SOFE 4630 Fall 2021 - Cloud Computing

Project Milestone #1 : IaaS: Virtualization and Containerization

Course Group No: 12

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Answer the following questions :

What are docker images, containers, and registry?

Docker Images : A docker image is a file that is used to run programmes in docker containers.

- It contains tools, libraries, and dependencies required to run a program in docker.
- It acts as a starting point for running code in docker.

Docker Containers :

- A docker container is a virtualized runtime environment that is used in the development of applications.
- It is used to develop, operate and distribute applications that are independent of build hardware.

Registry : A registry delivers and stores docker images in various tagged versions.

- It is a highly scalable server side application.

2. List the Docker commands used in the video with a brief description for each command and option ?

```
FROM openjdk
```

- This command is used to pull the latest image of openjdk from docker hub.

```
RUN mkdir /app
```

- This command makes a directory for applications to run in the docker image

```
COPY . /app
```

- This command is used to transfer files from the host machine to the docker image directory. Since, I was in the current directory a . is used.

```
WORKDIR /app
```

- This command sets the directory for executing future docker commands.

```
CMD java Main.java
```

- This command is to let docker know how to run the application. Since our application is a JAVA based web application, we run using the java run command.

The commands that can be used to stop and delete the two containers that were created in this video are as follows :

Stop : docker stop <container_ID>

Delete : docker rm <container_ID> or docker rm -f <container_ID>

3. What's a multi-container Docker application?

- It is an application that runs using multiple docker containers to be fully functional.
- Docker compose can be used to allow the containers to interact with each other.

4. How are these containers communicated together?

They communicate in one of the following two ways :

- Network :
  - The web application will expose its port to receive requests.
  - The application will make a port available outside the docker container for it to bind with one of the available network ports.
- Disk Sharing :
  - Applications can communicate by reading and writing files to a volume that will be shared with multiple containers.

5. What command can be used to stop the Docker application and delete its images?

- **Docker rm -f <container_ID> :** This will force stop the docker application.
- **Docker image rm -f <Image_ID> :** This will force stop the docker image and delete it.

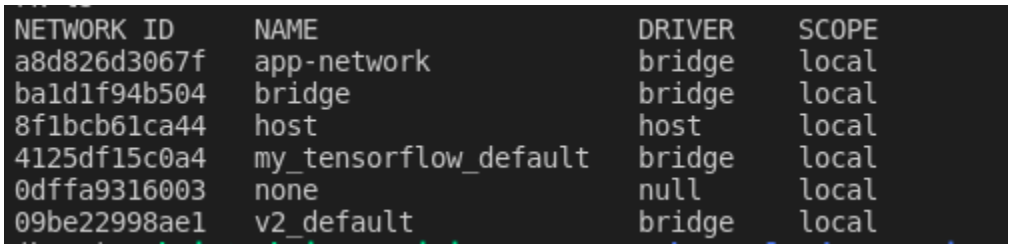
6. List the new docker commands used in the video with a brief description for each command and option.

- **docker pull mysql** : This command will pull the latest image version of mysql from docker hub.

- **docker run –name app-db -d -e MYSQL_ROOT_PASSWORD=password -e MYSQL_DATABASE=myDB mysql** : This creates a MYSQL database with root access. This is done by setting -e to assign environment variables.

- **docker run –name app -d my-web-app:1.0 :** This will run the docker container with the name app.

- **docker network ls :** This command will list all the available networks that is created by docker compose to connect containers for this application.



```
NETWORK ID     NAME                   DRIVER    SCOPE
a8d826d3067f   app-network            bridge    local
ba1d1f94b504   bridge                 bridge    local
8f1bcb61ca44   host                   host      local
4125df15c0a4   my_tensorflow_default  bridge    local
0dffa9316003   none                   null      local
09be22998ae1   v2_default             bridge    local
```

- **docker network connect app-network app-db :** This command is used to connect the docker container to the network we want to.

- **docker rm -f app :** This command is used to force stop and delete the web application.

- **docker rm -f app-db :** This command deletes the mysql database. This was done so that we can set up the application from scratch using docker-compose.

- **docker-compose up -d :** This command executes the docker-compose.yml file which contains instructions to build all the necessary docker containers and its connections to get the web application running.

7. List all used GCP shell commands and their description in your report.

- **docker run -d -p 8080:80 nginx:latest :** This command runs the docker container in port 8080 in detached mode. -p tag publishes the port to the host machine.
- **docker cp index.html Container_ID:/usr/share/nginx/html/ :** This command copies the html file contents to the docker container.
- **docker commit Container_ID cad/web:version1** : This command is used to build the container when changes were made to the original image.
- **docker tag cad/web:version1 us.gcr.io/elated-chariot-340214 /cad-site:version1**
    - This command makes a tag to the container
- **docker push us.gcr.io/elated-chariot-340214/cad-site:version1**
    - This will push the container to be manageable by container registry.

Kubernetes :

All the video links are provided in this google drive folder :

Video 1 - Hello world docker : **container_StopAndDelete**

Video 2 - Docker-compose.yml : **DockerCompose**

Video 3 - Cloud GCP : GKE_Deploy

https://drive.google.com/drive/folders/1v1AThnuAI87BILnFi1ACYToQDlHCIFrS?usp=sharing