CS208 Cloud Computing and Cloud Networking

Assignment 2 (Due 11:59 pm, 4 Feb 2025)

Docker Containers

Linux containers are widely used as cloud compute instances due to their fast bootup and lower memory footprint. Docker is one such widely used container technology. The goal of this assignment is to give an introduction to Docker containers.

Problem Statement

In this assignment, you have to use a client-server socket program using TCP sockets from Assignment 1 and containerize your applications. There will be two containers, one for the server and another for the client application. You can create two containers in the same machine.

Server Container

1. Create a volume/directory by name "server_persistent_storage" and create a file “mydata.txt” of any size with random content. Note down its checksum.
2. The server container will mount "server_persistent_storage" in "/server_storage".
3. This container runs a server application that will read a file “mydata.txt” from in "/server_storage"
4. The port on which the server runs must be specified as a command-line argument when we run docker.

Client Container

1. Create a volume/directory by name "client_persistent_storage".
2. The client container will mount "client_persistent_storage" in "/client_storage".
3. The client container runs an application that connects to the server, receives the file that the server sends, and saves it in "/client_storage" as “mydata.txt”.
4. Open another terminal and verify that the file “mydata.txt” is received properly at the clientside volume "client_persistent_storage" by verifying the checksum.

General instructions

- The client and server application itself can be built using any language you are comfortable with. But, the container should include all the packages that are required to run your application.
- You must create two docker networks and use one for hosting the server app and another one for the client app. This requires setting up iptable rules.
- Your containers should run these applications by default when they get started.

Resources

- https://www.freecodecamp.org/news/docker-simplified-96639a35ff36/
- https://medium.com/techanic/docker-containers-ipc-using-sockets-part-1-2ee90885602c

Grading

What is tested?

- Run the "run_server.sh" script on one terminal. It should create the user-defined network, the "server_persistent_storage", start the server and wait for the client connection.
- Run "run_client.sh" in another terminal. This script should create the "client_persistent_storage" and run the client container by specifying the server's IP and port as command line parameters.
- When the client container is run, a connection between the server and client is established and the file is transferred from the server to the client.
- Your code and scripts will be tested on creation of volumes/directory, proper running of server and client, and file transfer.
- You should make sure that the server can transfer any file with random text.

Grade Distribution

- Build and run server container - 30 points
- Build and run client container - 30 points
- Proper communication between the two - 15 points
- Scripts to run the containers - 15 points
- README file - 10 points