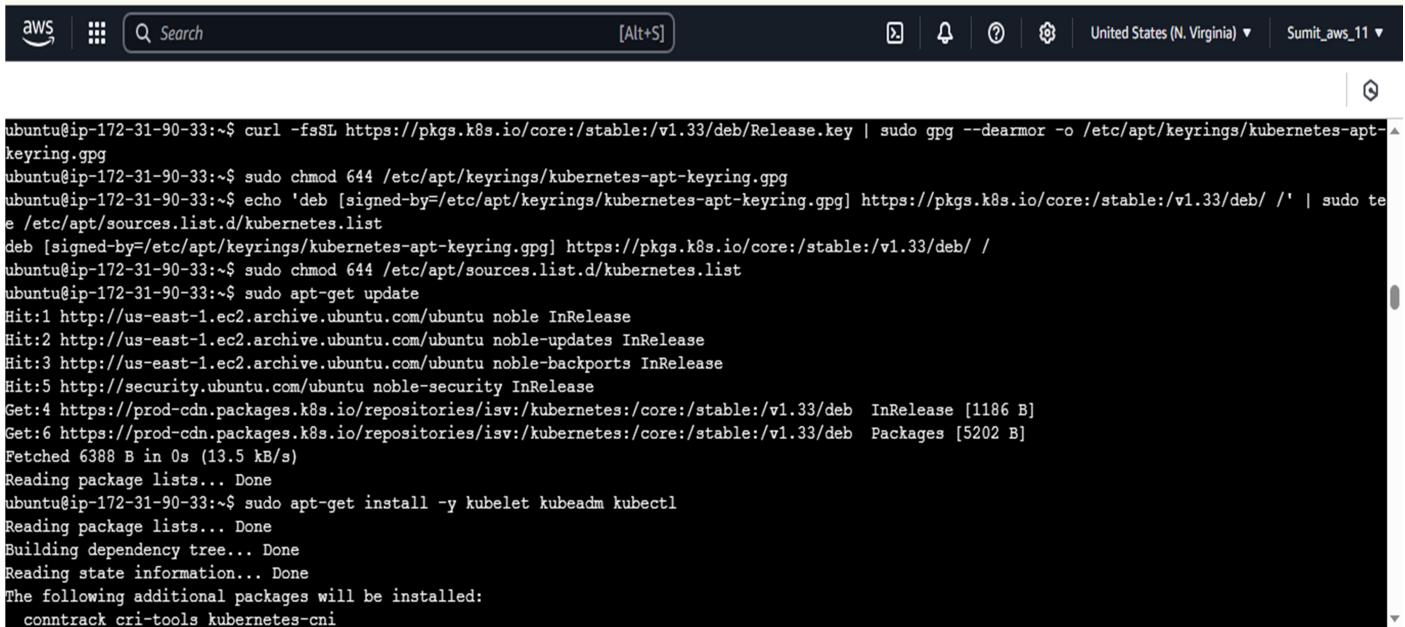


DevOps { PW Assignment }

Assignment 2: Kubernetes Introduction Task

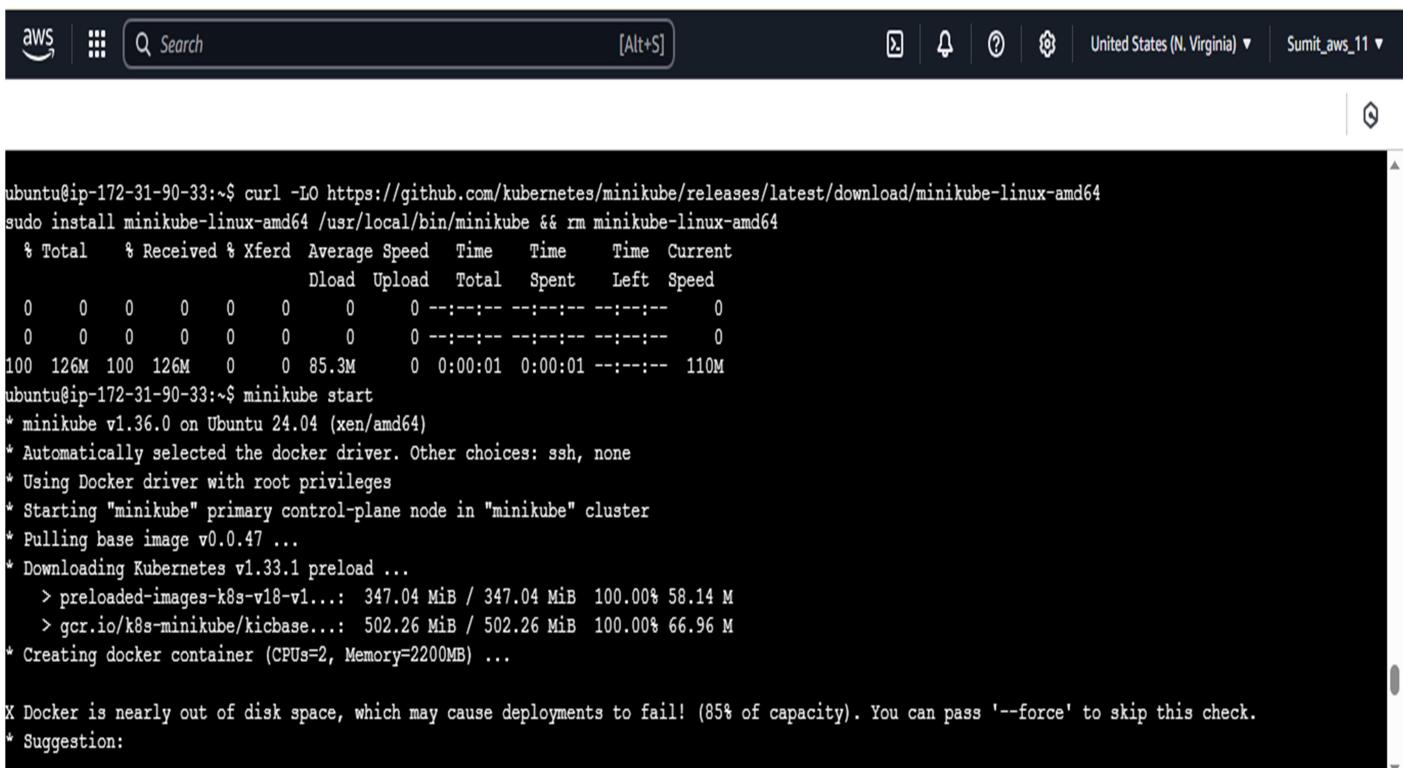
➤ HERE I'M USING AWS EC2 INSTANCE ,Instance Type -T2-Large 2/cpu

1. Kubernetes Setup: Set up a local Kubernetes cluster using Minikube or a managed Kubernetes service ? (e.g., GKE, EKS).



```
ubuntu@ip-172-31-90-33:~$ curl -fsSL https://pkgs.k8s.io/core:/stable:/v1.33/deb/Release.key | sudo gpg --dearmor -o /etc/apt/keyrings/kubernetes-apt-keyring.gpg
ubuntu@ip-172-31-90-33:~$ sudo chmod 644 /etc/apt/keyrings/kubernetes-apt-keyring.gpg
ubuntu@ip-172-31-90-33:~$ echo 'deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg] https://pkgs.k8s.io/core:/stable:/v1.33/deb/ ' | sudo tee /etc/apt/sources.list.d/kubernetes.list
deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg] https://pkgs.k8s.io/core:/stable:/v1.33/deb/
ubuntu@ip-172-31-90-33:~$ sudo chmod 644 /etc/apt/sources.list.d/kubernetes.list
ubuntu@ip-172-31-90-33:~$ sudo apt-get update
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:5 http://security.ubuntu.com/ubuntu noble-security InRelease
Get:4 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.33/deb InRelease [1186 B]
Get:6 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.33/deb Packages [5202 B]
Fetched 6388 B in 0s (13.5 kB/s)
Reading package lists... Done
ubuntu@ip-172-31-90-33:~$ sudo apt-get install -y kubelet kubeadm kubectl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  conntrack cri-tools kubernetes-cni

```



```
ubuntu@ip-172-31-90-33:~$ curl -LO https://github.com/kubernetes/minikube/releases/latest/download/minikube-linux-amd64
sudo install minikube-linux-amd64 /usr/local/bin/minikube && rm minikube-linux-amd64
  % Total    % Received % Xferd  Average Speed   Time   Time Current
                                 Dload  Upload Total   Spent    Left Speed
  0     0    0     0    0     0      0  --::-- --::-- --::--   0
  0     0    0     0    0     0      0  --::-- --::-- --::--   0
100  12M  100  12M    0     0  85.3M    0:00:01  0:00:01  --::-- 110M
ubuntu@ip-172-31-90-33:~$ minikube start
* minikube v1.36.0 on Ubuntu 24.04 (xen/amd64)
* Automatically selected the docker driver. Other choices: ssh, none
* Using Docker driver with root privileges
* Starting "minikube" primary control-plane node in "minikube" cluster
* Pulling base image v0.0.47 ...
* Downloading Kubernetes v1.33.1 preload ...
  > preloaded-images-k8s-v18-v1...: 347.04 MiB / 347.04 MiB 100.00% 58.14 M
  > gcr.io/k8s-minikube/kicbase...: 502.26 MiB / 502.26 MiB 100.00% 66.96 M
* Creating docker container (CPUs=2, Memory=2200MB) ...

X Docker is nearly out of disk space, which may cause deployments to fail! (85% of capacity). You can pass '--force' to skip this check.
* Suggestion:
```

2. Application Deployment: Deploy a simple application to your Kubernetes cluster?

```
ubuntu@ip-172-31-90-33:~$ kubectl get deployments
kubectl get pods
kubectl get services
NAME           READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment   2/2     2          2          2m56s
NAME           READY   STATUS    RESTARTS   AGE
nginx-deployment-96b9d695-hx4x2  1/1     Running   0          2m56s
nginx-deployment-96b9d695-t6zqk  1/1     Running   0          2m56s
NAME           TYPE      CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
kubernetes   ClusterIP  10.96.0.1   <none>        443/TCP   13m
ubuntu@ip-172-31-90-33:~$ minikube service nginx-service --url
X Exiting due to SVC_NOT_FOUND: Service 'nginx-service' was not found in 'default' namespace.
You may select another namespace by using 'minikube service nginx-service -n <namespace>'. Or list out all the services using 'minikube service list'

ubuntu@ip-172-31-90-33:~$ ls
nginx-deployment.yml
ubuntu@ip-172-31-90-33:~$ kubectl expose deployment nginx-deployment --type=NodePort --port=80
service/nginx-deployment exposed
ubuntu@ip-172-31-90-33:~$ minikube service nginx-deployment --url
http://192.168.49.2:31057
```

```
sions:[]v1.LabelSelectorRequirement(nil)}: field is immutable
ubuntu@ip-172-31-90-33:~$ kubectl delete deployment nginx-deployment
kubectl apply -f nginx-deployment.yml
deployment.apps "nginx-deployment" deleted
deployment.apps/nginx-deployment created
ubuntu@ip-172-31-90-33:~$ kubectl delete deployment nginx-deployment
deployment.apps "nginx-deployment" deleted
ubuntu@ip-172-31-90-33:~$ kubectl apply -f nginx-deployment.yml
deployment.apps/nginx-deployment created
ubuntu@ip-172-31-90-33:~$ kubectl get deployment,pods
NAME           READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/nginx-deployment   2/2     2          2          13s
NAME           READY   STATUS    RESTARTS   AGE
pod/nginx-deployment-96b9d695-hx4x2  1/1     Running   0          13s
pod/nginx-deployment-96b9d695-t6zqk  1/1     Running   0          13s
ubuntu@ip-172-31-90-33:~$ ls
nginx-deployment.yml
ubuntu@ip-172-31-90-33:~$ cat nginx-deployment.yml
apiVersion: apps/v1
kind: Deployment
metadata:
```

3. Resource Management: Practice managing Kubernetes resources like Pods, Services, and Deployments?

```
ubuntu@ip-172-31-90-33:~$ kubectl create deployment demo-app --image=httpd
deployment.apps/demo-app created
ubuntu@ip-172-31-90-33:~$ ls
nginx-deployment.yml
ubuntu@ip-172-31-90-33:~$ kubectl scale deployment demo-app --replicas=3
deployment.apps/demo-app scaled
ubuntu@ip-172-31-90-33:~$ kubectl get deployment
kubectl get pods
NAME           READY   UP-TO-DATE   AVAILABLE   AGE
demo-app       3/3     3          3          43s
nginx-deployment   2/2     2          2          13m
NAME           READY   STATUS    RESTARTS   AGE
demo-app-5dc5dfcc44-v5ntz  1/1     Running   0          43s
demo-app-5dc5dfcc44-vhc7h  1/1     Running   0          16s
demo-app-5dc5dfcc44-z2rw6  1/1     Running   0          16s
nginx-deployment-96b9d695-hx4x2  1/1     Running   0          13m
nginx-deployment-96b9d695-t6zqk  1/1     Running   0          13m
ubuntu@ip-172-31-90-33:~$ kubectl set image deployment/demo-app httpd=httpd:2.4.58
deployment.apps/demo-app image updated
ubuntu@ip-172-31-90-33:~$ kubectl rollout status deployment/demo-app
kubectl describe deployment demo-app
```



```
Name: demo-app
Namespace: default
CreationTimestamp: Sat, 21 Jun 2025 08:15:30 +0000
Labels: app=demo-app
Annotations: deployment.kubernetes.io/revision: 2
Selector: app=demo-app
Replicas: 3 desired | 3 updated | 3 total | 3 available | 0 unavailable
StrategyType: RollingUpdate
MinReadySeconds: 0
RollingUpdateStrategy: 25% max unavailable, 25% max surge
Pod Template:
  Labels: app=demo-app
  Containers:
    httpd:
      Image: httpd:2.4.58
      Port: <none>
      Host Port: <none>
      Environment: <none>
      Mounts: <none>
      Volumes: <none>
      Node-Selectors: <none>
      Tolerations: <none>
```



```
---- ---- -
Available True MinimumReplicasAvailable
Progressing True NewReplicaSetAvailable
OldReplicaSets: demo-app-5dc5dfcc44 (0/0 replicas created)
NewReplicaSet: demo-app-69675f657c (3/3 replicas created)
Events:
  Type Reason Age From Message
  ---- ---- - - -
  Normal ScalingReplicaSet 87s deployment-controller Scaled up replica set demo-app-5dc5dfcc44 from 0 to 1
  Normal ScalingReplicaSet 60s deployment-controller Scaled up replica set demo-app-5dc5dfcc44 from 1 to 3
  Normal ScalingReplicaSet 16s deployment-controller Scaled up replica set demo-app-69675f657c from 0 to 1
  Normal ScalingReplicaSet 11s deployment-controller Scaled down replica set demo-app-5dc5dfcc44 from 3 to 2
  Normal ScalingReplicaSet 11s deployment-controller Scaled up replica set demo-app-69675f657c from 1 to 2
  Normal ScalingReplicaSet 10s deployment-controller Scaled down replica set demo-app-5dc5dfcc44 from 2 to 1
  Normal ScalingReplicaSet 10s deployment-controller Scaled up replica set demo-app-69675f657c from 2 to 3
  Normal ScalingReplicaSet 9s deployment-controller Scaled down replica set demo-app-5dc5dfcc44 from 1 to 0
ubuntu@ip-172-31-90-33:~$ kubectl rollout undo deployment/demo-app
deployment.apps/demo-app rolled back
ubuntu@ip-172-31-90-33:~$ kubectl expose deployment demo-app --port=80 --type=NodePort
service/demo-app exposed
ubuntu@ip-172-31-90-33:~$ kubectl get svc demo-app
NAME      TYPE      CLUSTER-IP      EXTERNAL-IP      PORT(S)      AGE

```



```
nginx-deployment-96b9d695-hx4x2 1/1 Running 0 17m
nginx-deployment-96b9d695-t6zqk 1/1 Running 0 17m
ubuntu@ip-172-31-90-33:~$ kubectl apply -f pod-demo.yaml
error: the path "pod-demo.yaml" does not exist
ubuntu@ip-172-31-90-33:~$ vi pod-demo.yaml
ubuntu@ip-172-31-90-33:~$ ^C
ubuntu@ip-172-31-90-33:~$ vi pod-demo.yaml
ubuntu@ip-172-31-90-33:~$ kubectl apply -f pod-demo.yaml
error: the path "pod-demo.yaml" does not exist
ubuntu@ip-172-31-90-33:~$ ls
nginx-deployment.yaml pod-demo.yaml
ubuntu@ip-172-31-90-33:~$ kubectl apply -f pod-demo.yaml
pod/demo-app-69675f657c created
ubuntu@ip-172-31-90-33:~$ kubectl get pods
NAME          READY   STATUS    RESTARTS   AGE
demo-app-5dc5dfcc44-dhvzb  1/1     Running   0          6m56s
demo-app-5dc5dfcc44-s8ptg  1/1     Running   0          6m53s
demo-app-5dc5dfcc44-v8wz8  1/1     Running   0          6m54s
demo-app-69675f657c        1/1     Running   0          19s
nginx-deployment-96b9d695-hx4x2 1/1     Running   0          21m
nginx-deployment-96b9d695-t6zqk 1/1     Running   0          21m
ubuntu@ip-172-31-90-33:~$
```

4. Helm Charts: Use Helm to package and deploy applications on Kubernetes?

```
ubuntu@ip-172-31-90-33:~$ curl https://raw.githubusercontent.com/helm/helm/main/scripts/get-helm-3 | bash
% Total    % Received % Xferd  Average Speed   Time     Time      Current
          Dload  Upload Total Spent   Left Speed
100 11913  100 11913    0     0  302k      0 --:--:--:--:--:-- 306k
Helm v3.18.3 is already latest
ubuntu@ip-172-31-90-33:~$ helm version
version.BuildInfo{Version:"v3.18.3", GitCommit:"6838ebcf265a3842d1433956e8a622e3290cf324", GitTreeState:"clean", GoVersion:"go1.24.4"}
ubuntu@ip-172-31-90-33:~$ helm repo add bitnami https://charts.bitnami.com/bitnami
helm repo update
"bitnami" has been added to your repositories
Hang tight while we grab the latest from your chart repositories...
...Successfully got an update from the "bitnami" chart repository
Update Complete. *Happy Helming!*
ubuntu@ip-172-31-90-33:~$ helm install my-nginx bitnami/nginx
NAME: my-nginx
LAST DEPLOYED: Sat Jun 21 08:37:10 2025
NAMESPACE: default
STATUS: deployed
REVISION: 1
```

```
NOTES:
CHART NAME: nginx
CHART VERSION: 20.1.3
APP VERSION: 1.28.0

Did you know there are enterprise versions of the Bitnami catalog? For enhanced secure software supply chain features, unlimited pulls from Docker, LTS support, or application customization, see Bitnami Premium or Tanzu Application Catalog. See https://www.arrow.com/globalecs-na/vendors/bitnami for more information.

** Please be patient while the chart is being deployed **
NGINX can be accessed through the following DNS name from within your cluster:

my-nginx.default.svc.cluster.local (port 80)

To access NGINX from outside the cluster, follow the steps below:

1. Get the NGINX URL by running these commands:

NOTE: It may take a few minutes for the LoadBalancer IP to be available.
Watch the status with: 'kubectl get svc --namespace default -w my-nginx'

export SERVICE_PORT=$(kubectl get --namespace default -o jsonpath=".spec.ports[0].port" services my-nginx)
```

```
ubuntu@ip-172-31-90-33:~$ helm list
kubectl get all
NAME        NAMESPACE   REVISION   UPDATED             STATUS      CHART           APP VERSION
my-nginx    default     1          2025-06-21 08:37:10.378349131 +0000 UTC deployed  nginx-20.1.3   1.28.0
NAME        READY   STATUS  RESTARTS AGE
pod/demo-app-5dc5dfcc44-dhvzbz  1/1    Running   0       19m
pod/demo-app-5dc5dfcc44-s8ptg   1/1    Running   0       19m
pod/demo-app-5dc5dfcc44-w8wz8   1/1    Running   0       19m
pod/demo-app-69675f657c         1/1    Running   0       13m
pod/my-nginx-66cf78875d-9flhn  1/1    Running   0       16s
pod/nginx-deployment-96b9d695-hx4x2  1/1    Running   0       34m
pod/nginx-deployment-96b9d695-t6zqk  1/1    Running   0       34m

NAME        TYPE        CLUSTER-IP      EXTERNAL-IP      PORT(S)           AGE
service/demo-app  NodePort    10.103.73.39  <none>        80:31896/TCP   19m
service/kubernetes ClusterIP  10.96.0.1    <none>        443/TCP        45m
service/my-nginx   LoadBalancer 10.110.207.50 <pending>     80:32095/TCP,443:32624/TCP 16s
service/nginx-deployment NodePort    10.106.60.99  <none>        80:31057/TCP   30m

NAME        READY   UP-TO-DATE  AVAILABLE AGE
deployment.apps/demo-app  3/3     3           3        21m
deployment.apps/my-nginx   1/1     1           1        16s
```