Docker Containers

CMIS 545 - Cloud Computing Architecture

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Just Enough Microservices

What are Microservices?

Microservices are

How do Microservices relate to Containers?

- Containers facilitate the modularized development and deployment of microservices.
- Using one service per container guarantees independence

Containerization

Containers vs Virtual Machines

Containers vs Virtual Machines

Random explanation xxx

Differences

- Virtualization
- Containerization
- third bullet
- fourth bullet

Docker

Definition

Docker is a Platform xxx

Docker Primitives

Docker Engine

Docker Image

- We can think of a Docker Image as a stopped Docker Container
- Each element within an image represents an image layer.
 Layers are then stacked on top of each other and ready to run.

Docker Container

• Containers are the central unit on top of which all Docker is built, and they are better examined practically.

Docker Compose

Docker Demo

Graylog App

- Graylog is an open source log management solution for capturing, storing, and analyzing machine data. It needs two dependencies:
 - MongoDB: An open-source, "general purpose, document-based, distributed database"
 - Elasticsearch: An open-source, "powerful analytics engine to explore data easily".

Docker Run

~\$ docker container run <options> <image>:<tag> <app>

Graylog Setup

```
eduardo@eduardo-L380:~$ docker container run --name mongo -d mongo:3

eduardo@eduardo-L380:~$ docker run --name elasticsearch \
    -e "http.host=0.0.0.0" \
    -e "ES_JAVA_OPTS=-Xms512m -Xmx512m" \
    -d docker.elastic.co/elasticsearch/elasticsearch-oss:6.8.10

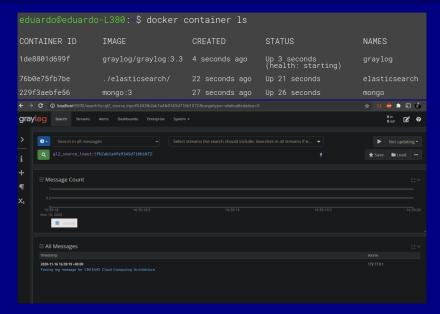
eduardo@eduardo-L380:~$ docker run --name graylog --link mongo --link elasticsearch \
    -p 9000:9000 -p 12201:12201 -p 1514:1514 -p 5555:5555\
    -e GRAYLOG_HTTP_EXTERNAL_URI="http://127.0.0.1:9000/" \
    -d graylog/graylog:3.3
```

Figure 1: Graylog Setup Commands

Note

In Ubuntu 20.04 LTS stock, installing graylog requires adjusting default virtual memory settings using: *sudo sysctl -w vm.max_map_count=262144*

Testing Graylog



Further Testing

 ${\tt eduardo@eduardo-L380:.} \textbf{§ echo 'Testing log message for CMIS545 Cloud Computing Architecture' | nc localhost 5555}$



Killing the Application // Stoping and Removing Containers??

```
eduardo@eduardo-L380:~$ docker container stop mongo

eduardo@eduardo-L380:~$ docker container ls -a

CONTAINER ID IMAGE CREATED STATUS NAMES

1de8801d699f graylog/graylog:3.3 2 minutes ago Up 2 minutes (healthy) graylog
76b0e75fb7be ./elasticsearch/ 53 seconds ago Up 52 seconds elasticsearch
229f3aebfe56 mongo:3 2 minutes ago Exited(0) 5 seconds ago mongo
```

Figure 2: Stoping Single Container

```
eduardo@eduardo-L380:~$ docker container stop mongo elasticsearch graylog eduardo@eduardo-L380:~$ docker container rm mongo elasticsearch graylog
```

Figure 3: Stopping and Removing all Containers

Further Container Commands[1]

| Command | Description |
|---|---|
| docker container prune docker container start docker container diff docker container exec docker container export docker container inspect docker container kill docker container logs | Remove all stopped containers Start one or more stopped containers Inspect file or directory changes Run a command in a running container Export a container's filesystem as a tar Display detailed information Kill one or more running containers Fetch the logs of a container |

[1]

Documentation: https://docs.docker.com/engine/reference/commandline/container_run/