

DCA Course Project - 1

Project: Create a Docker Image and Deploy It to Kubernetes

Steps :

1. Install Docker

```
$ sudo apt-get remove docker docker-engine docker.io containerd runc
$ sudo apt-get update
$ sudo apt-get install docker-ce docker-ce-cli containerd.io
docker-compose-plugin
```

2. Setup Kubernetes Cluster

```
#Set Hostname

# In Master Node:
$ sudo hostnamectl set-hostname master.example.com
$ exec bash

# In Worker1 Node:
$ sudo hostnamectl set-hostname worker-node-1.example.com
$ exec bash

# In Worker2 Node:
$ sudo hostnamectl set-hostname worker-node-2.example.com
$ exec bash

# Docker Configuration - Master, Worker1, Worker2

$ sudo mkdir /etc/docker

$ cat <<EOF | sudo tee /etc/docker/daemon.json
{
  "exec-opts": ["native.cgroupdriver=systemd"],
  "log-driver": "json-file",
  "log-opts": {
    "max-size": "100m"
  },
  "storage-driver": "overlay2"
}
```

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```
}
EOF
-----
$ sudo systemctl enable docker
$ sudo systemctl daemon-reload
$ sudo systemctl restart docker
$ sudo swapoff -a

# Note: Do the above steps in Master, Worker1 and Worker2 nodes

# Master Node initialisation :

$ sudo kubeadm init --pod-network-cidr=192.168.0.0/16

# Copy kubeadm join command

$ mkdir -p $HOME/.kube
$ sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
$ sudo chown $(id -u):$(id -g) $HOME/.kube/config
$ cat ~/.kube/config

# Install Container Network Interface (CNI)

$ kubectl apply -f
https://cloud.weave.works/k8s/net?k8s-version=$(kubectl version |
base64 | tr -d '\n')

# Verification:
$ kubectl get nodes

# Worker Nodes initialization - Worker1 & 2
# DONT COPY AND PASTE: your join command will be different

$ sudo kubeadm join 172.31.59.10:6443 --token lmgp27.x5juohzs4wxmtwdc \
--discovery-token-ca-cert-hash
sha256:a059ff766ec0801fb80716f4e8614008092a087ccf8f5b97097c26d4213a77
12
#Note: In case you need to find your unique token, run the command
```

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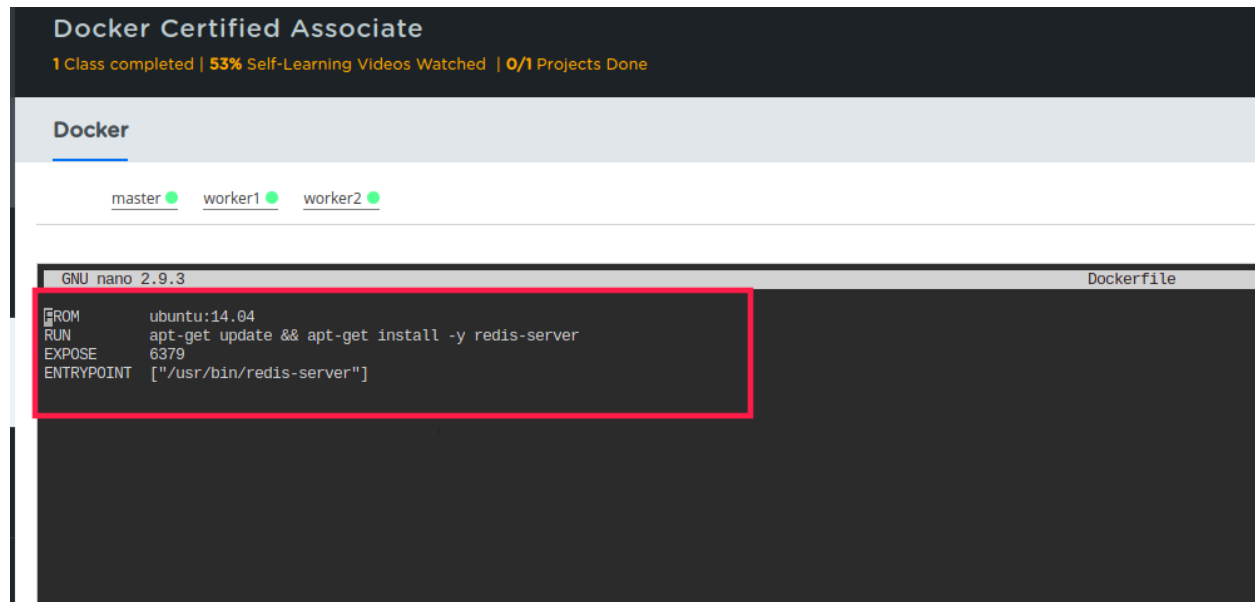
```
$ sudo kubeadm token create --print-join-command
```

3. Create a Dockerfile for redis image

```
$ nano Dockerfile

# Paste the below commands in Dockerfile

FROM          ubuntu:14.04
RUN           apt-get update && apt-get install -y redis-server
EXPOSE        6379
ENTRYPOINT    ["/usr/bin/redis-server"]
```



4. Build the Dockerfile to create a redis image

```
$ sudo docker build -t redis .
```

5. Verifying the image is created or not

```
$ sudo docker images

# you can see the redis image created there.
```

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```

Docker

master ● worker1 ● worker2 ●

Used 14.3 of 50 hours in Sep, 2022      03:05      ▶ Start Lab      ■ End Lab      ⓘ Details

This Lab will get reset on 02nd October 2022, 10:59 A

labuser@master:~$ ls
Desktop  Dockerfile  Documents  Downloads  Music  Pictures  Public  Templates  Videos  examples.desktop  redis.yaml  storage  work

labuser@master:~$ kubectl apply -f redis.yaml
error: error validating "redis.yaml": error validating data: [ValidationError(Deployment): unknown field "volumes.volumes.replicas" in io.k8s.api.apps.v1.Deployment, ValidationError(Deployment): unknown field "volumes.volumes.replicas" in io.k8s.api.apps.v1.Deployment, ValidationError(Deployment): unknown field "volumes.volumes.replicas.volumes.replicas.name" in io.k8s.api.apps.v1.Deployment, ValidationError(Deployment): unknown field "volumes.volumes.replicas.volumes.replicas.volumes.replicas.containerPort" in io.k8s.api.apps.v1.Deployment, ValidationError(Deployment): unknown field "volumes.volumes.replicas.volumes.replicas.volumes.replicas.volumes.replicas" in io.k8s.api.apps.v1.Deployment]; if you choose to ignore these errors, run validation off with --validate=false
labuser@master:~$ sudo kubectl apply -f redis.yaml
error: error validating "redis.yaml": error validating data: [ValidationError(Deployment): unknown field "volumes.volumes.replicas" in io.k8s.api.apps.v1.Deployment, ValidationError(Deployment): unknown field "volumes.volumes.replicas" in io.k8s.api.apps.v1.Deployment, ValidationError(Deployment): unknown field "volumes.volumes.replicas.volumes.replicas.name" in io.k8s.api.apps.v1.Deployment, ValidationError(Deployment): unknown field "volumes.volumes.replicas.volumes.replicas.volumes.replicas.containerPort" in io.k8s.api.apps.v1.Deployment, ValidationError(Deployment): unknown field "volumes.volumes.replicas.volumes.replicas.volumes.replicas.volumes.replicas" in io.k8s.api.apps.v1.Deployment]; if you choose to ignore these errors, run validation off with --validate=false
labuser@master:~$ nano redis.yaml
labuser@master:~$ nano redis.yaml
labuser@master:~$ sudo kubectl apply -f redis.yaml
deployment.apps/redis-deployment created
labuser@master:~$ kubectl get nodes
NAME                                STATUS    ROLES    AGE   VERSION
master.example.com                 Ready    master   4m35s   v1.19.4
master-node-1.example.com          Ready    <none>   3m5s   v1.19.4
worker-node-2.example.com          Ready    <none>   2m59s   v1.19.4
labuser@master:~$ kubectl get pods
NAME                                READY     STATUS    RESTARTS   AGE
redis-deployment-8554b995fd-d41v9   1/1       Running   0           15s
redis-deployment-8554b995fd-jdrnp   1/1       Running   0           15s
redis-deployment-8554b995fd-kpftc   1/1       Running   0           15s
labuser@master:~$ nano Dockerfile
labuser@master:~$ sudo docker images
REPOSITORY          TAG                 IMAGE ID            CREATED             SIZE
chillipili/alnihil/redis-server   latest             91b45fab7f2a        46 minutes ago     214MB
redis                latest             91b45fab7f2a        46 minutes ago     214MB
nginx                latest             326b648c9c6e        6 days ago         142MB
alpine               latest             8c49f7244128        5 weeks ago        5.54MB
k8s.gcr.io/kube-apiserver          v1.19.16          806534c-805c60      10 months ago      119MB
k8s.gcr.io/kube-controller-manager v1.19.16          a73d17262720        10 months ago      111MB
k8s.gcr.io/kube-proxy              v1.19.16          8a8a927c0e1b        10 months ago      98.0MB
k8s.gcr.io/kube-scheduler          v1.19.16          7c8a6e6b41e         10 months ago      46.2MB
ubuntu                    14.04             12666b487f54        18 months ago      107MB
ghcr.io/weaveworks/launcher/weave-npc 2.8.1             7f325f5644ff        10 months ago      29.9MB
ghcr.io/weaveworks/launcher/weave-kube 2.8.1             d729c8a400c2        20 months ago      89MB
k8s.gcr.io/etcd                 3.4.13-0          6368c4f303ff        2 years ago        253MB
k8s.gcr.io/coredns              1.7.0             bf6a336e3dc5        2 years ago        45.2MB
k8s.gcr.io/pause                 3.2              80d238ed6f5d        2 years ago        683kB
labuser@master:~$
```

6. Tag and push the Image to DockerHub

```
# Need to create a DockerHub account by using the link
https://hub.docker.com/

$ sudo docker tag redis:latest <yourUserName/Repositoryname>:tagname
$ sudo docker push <yourUserName/Repositoryname>:tagname
```

The screenshot shows the Docker Hub interface for a repository named `chittimallanikhil / redis-server`. The page has a blue header with the Docker logo and navigation links. Below the header, there are tabs for `General`, `Tags`, `Builds`, `Collaborators`, `Webhooks`, and `Settings`. The `General` tab is selected. A light blue banner at the top of the content area says "Add a short description for this repository" with an "Update" button. The repository name is displayed with a globe icon. Below it, the "Description" section is empty, with a note "This repository does not have a description". A clock icon indicates "Last pushed: an hour ago". On the right, the "Docker commands" section shows a "Public View" button and a code box containing `docker push chittimallanikhil/redis-server:tagname`. This code box is highlighted with a red rectangle, and two red arrows point from it to the labels "Username" and "Repositoryname" below. At the bottom, there are sections for "Tags and scans" and "Automated Builds".

chittimallanikhil / redis-server

Description

This repository does not have a description

Last pushed: an hour ago

Docker commands

Public View

To push a new tag to this repository,

```
docker push chittimallanikhil/redis-server:tagname
```

Username Repositoryname

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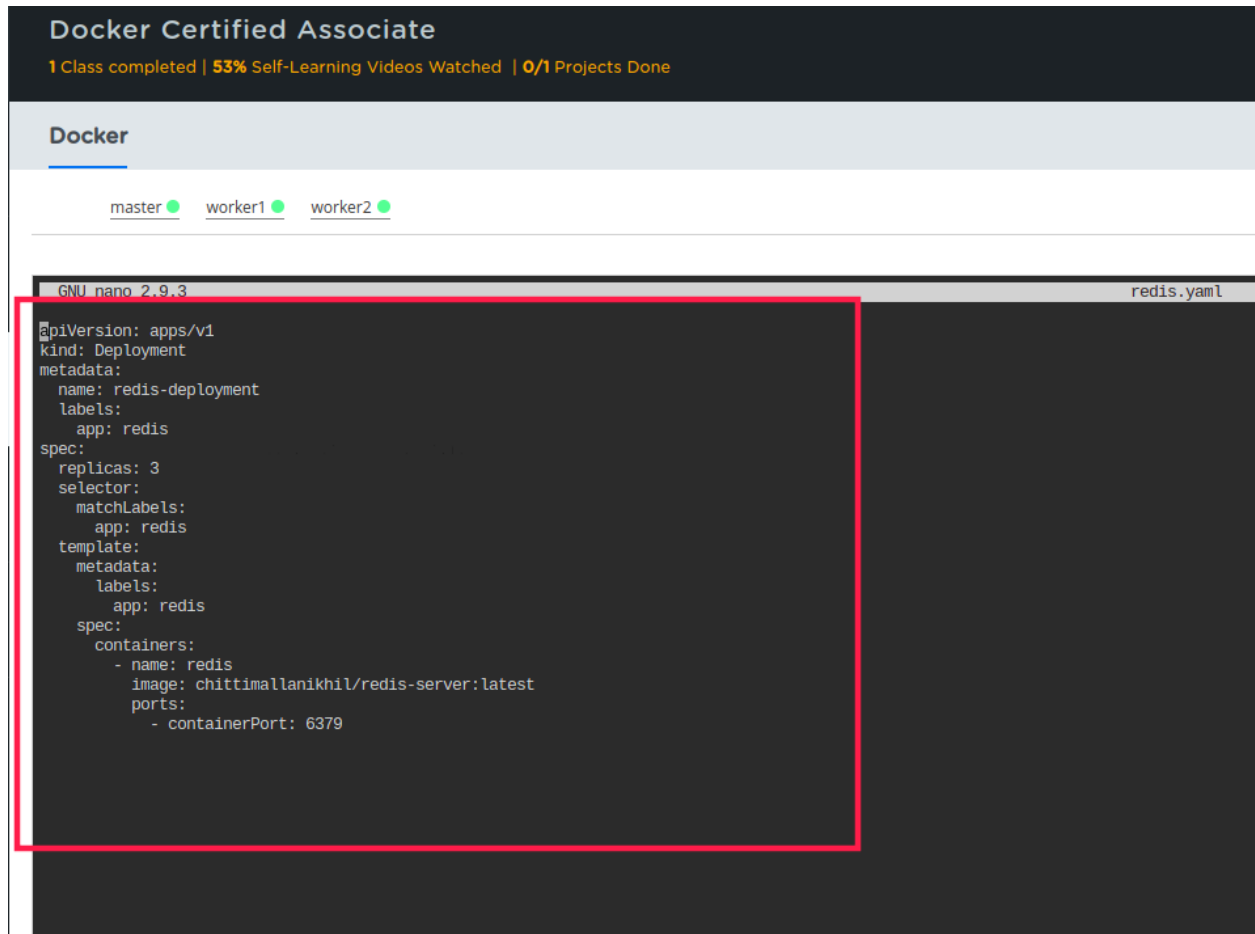
7. Create a yaml file for image deployment in kubernetes cluster

```
$ nano redis.yaml
```

```
# Note : paste the below text into yaml file and change the image  
name in it with your docker hub account details.
```

```
apiVersion: apps/v1  
kind: Deployment  
metadata:  
  name: redis-deployment  
  labels:  
    app: redis  
spec:  
  replicas: 3  
  selector:  
    matchLabels:  
      app: redis  
  template:  
    metadata:  
      labels:  
        app: redis  
    spec:  
      containers:  
        - name: redis  
          image: chittimallanikhil/redis-server:latest  
          ports:  
            - containerPort: 6379
```

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8. Deploy the image in kubernetes cluster

```
$ sudo kubectl apply -f redis.yaml

# you can see deployment created and verify it.

$ sudo kubectl get pods

# you can see the pods created

$ sudo kubectl get deployment

# you can see the deployment created
```

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Output :

```
Docker Certified Associate
1 Class completed | 53% Self-Learning Videos Watched | 0/1 Projects Done

Docker

master ● worker1 ● worker2 ●

labsuser@master:~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
redis-deployment-8554b995fd-d4lv9   1/1     Running   0           28m
redis-deployment-8554b995fd-jdrwp   1/1     Running   0           28m
redis-deployment-8554b995fd-kpfbc   1/1     Running   0           28m
labsuser@master:~$ kubectl get deployment
NAME          READY   UP-TO-DATE   AVAILABLE   AGE
redis-deployment  3/3     3            3           28m
labsuser@master:~$
```