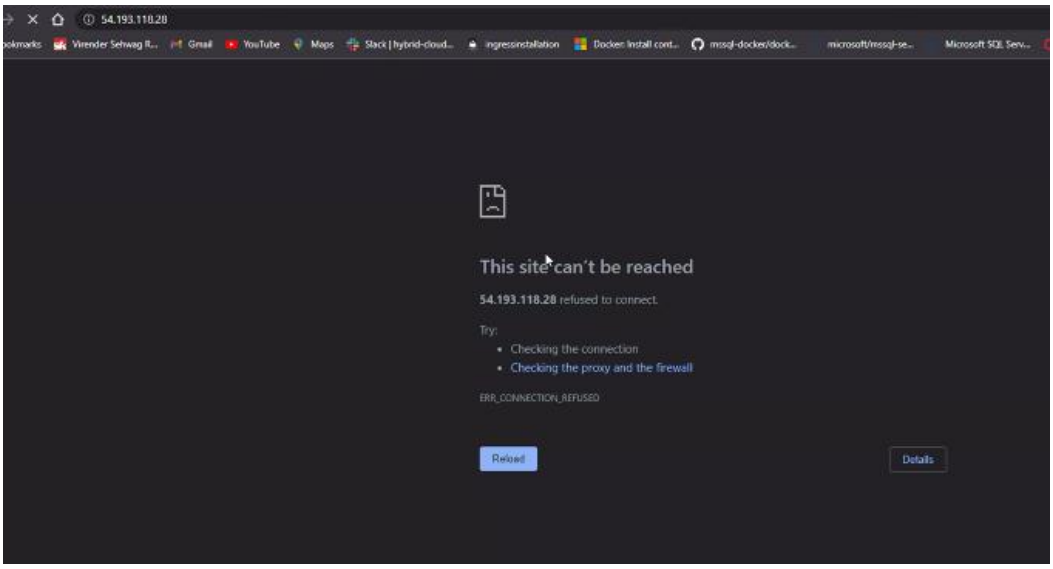


Now you can see the public ip:



Verify:

Not able to do anything right now:



That should show the website:

Destroy Command:

```
PublicIP = "54.193.118.28"
[root@master terracode]# terraform  destroy
```

It will ask for the permission:

```
Changes to Outputs:
  - PublicIP = "54.193.118.28" -> null

Do you really want to destroy all resources?
  Terraform will destroy all your managed infrastructure, as shown above
  There is no undo. Only 'yes' will be accepted to confirm.

  Enter a value: yes

aws_instance.collinsterraform: Destroying... [id=i-07f7304cb95100fe0]
```

User data in terraform:

How can we add it?

If we want to run a shell script

EOF – End of file. (we need to create a end of file inside a bash script – inside that install, configure, and start)

```
[root@node1 ~]# systemctl start kubelet
[root@node1 ~]# sudo su
[root@node1 ~]# exit
[root@node1 ~]# logout
[ec2-user@node1 ~]$ sudo su
[root@node1 ec2-user]#
```

Add user data:

```
provider "aws" {
  region                  = "us-west-1"
  profile                 = "mayank"
}


  resource    "aws_instance"  "collinsterraform"   {

                        ami =  "ami-09625adacc474a7b4"
                        instance_type = "t2.medium"
                        security_groups = ["MainMayank"]
                       user_data  = <<EOF
                                #!/bin/bash
                                sudo su
                                yum install httpd -y && echo "Hi there !!  ,  Using terraform My server iS up and RU
NNING" >> /var/www/html/index.html  &&  systemctl start  httpd
                                EOF
                       key_name =  "mayank"


}


   output "PublicIP" {
               value =  aws_instance.collinsterraform.public_ip

}
~
~
~
~
-- INSERT --                                                                17,5-33       All
```

If we want private IP:

```
provider "aws" {
  region                  = "us-west-1"
  profile                 = "mayank"
}

  resource    "aws_instance"  "collinsterraform"   {

                        ami =  "ami-09625adacc474a7b4"
                        instance_type = "t2.medium"
                        security_groups = ["MainMayank"]
                       user_data  = <<EOF
                                #!/bin/bash
                                sudo su
                                yum install httpd -y && echo "Hi there !!  ,  Using terraform My server iS up and RU
NNING" >> /var/www/html/index.html  &&  systemctl start  httpd
                                EOF
                       key_name =  "mayank"
}

   output "PublicIP" {
               value =  aws_instance.collinsterraform.public_ip

}

output "PrivateIP" {
               value =  aws_instance.collinsterraform.private_ip
}
~
~
~
~
~
-- INSERT --                                                                26,2          All
```

Cat command to check the content of terraform file:

```
[root@master terracode]# cat ec2.tf
provider "aws" {
  region                  = "us-west-1"
  profile                 = "mayank"
}

  resource    "aws_instance"  "collinsterraform"   {

                        ami =  "ami-09625adacc474a7b4"
                        instance_type = "t2.medium"
                        security_groups = ["MainMayank"]
                       user_data  = <<EOF
                                #!/bin/bash
                                sudo su
                                yum install httpd -y && echo "Hi there !!  ,  Using terraform My server iS up and RU
NNING" >> /var/www/html/index.html  &&  systemctl start  httpd
                                EOF
                       key_name =  "mayank"
}

   output "PublicIP" {
               value =  aws_instance.collinsterraform.public_ip
               value =  aws_instance.collinsterraform.private_ip

}
[root@master terracode]#
```

To know what is inside .aws folder:

```
}
[root@master terracode]#   echo  $HOME/.aws
/root/.aws
[root@master terracode]#
```

```
/root/.aws
[root@master terracode]# ls  $(  echo  $HOME/.aws)
config  credentials
[root@master terracode]#
```

```
[root@vishali terracode]# ls -la ../
total 60
dr-xr-x--- 10 root root   299 Apr 27 10:35 .
dr-xr-xr-x 22 root root   321 Apr 26 05:51 ..
drwxr-xr-x  2 root root    39 Apr 27 09:49 .aws
-rw-------  1 root root 11289 Apr 27 07:21 .bash_history
-rw-r--r--  1 root root    18 Oct 18  2017 .bash_logout
-rw-r--r--  1 root root   176 Oct 18  2017 .bash_profile
-rw-r--r--  1 root root   218 Apr 27 09:47 .bashrc
drwxr-xr-x  2 root root    39 Apr 26 10:09 code
-rw-r--r--  1 root root    30 Apr 25 07:22 collins
-rw-r--r--  1 root root  5640 Apr 26 08:59 config
-rw-r--r--  1 root root   100 Oct 18  2017 .cshrc
-rw-r--r--  1 root root   397 Apr 26 11:17 deployment.yaml
drwx------  2 root root    25 Apr 26 11:46 .docker
drwxr-xr-x  5 root root    98 Apr 26 05:26 dockerfile
drwxr-xr-x  3 root root    33 Apr 26 09:48 .kube
drwx------  2 root root    29 Apr 25 04:52 .ssh
-rw-r--r--  1 root root   129 Oct 18  2017 .tcshrc
drwxr-xr-x  3 root root   141 Apr 27 10:36 terracode
drwxr-xr-x  2 root root    58 Apr 27 09:52 .terraform.d
-rw-------  1 root root  9575 Apr 27 10:35 .viminfo
```

Apply command:

```
[root@master terracode]# terraform  apply
```

If you don't want to ask question (for confirmation): use this –auto-approve

```
Options:

  -auto-approve          Skip interactive approval of plan before applying.

  -backup=path           Path to backup the existing state file before
                         modifying. Defaults to the "-state-out" path with
```

```
[root@master terracode]# terraform  apply  --auto-approve
```

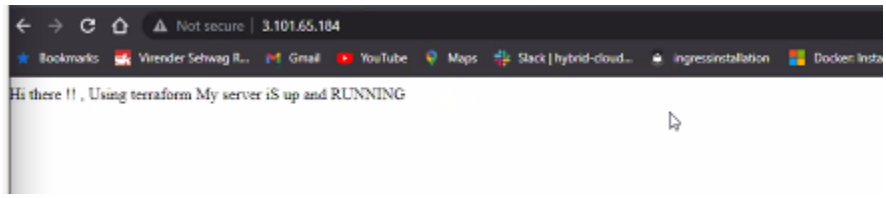
```
[root@master terracode]# terraform  validate
Success! The configuration is valid.

[root@master terracode]# terraform  apply  --auto-approve
```

What will it do?

We will get the ip – that will directly show the website:

```
Plan: 1 to add, 0 to change, 0 to destroy.

Changes to Outputs:
  + PrivateIP = (known after apply)
  + PublicIP  = (known after apply)
aws_instance.collinsterraform: Creating...
aws_instance.collinsterraform: Still creating... [10s elapsed]
aws_instance.collinsterraform: Still creating... [20s elapsed]
aws_instance.collinsterraform: Still creating... [30s elapsed]
aws_instance.collinsterraform: Still creating... [40s elapsed]
aws_instance.collinsterraform: Still creating... [50s elapsed]
aws_instance.collinsterraform: Still creating... [1m0s elapsed]
aws_instance.collinsterraform: Still creating... [1m10s elapsed]
aws_instance.collinsterraform: Creation complete after 1m12s [id=i-01b37ff743cb6eeb1]

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.

Outputs:

PrivateIP = "172.31.17.124"
PublicIP = "3.101.65.184"
[root@master terracode]#
```

Website:



Without going to AWS account, our website is up and running!

Can we create a docker container and expose it somewhere else?

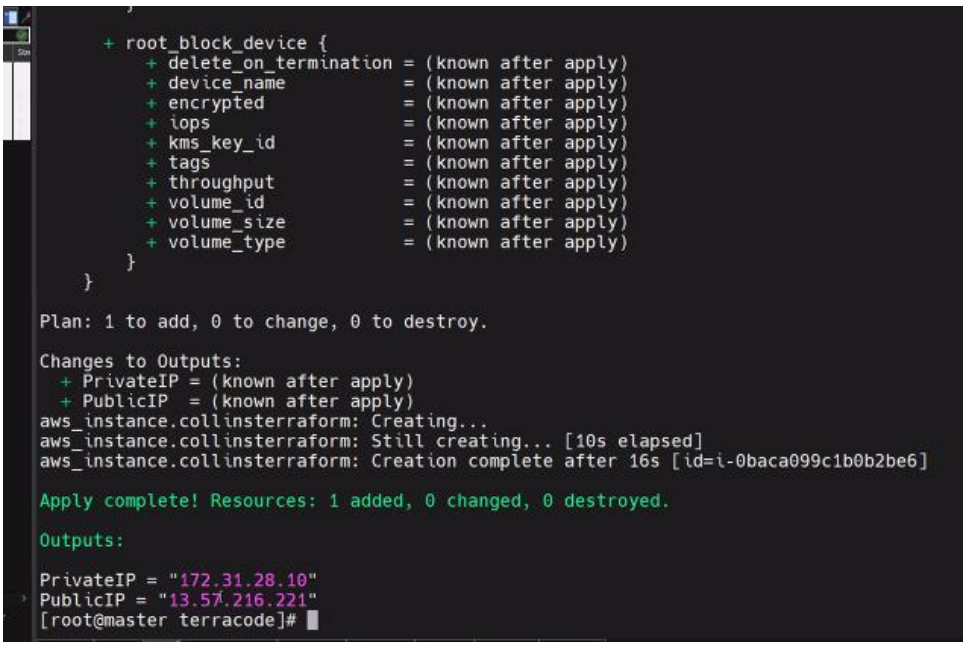
Can we do that? Yes

```
provider "aws" {
  region                  = "us-west-1"
  profile                 = "mayank"
}

  resource    "aws_instance"  "collinsterraform"   {

                      ami =  "ami-09625adacc474a7b4"
                      instance_type = "t2.medium"
                      security_groups = ["MainMayank"]
                     user_data  = <<EOF
                              #!/bin/bash
                              sudo su
                              yum install httpd -y && echo "Hi there !!  ,  Using terraform My server iS up and RU
NNING" >> /var/www/html/index.html  &&  systemctl start  httpd
                              yum install docker -y ; systemctl start docker ; docker run -itd -p 3434:8080  quay.
io/mayank123modi/simple-webapp
                              EOF
                    key_name =  "mayank"
}

   output "PublicIP" {
               value =  aws_instance.collinsterraform.public_ip

}

output "PrivateIP" {
               value =  aws_instance.collinsterraform.private_ip
}
~
~
~
-- INSERT --                                                                    15,120-147    All
```

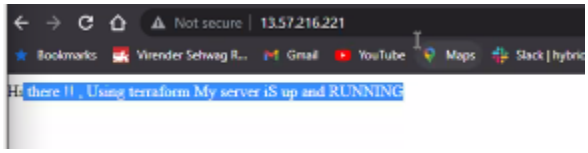
Destroy it:

```
[root@master terracode]# terraform  destroy  --auto-approve
```

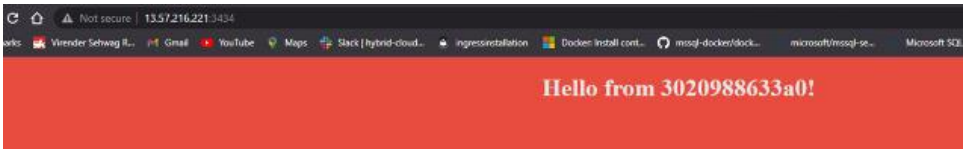
Terraform appy command: You will get the public id and private ip



Default port:



Docker container port:



We can create an infrastructure automatically.

Commands are shared by the Trainer:

185 mkdir terracode

186 ls

187 cd terracode/

188 ls

189 ls -la

190 vim ec2.tf

191 aws

192 aws

```
193  cd
194  ls -la
195  aws configure  --profile mayank
196  aws configure --list
197  aws configure list
198  aws configure --list-profile
199  aws configure --list-profiles
200  aws configure list
201  aws configure  --list profile
202  aws configure  --profile mayank
203  aws configure list   --profile mayank
204  ls -la
205  cd .aws
206  ls
207  cat config
208  cat credentials
209  cd
210  cd terracode/
211  ls
212  vim ec2.tf
213  ls -la
214  cat ec2.tf
215  ls -la
216  terraform  init
217  ls -la
218  cd .terraform/
219  ls
220  cd providers/registry.terraform.io/hashicorp/aws/4.11.0/linux_amd64/
221  s
222  ls
223  ccd
```

```
224  cd terr
225  cd
226  cd terracode/ls
227  cd terracode/
228  cat ec2.tf
229  viim ec2.tf
230  vim ec2.tf
231  terraform  validate
232  vim ec2.tf
233  terraform  validate
234  vim ec2.tf
235  terraform  validate
236  terraform  apply
237  terraform  plan
238  terraform  apply
239  cat ec2.tf
240  terraform  destroy
241  vim ec2.tf
242  cat ec2.tf
243  ls
244  cat terraform.tfstate
245  cat terraform.tfstate.backup
246  ls
247  terraform  apply
248  terraform  destroy
249  vim ec2.tf
250  cat ec2.tf
251    echo  $HOME/.aws
252  ls  $(  echo  $HOME/.aws)
253  terraform  apply  --help
254  ls  $(  echo  $HOME/.aws)
```

255 terraform apply --auto-approve

256 vim ec2.tf

257 terraform validate

258 terraform apply --auto-approve

259 vim ec2.tf

260 terraform destroy --auto-approve

261 cat ec2.tf

262 terraform apply --auto-approve

263 cat ec2.tf

264 history

TASK:

Q.1 Create ec2 instance using terraform code

Q.2 Create ec2 instance with apache server using

Q.3 Docker containers

AcessKEY AKIATMEMAPKBJ554B3NE

Secret access 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

Authetication of AWS:

```
[root@vishali terracode]# aws configure --profile vishali
AWS Access Key ID [****************B3NE]:
AWS Secret Access Key [****************pV72]:
Default region name [us-west-1]:
Default output format [None]:
[root@vishali terracode]#
```

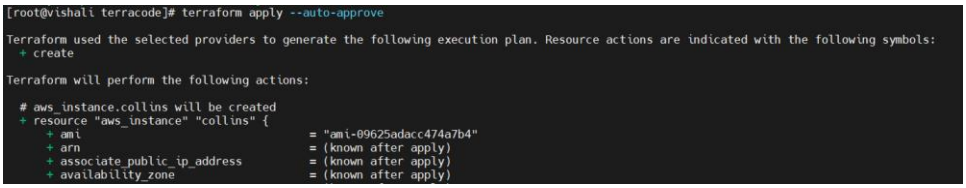
Terraform init:

```
[root@vishali terracode]# terraform init

Initializing the backend...

Initializing provider plugins...
- Reusing previous version of hashicorp/aws from the dependency lock file
- Using previously-installed hashicorp/aws v4.11.0

Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.
[root@vishali terracode]# terraform validate
Success! The configuration is valid.
```

Terraform file:

```
provider "aws" {

  region        = "us-west-1"
  profile       = "vishali"
}

 resource  "aws_instance"  "collins" {

                ami = "ami-09625adacc474a7b4"
                instance_type = "t2.micro"
                security_groups = [Vish"]
                user_data = <<EOF
                        #!/bin/bash
                        sudo su
                        yum install httpd -y && echo "Hi there!!, This is vishali using terraform my server is up and running" >> /var/www/html/index.html &
& systemctl start httpd
                        yum install docker -y ;  systemctl start docker ; docker run -itd -p 3434:8080 quay.io/mayank123modi/simple-webapp
                        EOF
                key_name = "vishali"
}

output "PublicIP" {
  value = aws_instance.collins.public_ip
}
```

Terraform apply command:



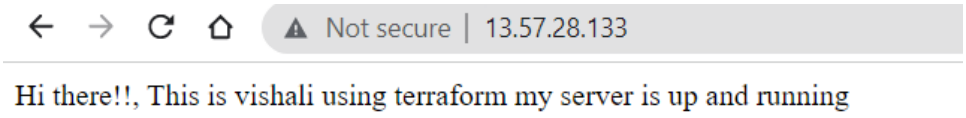
```
[root@vishali terracode]# terraform apply --auto-approve

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following symbols:
  + create

Terraform will perform the following actions:

  # aws_instance.collins will be created
  + resource "aws_instance" "collins" {
      + ami                                  = "ami-09625adacc474a7b4"
      + arn                                  = (known after apply)
      + associate_public_ip_address          = (known after apply)
      + availability_zone                    = (known after apply)
```

IP Address is seen now:

```
2. 3.88.196.199 (root)
          + http_put_response_hop_limit = (known after apply)
          + http_tokens                 = (known after apply)
          + instance_metadata_tags      = (known after apply)
        }

      + network_interface {
          + delete_on_termination = (known after apply)
          + device_index          = (known after apply)
          + network_card_index    = (known after apply)
          + network_interface_id  = (known after apply)
        }

      + root_block_device {
          + delete_on_termination = (known after apply)
          + device_name           = (known after apply)
          + encrypted             = (known after apply)
          + iops                  = (known after apply)
          + kms_key_id            = (known after apply)
          + tags                  = (known after apply)
          + throughput            = (known after apply)
          + volume_id             = (known after apply)
          + volume_size           = (known after apply)
          + volume_type           = (known after apply)
        }
    }

Plan: 1 to add, 0 to change, 0 to destroy.

Changes to Outputs:
  + PublicIP = (known after apply)
aws_instance.collins: Creating...
aws_instance.collins: Still creating... [10s elapsed]
aws_instance.collins: Still creating... [20s elapsed]
aws_instance.collins: Creation complete after 23s [id=i-0320a91a8bc218eec]

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.

Outputs:

PublicIP = "13.57.28.133"
[root@vishali terracode]# ^C
```

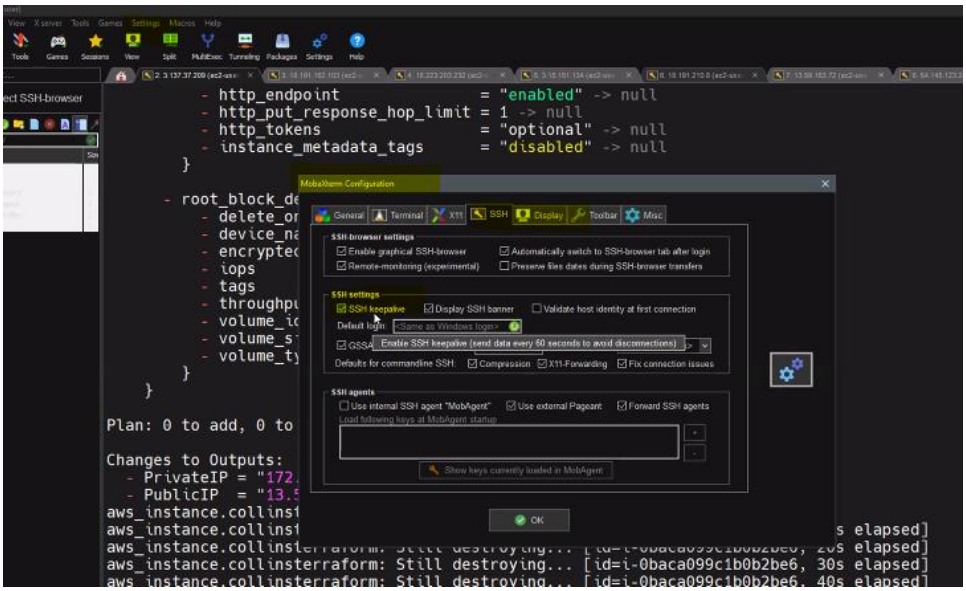
Verify:

Deafult page:



Docker container page:

To keep the session alive:



Terraform file - Shared by the trainer:

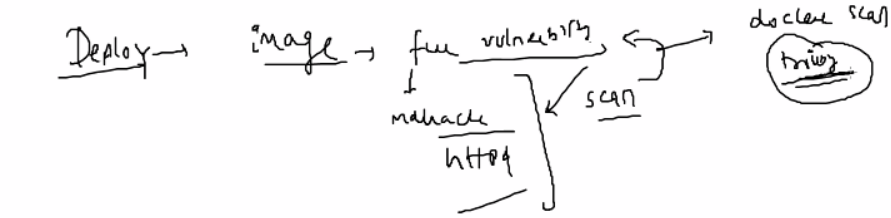
```
provider "aws" {
  region                  = "us-west-1"
  profile                 = "mayank"
}
  resource    "aws_instance"  "collinsterraform"   {
                    ami =  "ami-09625adacc474a7b4"
                    instance_type = "t2.medium"
                    security_groups = ["MainMayank"]
                   user_data  = <<EOF
                          #!/bin/bash
                          sudo su
                          yum install httpd -y && echo "Hi there !!  ,  Using terraform My server iS up and RUNNING" >> /var/www/html/index.html  &&  systemctl start  httpd
                          yum install docker -y ; systemctl start docker ; docker run -itd -p 3434:8080  quay.io/mayank123modi/simple-webapp
                          EOF
                  key_name =  "mayank"
}
   output "PublicIP" {
```

```
        value =  aws_instance.collinsterraform.public_ip
}
output "PrivateIP" {
        value =  aws_instance.collinsterraform.private_ip
}
```

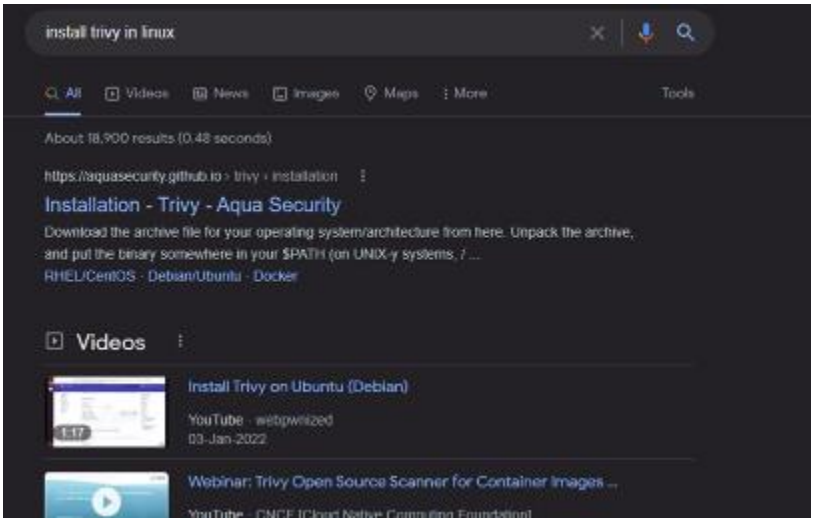
Image scanning:

Purpose: For checking vulenaribiliy

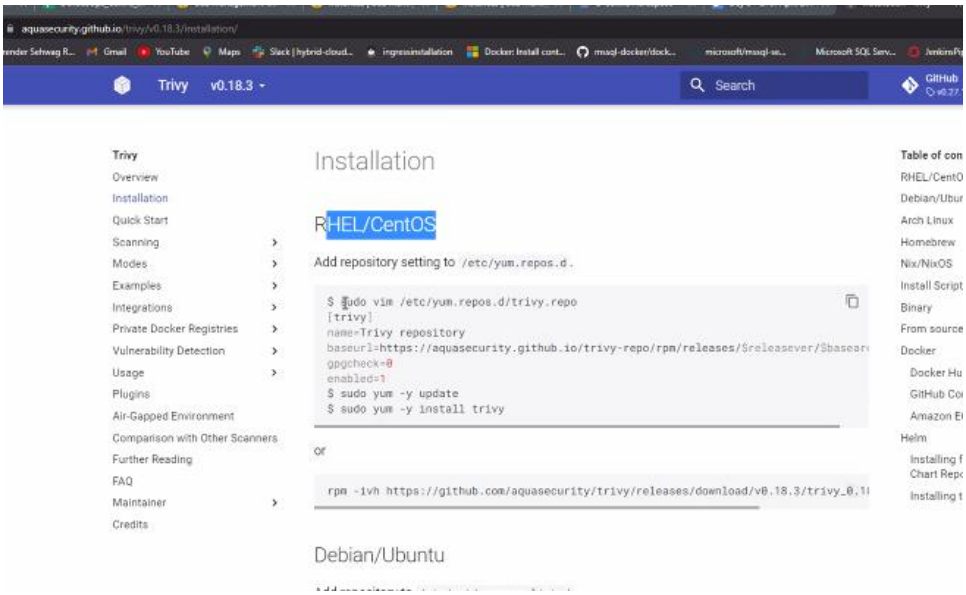
Which tool we are going to use? Trivy



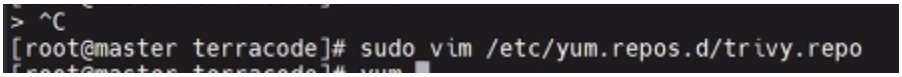
Install Trivy tool:

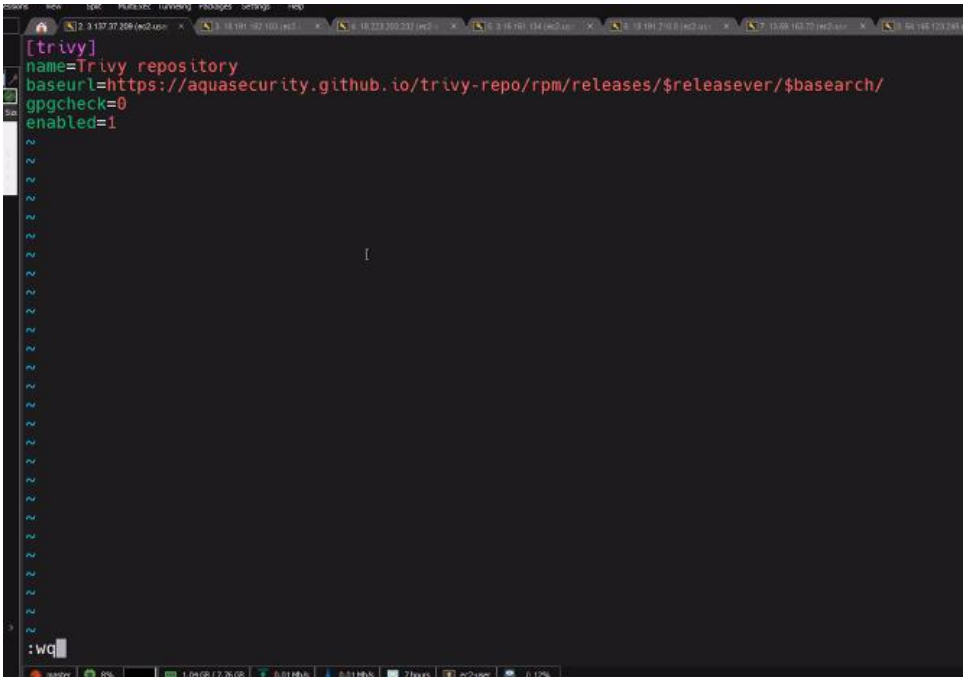


The first one won’t work. The second command will work.



Edit the content at this location:





Remove this as it doesn’t work

Trivy install: (This works)

```
rm: remove regular file '/etc/yum.repos.d/trivy.repo'? y
[root@master terracode]# rpm -ivh https://github.com/aquasecurity/trivy/releases/download/v0.18.3/trivy_0.18.3_Linux-64bit.rpm
Retrieving https://github.com/aquasecurity/trivy/releases/download/v0.18.3/trivy_0.18.3_Linux-64bit.rpm
Preparing...                          ################################# [100%]
Updating / installing...
   1:trivy-0:0.18.3-1                 ################################# [100%]
[root@master terracode]#
```

Now, try trivy command:

```
[root@master terracode]# trivy
bash: trivy: command not found
[root@master terracode]#
```

You can find the trivy folder here:

```
[root@master terracode]# cd /usr/local/bin/
[root@master bin]# ls
trivy
[root@master bin]#
```

We need to move the trivy folder into usr/bin

```
[root@master bin]# cp trivy  /usr/bin/
[root@master bin]# trivy
NAME:
   trivy - A simple and comprehensive vulnerability scanner for containers

USAGE:
   trivy command [command options] target

COMMANDS:
   image, i          scan an image
   filesystem, fs    scan local filesystem
   repository, repo  scan remote repository
   client, c         client mode
   server, s         server mode
   plugin, p         manage plugins
   help, h           Shows a list of commands or help for one command
```

Let’s check whether image is secure

Docker pull the image:

```
[root@master bin]# docker pull mdhack/myserver
Using default tag: latest
latest: Pulling from mdhack/myserver
74f0853ba93b: Pull complete
7aa70b934c32: Pull complete
2d68deff9aaf: Pull complete
31ea4127808d: Pull complete
Digest: sha256:70adde817b3b8c8029ed3eb6d8542ccea47a90087517ec05813149f0c7a292d1
Status: Downloaded newer image for mdhack/myserver:latest
docker.io/mdhack/myserver:latest
```

Docker pull the image:

```
[root@master bin]# docker pull quay.io/mayank123modi/simple-webapp
Using default tag: latest
latest: Pulling from mayank123modi/simple-webapp
7d0b3176f146: Pull complete
656769b42b54: Pull complete
46877b8f32e2: Pull complete
f5e790313325: Pull complete
03b307d006b6: Pull complete
a7b78dcf172f: Pull complete
cc19739c4acc: Pull complete
Digest: sha256:9a22693032c8fc8d93a4bb30b8e8d36804736c1a06d3419fc83e4a7ecb85c5f9
Status: Downloaded newer image for quay.io/mayank123modi/simple-webapp:latest
quay.io/mayank123modi/simple-webapp:latest
[root@master bin]#
```

Trivy image:

```
[root@master ~]# trivy image mdhack/myserver
2022-04-27T11:44:13.335Z        INFO    Need to update DB
2022-04-27T11:44:13.335Z        INFO    Downloading DB...
23.07 MiB / 27.67 MiB [------------------------------------------------------>_________] 83.36% 19.71 MiB p/s ETA 0s
```

```
+                          +------------------+          +                          +----------------
----------------------------------------------------------+
|                          | CVE-2022-0351    |          |                          |
cess of memory location                                  |
|                          |                  |          |                          |
start of buffer                                          |
|                          |                  |          |                          |
aquasec.com/nvd/cve-2022-0351                            |
+                          +------------------+          +                          +----------------
----------------------------------------------------------+
|                          | CVE-2022-1154    |          |                          |
e after free in utf_ptr2char                             |
|                          |                  |          |                          |
aquasec.com/nvd/cve-2022-1154                            |
+--------------------------+------------------+----------+--------------------------+----------------
----------------------------------------------------------+
| yum-plugin-fastestmirror | CVE-2018-10897   | HIGH     | 1.1.31-40.el7            | 1.1.31-46.el7_
ls: reposync: improper                                   |
|                          |                  |          |                          |
lidation may lead                                        |
|                          |                  |          |                          |
ctory traversal                                          |
|                          |                  |          |                          |
aquasec.com/nvd/cve-2018-10897                           |
+--------------------------+                  +          +                          +
                                                         +
| yum-plugin-ovl           |                  |          |                          |
                                                         |
|                          |                  |          |                          |
                                                         |
|                          |                  |          |                          |
                                                         |
|                          |                  |          |                          |
```

To count:

```
[root@master ~]# trivy image mdhack/myserver  | head -10
2022-04-27T11:44:56.654Z        INFO    Detected OS: centos
2022-04-27T11:44:56.654Z        INFO    Detecting RHEL/CentOS vulnerabilities...
2022-04-27T11:44:56.671Z        INFO    Number of PL dependency files: 0

mdhack/myserver (centos 7.3.1611)
=================================
Total: 1760 (UNKNOWN: 0, LOW: 693, MEDIUM: 987, HIGH: 73, CRITICAL: 9)

+-------------------------+-----------------+----------+---------------------+-----------------------+-------
----------------------------------------------------------+
|         LIBRARY         | VULNERABILITY ID | SEVERITY |   INSTALLED VERSION   |      FIXED VERSION      |
                TITLE                                     |
[root@master ~]#
```

Will you use this in production environment? NO

It shows Low risk, medium risk, high risk.....

Count the vulnerability:

```
[root@master ~]# trivy image quay.io/mayank123modi/simple-webapp | head -10
2022-04-27T11:45:39.804Z        INFO    Detected OS: alpine
2022-04-27T11:45:39.804Z        INFO    Detecting Alpine vulnerabilities...
2022-04-27T11:45:39.805Z        INFO    Number of PL dependency files: 0
2022-04-27T11:45:39.805Z        WARN    This OS version is no longer supported by the distribution: alpine 3.8.1
2022-04-27T11:45:39.805Z        WARN    The vulnerability detection may be insufficient because security updates are
 not provided

quay.io/mayank123modi/simple-webapp (alpine 3.8.1)
==================================================
Total: 14 (UNKNOWN: 0, LOW: 0, MEDIUM: 5, HIGH: 5, CRITICAL: 4)

[root@master ~]#
```

But still, will you use this image in production? NO

Then how to find out what images are secure.

Get nodes:

```
[root@master ~]# kubectl get  nodes
NAME      STATUS   ROLES                  AGE   VERSION
master    Ready    control-plane,master   28h   v1.23.6
node1     Ready    <none>                 28h   v1.23.6
node2     Ready    <none>                 28h   v1.23.6
node3     Ready    <none>                 28h   v1.23.6
node4     Ready    <none>                 28h   v1.23.6
node5     Ready    <none>                 28h   v1.23.6
[root@master ~]#
```

Docker images:

```
>
>
>   kube- scheduler
>
>   api server
>
>   etc  ^Cheduler
[root@master ~]# docker images
REPOSITORY                                TAG       IMAGE ID       CREATED         SIZE
mayanktest                                latest    373987aa2ad7   8 hours ago     393MB
mdhack/collinsimage                       latest    373987aa2ad7   8 hours ago     393MB
calico/cni                                v3.22.2   be7dfc21ba2e   12 days ago     236MB
calico/pod2daemon-flexvol                 v3.22.2   d6660bf471e1   12 days ago     19.7MB
calico/node                               v3.22.2   fd1608dbbc19   12 days ago     198MB
k8s.gcr.io/kube-apiserver                 v1.23.6   8fa62c12256d   13 days ago     135MB
k8s.gcr.io/kube-proxy                     v1.23.6   4c0375452406   13 days ago     112MB
k8s.gcr.io/kube-scheduler                 v1.23.6   595f327f224a   13 days ago     53.5MB
k8s.gcr.io/kube-controller-manager        v1.23.6   df7b72818ad2   13 days ago     125MB
k8s.gcr.io/etcd                           3.5.1-0   25f8c7f3da61   5 months ago    293MB
k8s.gcr.io/coredns/coredns                v1.8.6    a4ca41631cc7   6 months ago    46.8MB
k8s.gcr.io/pause                          3.6       6270bb605e12   8 months ago    683kB
oraclelinux                               8.3       816d99f0bbe8   12 months ago   224MB
mdhack/myserver                           latest    e8ce7504414a   20 months ago   350MB
quay.io/mayank123modi/simple-webapp       latest    c6e3cd9aae36   3 years ago     84.8MB
[root@master ~]#
```

These images are responsible to run your containers in the cluster.

Is the vulnerability okay here? NO

There should be no vulnerability.

```
[root@master ~]# docker history k8s.gcr.io/kube-apiserver:v1.23.6
IMAGE          CREATED         CREATED BY                                      SIZE      COMMENT
8fa62c12256d   13 days ago     COPY /kube-apiserver /usr/local/bin/kube-api…   131MB     buildkit.dockerfile.v0
<missing>      13 days ago     ARG BINARY                                      0B        buildkit.dockerfile.v0
<missing>      2 weeks ago     ENTRYPOINT ["/go-runner"]                       0B        buildkit.dockerfile.v0
<missing>      2 weeks ago     COPY /workspace/go-runner . # buildkit          1.51MB    buildkit.dockerfile.v0
<missing>      2 weeks ago     WORKDIR /                                       0B        buildkit.dockerfile.v0
<missing>      2 weeks ago     LABEL description=go based runner for distro…   0B        buildkit.dockerfile.v0
<missing>      2 weeks ago     LABEL maintainers=Kubernetes Authors            0B        buildkit.dockerfile.v0
<missing>      52 years ago    bazel build ...                                 2.36MB
[root@master ~]#
```

Check for one of this image:

```
[root@master ~]# trivy image  k8s.gcr.io/kube-apiserver:v1.23.6
^C
```

Check for the count:

```
[root@master ~]# trivy image  k8s.gcr.io/kube-apiserver:v1.23.6 | head -10
2022-04-27T11:49:22.313Z        INFO    Detected OS: debian
2022-04-27T11:49:22.313Z        INFO    Detecting Debian vulnerabilities...
2022-04-27T11:49:22.313Z        INFO    Number of PL dependency files: 0

k8s.gcr.io/kube-apiserver:v1.23.6 (debian 11.3)
===============================================
Total: 0 (UNKNOWN: 0, LOW: 0, MEDIUM: 0, HIGH: 0, CRITICAL: 0)
```

We can use these kind of images in production? Yes

Check for another image:

Vulnerablity is okay for cmd. You can see 2.

```
[root@master ~]# tricy image k8s.gcr.io/etcd:3.5.1-0
bash: tricy: command not found
[root@master ~]# trivy image k8s.gcr.io/etcd:3.5.1-0
[root@master ~]# trivy image k8s.gcr.io/etcd:3.5.1-0
2022-04-27T11:49:59.780Z        INFO    Detected OS: debian
2022-04-27T11:49:59.780Z        INFO    Detecting Debian vulnerabilities...
2022-04-27T11:49:59.780Z        INFO    Number of PL dependency files: 4
2022-04-27T11:49:59.780Z        INFO    Detecting gobinary vulnerabilities...

k8s.gcr.io/etcd:3.5.1-0 (debian 11.1)
=====================================
Total: 0 (UNKNOWN: 0, LOW: 0, MEDIUM: 0, HIGH: 0, CRITICAL: 0)


usr/local/bin/etcd
==================
Total: 2 (UNKNOWN: 1, LOW: 0, MEDIUM: 0, HIGH: 1, CRITICAL: 0)

+---------------------+------------------+----------+--------------------------------
```

Check for the count of vulnerability:

```
[root@master ~]# trivy image k8s.gcr.io/etcd:3.5.1-0 | head -10
2022-04-27T11:50:04.092Z        INFO    Detected OS: debian
2022-04-27T11:50:04.092Z        INFO    Detecting Debian vulnerabilities...
2022-04-27T11:50:04.092Z        INFO    Number of PL dependency files: 4
2022-04-27T11:50:04.092Z        INFO    Detecting gobinary vulnerabilities...

k8s.gcr.io/etcd:3.5.1-0 (debian 11.1)
=====================================
Total: 0 (UNKNOWN: 0, LOW: 0, MEDIUM: 0, HIGH: 0, CRITICAL: 0)


[root@master ~]#
```

How to fix the vulnerability? We will see later.

Commands shared by the Trainer:

277 rpm -ivh https://github.com/aquasecurity/trivy/releases/download/v0.18.3/trivy_0.18.3_Linux-64bit.rpm

278 trivy

279 cd /usr/local/bin/

280 ls

281 cp trivy /usr/bin/

282 trivy

283 docker images

284 docker pull mdhack/myserver

285 docker pull quay.io/mayank123modi/simple-webapp

286 cd

287 docker images

288 trivy

289 trivy image mdhack/myserver

290 trivy image mdhack/myserver | head -190

291 trivy image mdhack/myserver | head -10

292 trivy image quay.io/mayank123modi/simple-webapp | head -10

293 docker images

294 kubectl get nodes

295 <<X

kube- scheduler

api server

296 docker images

297 trivy image k8s.gcr.io/kube-apiserver | head -10

298 trivy image k8s.gcr.io/kube-apiserver

299 docker image

300 docker images

301 trivy image k8s.gcr.io/kube-apiserver

302 systemctl start docker

303 trivy image k8s.gcr.io/kube-apiserver

304 trivy image k8s.gcr.io/kube-apiserver:latest

305 docker history k8s.gcr.io/kube-apiserver

306 docker images

307 docker history k8s.gcr.io/kube-apiserver:v1.23.6

308 trivy image k8s.gcr.io/kube-apiserver:v1.23.6

309 trivy image k8s.gcr.io/kube-apiserver:v1.23.6 | head -10

310 docker images

311 tricy image k8s.gcr.io/etcd:3.5.1-0

312 trivy image k8s.gcr.io/etcd:3.5.1-0

313 trivy image k8s.gcr.io/etcd:3.5.1-0 | head -10

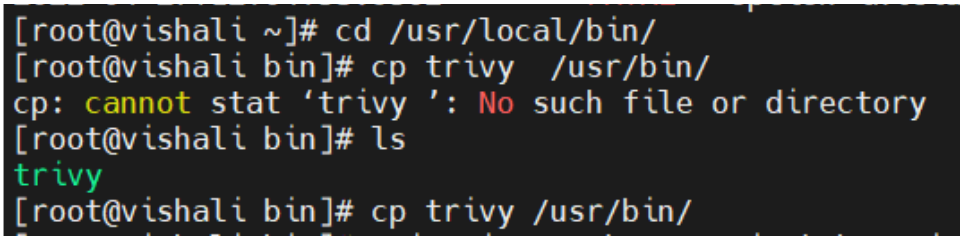
314 <<X

<<X

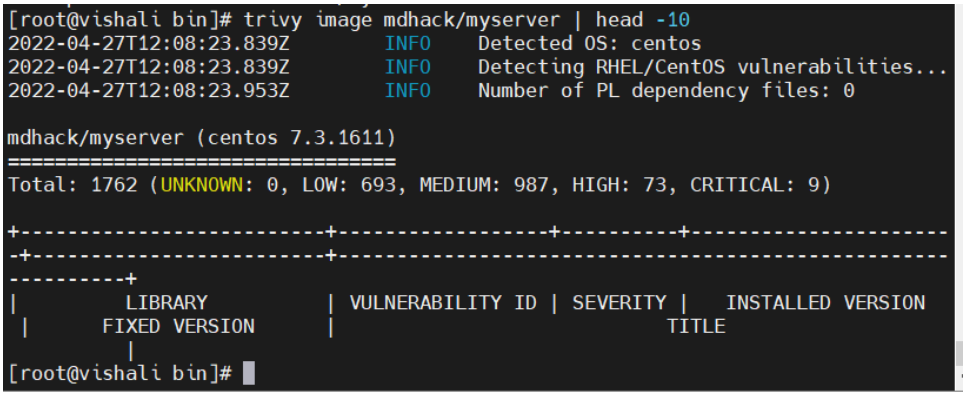
315 history

TASK:

Try the above command:



Vulernability for myserver image:



Vulnerability for webapp image:

```
[root@vishali bin]# docker pull quay.io/mayank123modi/simple-webapp
Using default tag: latest
latest: Pulling from mayank123modi/simple-webapp
7d0b3176f146: Pull complete
656769b42b54: Pull complete
46877b8f32e2: Pull complete
f5e790313325: Pull complete
03b307d006b6: Pull complete
a7b78dcf172f: Pull complete
cc19739c4acc: Pull complete
Digest: sha256:9a22693032c8fc8d93a4bb30b8e8d36804736c1a06d3419fc83e4a7ecb85c5f9
Status: Downloaded newer image for quay.io/mayank123modi/simple-webapp:latest
quay.io/mayank123modi/simple-webapp:latest
[root@vishali bin]# trivy image quay.io/mayank123modi/simple-webapp | head -10
2022-04-27T12:06:03.875Z        INFO    Need to update DB
2022-04-27T12:06:03.875Z        INFO    Downloading DB...
27.67 MiB / 27.67 MiB [-------------------------------] 100.00% 20.50 MiB p/s 1s
2022-04-27T12:06:10.435Z        INFO    Detected OS: alpine
2022-04-27T12:06:10.436Z        INFO    Detecting Alpine vulnerabilities...
2022-04-27T12:06:10.436Z        INFO    Number of PL dependency files: 0
2022-04-27T12:06:10.437Z        WARN    This OS version is no longer supported b
y the distribution: alpine 3.8.1
2022-04-27T12:06:10.437Z        WARN    The vulnerability detection may be insuf
ficient because security updates are not provided

quay.io/mayank123modi/simple-webapp (alpine 3.8.1)
==================================================
[root@vishali bin]#
```

Home work: Learn about this: