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.

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

```
PS E:\7sem\MLOPS\practicals\wordfiles\practical_10> kubectl get nodes
>>
NAME             STATUS   ROLES           AGE    VERSION
docker-desktop   Ready    control-plane   170m   v1.28.2
```

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

ml-deployment.yaml 1

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io.k8s.api.apps.v1.Deployment (v1@deployment.json)

```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:    One or more containers
      - name: ml-container
        image: pr10
        ports:
        - containerPort: 8080

```

Apply the deployment:

```
PS E:\7sem\MLOPS\practicals\wordfiles\practical_10> kubectl apply -f ml-deployment.yaml
deployment.apps/ml-deployment created
```

Step 3: Describe Deployment

```
PS E:\7sem\MLOPS\practicals\wordfiles\practical_10> kubectl describe deployment ml-deployment
Name:                   ml-deployment
Namespace:              default
CreationTimestamp:      Sat, 02 Dec 2023 15:07:53 +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:        pr10
    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-74b4ddfb79 (3/3 replicas created)
Events:
  Type    Reason             Age    From                   Message
  ----    ------             ----   ----                   -------
  Normal  ScalingReplicaSet  2m37s  deployment-controller  Scaled up replica set ml-deployment-74b4ddfb79 to 3
```

Step 4: Expose Service

```
PS E:\7sem\MLOPS\practicals\wordfiles\practical_10> kubectl expose deployment ml-deployment --type=NodePort --port=80
service/ml-deployment exposed
```

Step 5: Access the Service

```
PS E:\7sem\MLOPS\practicals\wordfiles\practical_10> kubectl get svc ml-deployment
NAME            TYPE       CLUSTER-IP      EXTERNAL-IP   PORT(S)        AGE
ml-deployment   NodePort   10.107.125.78   <none>        80:30446/TCP   36s
```

Step 6: Scale Deployment

```
PS E:\7sem\MLOPS\practicals\wordfiles\practical_10> kubectl scale deployment ml-deployment --replicas=4
deployment.apps/ml-deployment scaled
```

Step 7: Update Deployment

ml-deployment.yaml 1

practicals > wordfiles > practical_10 > ml-deployn

io.k8s.api.apps.v1.Deployment (v1@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:    One or more
      - name: ml-container
        image: pr10_1
        ports:
        - containerPort: 8080

```

```
PS E:\7sem\MLOPS\practicals\wordfiles\practical_10> kubectl apply -f ml-deployment.yaml
deployment.apps/ml-deployment configured
```

Step 8: Rollout Status

```
PS E:\7sem\MLOPS\practicals\wordfiles\practical_10> 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 E:\7sem\MLOPS\practicals\wordfiles\practical_10> kubectl rollout undo deployment ml-deployment
deployment.apps/ml-deployment rolled back
```

Step 10: Delete Resources

```
PS E:\7sem\MLOPS\practicals\wordfiles\practical_10> kubectl delete deployment ml-deployment
deployment.apps "ml-deployment" deleted
```

```
PS E:\7sem\MLOPS\practicals\wordfiles\practical_10> kubectl delete svc ml-deployment
service "ml-deployment" deleted
```