Course-end Project 1

**Deploy the Application Using the Kubernetes Dashboard.**

* **Creating a token and working on a dashboard.**

1. The Dashboard UI is not deployed by default. To deploy it, run the following command:

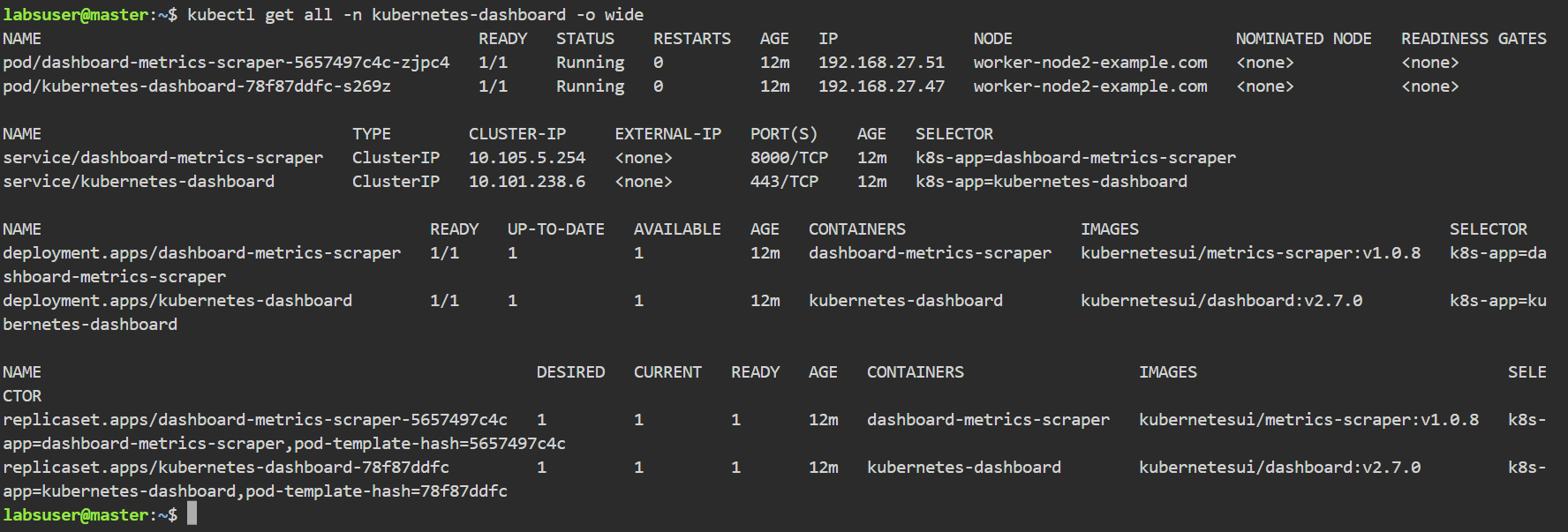
**kubectl apply -f** [**https://raw.githubusercontent.com/kubernetes/dashboard/v2.7.0/aio/deploy/recommended.yaml**](https://raw.githubusercontent.com/kubernetes/dashboard/v2.7.0/aio/deploy/recommended.yaml)

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1. To verify the dashboard resources, run the following command:

**kubectl get all -n kubernetes-dashboard -o wide**



1. Edit the service ‘kubernetes-dashboard’ and change the service type form ‘ClusterIP’ to ‘NodePort’. To edit the service, run the following command:

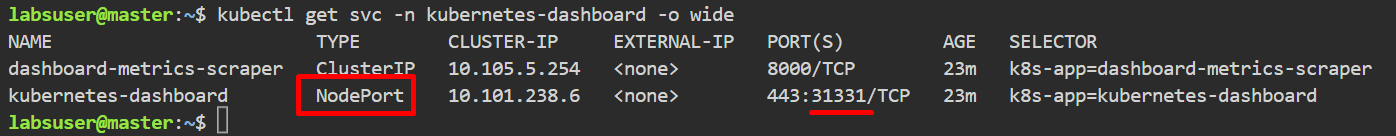
**kubectl edit svc -n kubernetes-dashboard kubernetes-dashboard**

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1. To verify the changes done in point 3, run the following command:

**kubectl get svc -n kubernetes-dashboard -o wide**



Type is changed to **NodePort** and NodePort **31331** is being used.

1. To access Kubernetes Dashboard UI , open firefox on master node and open below url

“https://localhost:<<NodePort>>” 🡪 NodePort from point 4.

[**https://localhost:31331**](https://localhost:31331)

Click on Advanced -> Accept Risk and Continue and below page will be displayed.

Select the token and enter the token and sign in.

To generate the token follow below points.

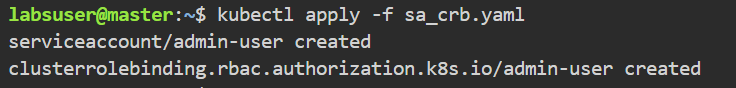
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1. To generate the token, create a service account ‘admin-user’ in namespace ‘kubernetes-dashboard’ and perform clusterrolebinding with existing cluster role ‘cluster-admin’. Use attached sa\_crb.yaml file to create the resources.



**kubectl apply -f sa\_crb.yaml**



1. To Create the token for above service account, run following command:

**kubectl -n kubernetes-dashboard create token admin-user**

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1. Copy this token and enter in the Kubernetes dashboard login page and sign in into the dashboard. The dashboard is accessible

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* **Configure the NFS-server.**

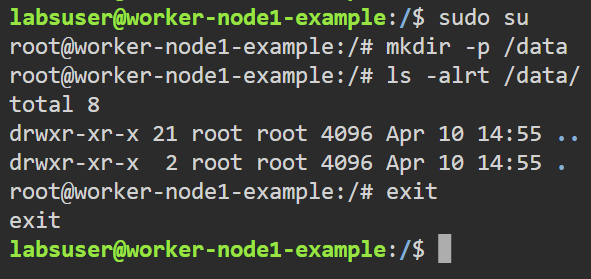
1. To create a directory on NFS server node which can be exported to NFS clients, run the below command on worker node 1.

**sudo su**

**mkdir -p /data**

**ls -alrt /data/**

**exit**



1. Install the NFS kernel server on the machine:

**sudo apt install nfs-kernel-server**

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1. To specify which directories on the server should be exported to NFS clients and what level of access those clients should have, open the exports file in the /etc directory:

**sudo vi /etc/exports**



1. Inside the file, append the following code:

**/ data \*(rw,sync,no\_root\_squash)**:A screenshot of a computer program

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1. To export all shared directories, you have defined in the /etc/exports file, use:

**sudo exportfs -rv**

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1. Make the folder publicly accessible by changing its owner user and group:

**sudo chown nobody:nogroup /data/**



1. Assign full permissions to ensure everyone can read, write, and execute files in this directory:

**sudo chmod 777 /data/**



1. Restart the NFS kernel server to apply the changes:

**sudo systemctl restart nfs-kernel-server**



1. To get the IP of worker nodes running the nfs server run below command:

**ip a**

or run **kubectl get nodes -o wide** on master node.

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* **Setting up the NFS client side.**

**Note:** Perform these steps on each worker node intended for sharing.

1. Run the following command to install the NFS common package on worker2:

**sudo apt install nfs-common**

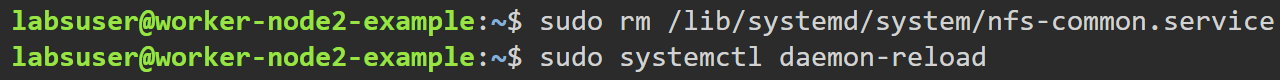
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Execute the following commands to refresh the NFS common service and verify its current status:  
  
 **sudo rm /lib/systemd/system/nfs-common.service  
 sudo systemctl daemon-reload**

**sudo systemctl restart nfs-common**

**sudo systemctl status nfs-common**



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* **Creating and verifying the PV and PVC.**

1. In master node create below wordpress-pv.yaml file to create a NFS PV.

The NFS server IP is the which we noted while installing NFS server on worker1.

apiVersion: v1

kind: PersistentVolume

metadata:

  name: mysql-pv

  labels:

    app: wordpress

    tier: mysql

spec:

  capacity:

    storage: 2Gi

  accessModes:

    - ReadWriteMany

  nfs:

    server: 172.31.26.41

    path: /data





**kubectl apply -f mysql-pv.yaml**

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1. To describe the persistent volume created in above step run below commands:

**kubectl get pv mysql-pv**

**kubectl describe pv mysql-pv**

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1. Create below mysql-pvc.yaml file to create a persistent volume claim for pv created in above step:

apiVersion: v1

kind: PersistentVolumeClaim

metadata:

  name: mysql-pvc

  labels:

    app: wordpress

spec:

  accessModes:

    - ReadWriteMany

  resources:

    requests:

      storage: 500Mi



**kubectl apply -f mysql-pvc.yaml**



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1. To describe the persistent volume claim created in above step run below commands:

**kubectl get pvc mysql-pvc**

**kubectl describe pvc mysql-pvc**

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**NOTE: This mysql-pvc will be used in mysql deployment.**

1. To create PV and PVC for wordpress deployment use below yaml files.

apiVersion: v1

kind: PersistentVolume

metadata:

  name: wordpress-pv

  labels:

    type: hostpath

spec:

  capacity:

    storage: 2Gi

  accessModes:

    - ReadWriteMany

  persistentVolumeReclaimPolicy: Delete

  hostPath:

    type: DirectoryOrCreate

    path: "/opt/ "

---

kind: PersistentVolumeClaim

apiVersion: v1

metadata:

  name: wordpress-pvc

spec:

  accessModes:

    - ReadWriteMany

  resources:

    requests:

      storage: 500Mi





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1. To describe the PV and PVC created in above step, run the following command:

**kubectl describe pv wordpress-pv**

**kubectl describe pvc wordpress-pvc**

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* **Creating a secret for MySQL deployments secret data.**

1. Run the command below to encrypt your password with base64 encoding to make it more secure:

**echo -n 'admin' | base64**

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1. Create below mysql-secret.yaml file to create the secret to be used in mysql deployment.

apiVersion: v1

kind: Secret

metadata:

  name: mysql-secret

type: Opaque

data:

  password: YWRtaW4=





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1. To describe the secret created in above step, run the below command:

**kubectl get secret mysql-secret**

**kubectl describe secret mysql-secret**

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* **Creating a configmap for WordPress deployment.**

1. Create below wordpress-config.yaml file to create the configmap to be used in wordpress deployment.

apiVersion: v1

kind: ConfigMap

metadata:

  name: wordpress-config

data:

  host: wordpress-mysql







1. To describe the configmap created in above step, run the below command:

**kubectl get configmap wordpress-configmap**

**kubectl describe configmap wordpress-configmap**

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* **Creating and verifying the Deployments.**

1. To create the mysql deployment use the below mysql-deployment.yml file:

apiVersion:  apps/v1

kind: Deployment

metadata:

  name: wordpress-mysql

  labels:

    app: mysql-wordpress

spec:

  selector:

    matchLabels:

      app: mysql-wordpress

      tier: backend

  strategy:

    type: Recreate

  template:

    metadata:

      labels:

        app: mysql-wordpress

        tier: backend

    spec:

      containers:

      - image: mysql:5.6

        name: mysql

        env:

        - name: MYSQL\_ROOT\_PASSWORD

          valueFrom:

            secretKeyRef:

              name: mysql-secret

              key: password

        ports:

        - containerPort: 3306

          name: mysql

        volumeMounts:

        - name: mysql-persistent-storage

          mountPath: "/var/lib/mysql"

      volumes:

      - name: mysql-persistent-storage

        persistentVolumeClaim:

          claimName: mysql-pvc





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1. To describe the configmap created in above step, run the below command:

**kubectl get deployment wordpress-mysql**

**kubectl describe deployment wordpress-mysql**

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1. To create the wordpress deployment use the below wordpress-deployment.yml file:

apiVersion: apps/v1

kind: Deployment

metadata:

  name: wordpress

  labels:

    app: mysql-wordpress

spec:

  selector:

    matchLabels:

      app: mysql-wordpress

      tier: frontend

  strategy:

    type: Recreate

  template:

    metadata:

      labels:

        app: mysql-wordpress

        tier: frontend

    spec:

      containers:

      - image: wordpress

        name: wordpress

        env:

        - name: WORDPRESS\_DB\_HOST

          valueFrom:

            configMapKeyRef:

              name: wordpress-config

              key: host

        - name: WORDPRESS\_DB\_PASSWORD

          valueFrom:

            secretKeyRef:

              name: mysql-secret

              key: password

        ports:

        - containerPort: 80

          name: wordpress

        volumeMounts:

        - name: wordpress-persistent-storage

          mountPath: "/var/www/html"

      volumes:

      - name: wordpress-persistent-storage

        persistentVolumeClaim:

          claimName: wordpress-pvc



1. To describe the configmap created in above step, run the below command:

**kubectl get deployment wordpress**

**kubectl describe deployment wordpress**

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* **Creating and verifying the service.**

1. Create below mysql-service.yaml file to create the service to expose the mysql deployment.

apiVersion: v1

kind: Service

metadata:

  name: wordpress-mysql

  labels:

    app: mysql-wordpress

spec:

  ports:

    - port: 3306

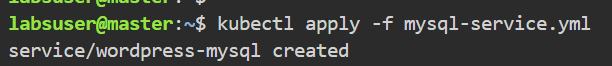
  selector:

    app: mysql-wordpress

    tier: backend

****





1. To describe the mysql service created in above step, run the below command:

**kubectl get svc wordpress-mysql**

**kubectl describe svc wordpress-mysql**

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1. Create below wordpress-service.yaml file to create the service to expose the wordpress deployment. Type is NodePort so we can access the wordpress service on **http://localhost:nodeport**.

apiVersion: v1

kind: Service

metadata:

  name: wordpress

  labels:

    app: mysql-wordpress

spec:

  ports:

    - port: 80

  selector:

    app: mysql-wordpress

    tier: frontend

  type: NodePort







1. To describe the mysql service created in above step, run the below command:

**kubectl get svc wordpress**

**kubectl describe svc wordpress**

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* **Access the WordPress application using the NodePort.**

1. Use the command below to get the Nodeport and access the WordPress application:

**kubectl get services**

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1. On the master node, open the Firefox browser, and then open the url http://localhost:<node\_port> to access the WordPress application

[**http://localhost:30175**](http://localhost:30175)

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1. Once the WordPress application opens, choose the language as English and then click Continue , provide the website-related information, and proceed with the installation.

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1. Once the installation is completed login into WordPress Application.

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