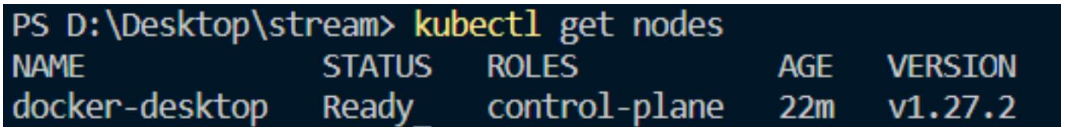
Practical-10

AIM: Orchestration of ML project containers using Kubernetes

The objective of this lab is to introduce you to the fundamentals of orchestrating applications with Kubernetes. You will learn how to define, deploy, and manage containerized applications using Kubernetes manifests.

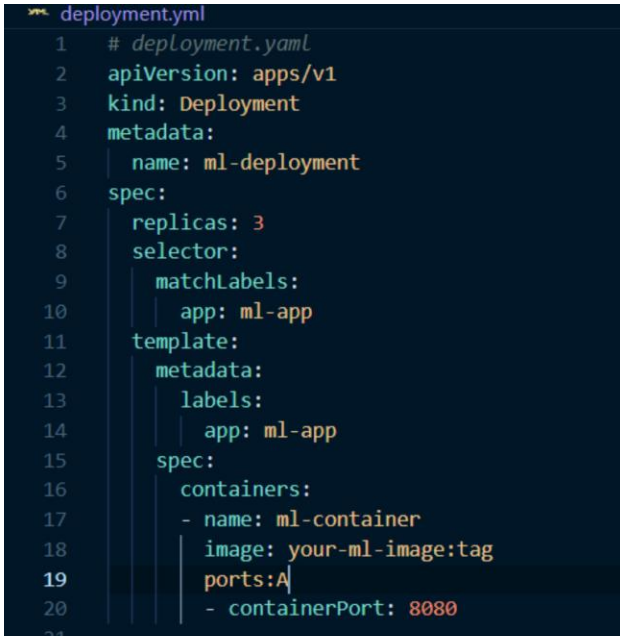
Lab Steps:

Step 1: Verify Kubernetes Cluster Ensure your Kubernetes cluster is up and running by checking the cluster nodes



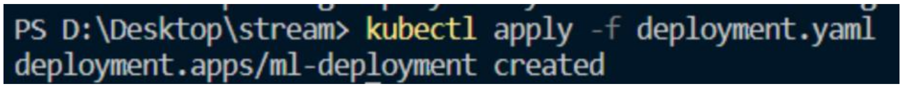
```
PS D:\Desktop\stream> kubectl get nodes
NAME             STATUS   ROLES           AGE   VERSION
docker-desktop   Ready    control-plane   22m   v1.27.2
```

Step 2: Define a Deployment using YAML manifest and apply the deployment to your cluster



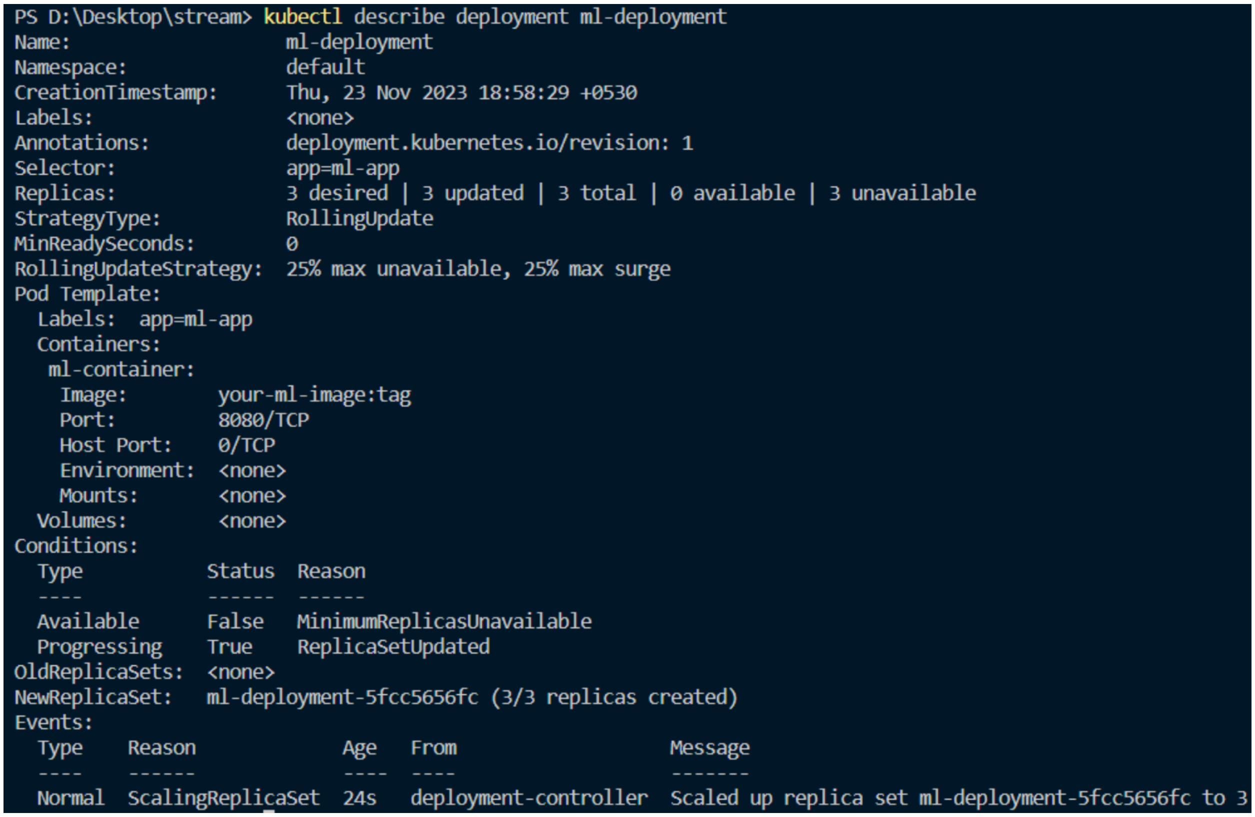
```
# deployment.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: ml-deployment
spec:
  replicas: 3
  selector:
    matchLabels:
      app: ml-app
  template:
    metadata:
      labels:
        app: ml-app
    spec:
      containers:
      - name: ml-container
        image: your-ml-image:tag
        ports:A
        - containerPort: 8080
```

Apply the deployment :



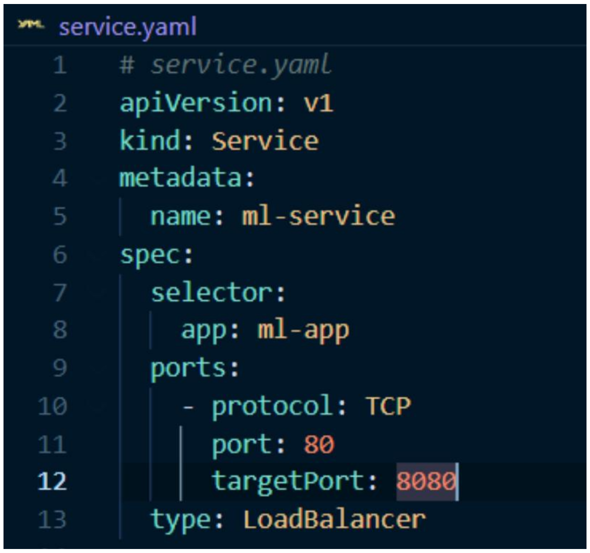
```
PS D:\Desktop\stream> kubectl apply -f deployment.yaml
deployment.apps/ml-deployment created
```

Step 3: Describe Deployment



```
PS D:\Desktop\stream> kubectl describe deployment ml-deployment
Name:                   ml-deployment
Namespace:              default
CreationTimestamp:      Thu, 23 Nov 2023 18:58:29 +0530
Labels:                 <none>
Annotations:            deployment.kubernetes.io/revision: 1
Selector:               app=ml-app
Replicas:               3 desired | 3 updated | 3 total | 0 available | 3 unavailable
StrategyType:           RollingUpdate
MinReadySeconds:        0
RollingUpdateStrategy:  25% max unavailable, 25% max surge
Pod Template:
  Labels:  app=ml-app
  Containers:
   ml-container:
    Image:        your-ml-image:tag
    Port:         8080/TCP
    Host Port:    0/TCP
    Environment:  <none>
    Mounts:       <none>
  Volumes:        <none>
Conditions:
  Type           Status  Reason
  ----           ------  ------
  Available      False   MinimumReplicasUnavailable
  Progressing    True    ReplicaSetUpdated
OldReplicaSets:  <none>
NewReplicaSet:   ml-deployment-5fcc5656fc (3/3 replicas created)
Events:
  Type    Reason             Age   From                   Message
  ----    ------             ----  ----                   -------
  Normal  ScalingReplicaSet  24s   deployment-controller  Scaled up replica set ml-deployment-5fcc5656fc to 3
```

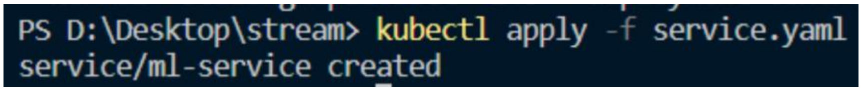
Step 4 : Expose Service



service.yaml

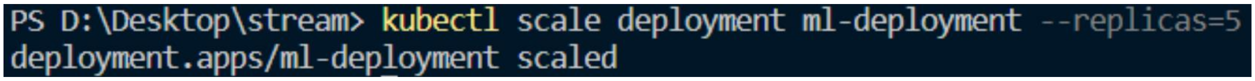
```yaml
# service.yaml
apiVersion: v1
kind: Service
metadata:
  name: ml-service
spec:
  selector:
    app: ml-app
  ports:
    - protocol: TCP
      port: 80
      targetPort: 8080
  type: LoadBalancer
```

Step 5: Access the Service



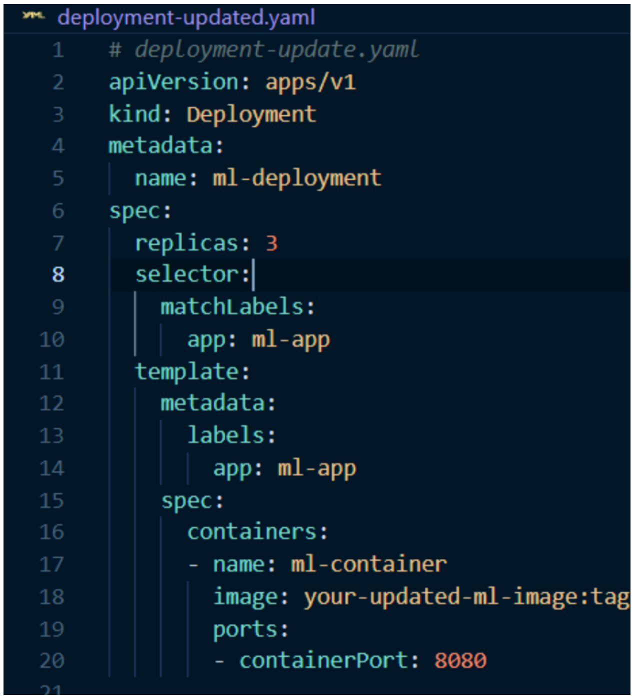
```
PS D:\Desktop\stream> kubectl apply -f service.yaml
service/ml-service created
```

Step 6: Scale Deployment



```
PS D:\Desktop\stream> kubectl scale deployment ml-deployment --replicas=5
deployment.apps/ml-deployment scaled
```

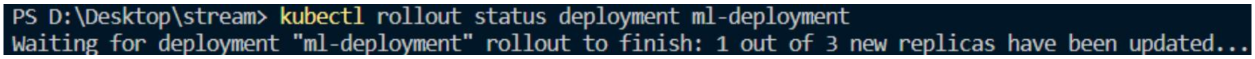
Step 7: Update Deployment



deployment-updated.yaml

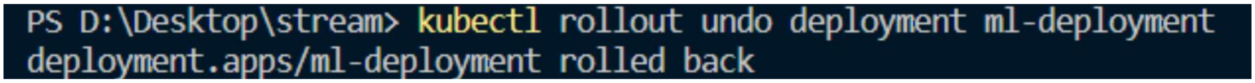
```yaml
# deployment-update.yaml
apiVersion: apps/v1
kind: Deployment
metadata:
  name: ml-deployment
spec:
  replicas: 3
  selector:
    matchLabels:
      app: ml-app
  template:
    metadata:
      labels:
        app: ml-app
    spec:
      containers:
      - name: ml-container
        image: your-updated-ml-image:tag
        ports:
        - containerPort: 8080
```

Step 8: Rollout Status



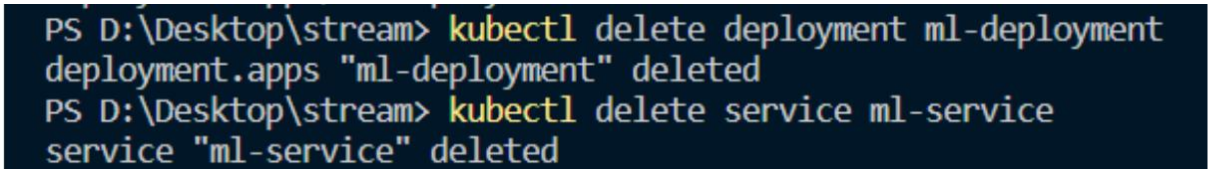
```
PS D:\Desktop\stream> kubectl rollout status deployment ml-deployment
Waiting for deployment "ml-deployment" rollout to finish: 1 out of 3 new replicas have been updated...
```

Step 9: Rollback Deployment



```
PS D:\Desktop\stream> kubectl rollout undo deployment ml-deployment
deployment.apps/ml-deployment rolled back
```

Step 10: Delete Resources



```
PS D:\Desktop\stream> kubectl delete deployment ml-deployment
deployment.apps "ml-deployment" deleted
PS D:\Desktop\stream> kubectl delete service ml-service
service "ml-service" deleted
```