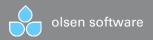


- 1. Linking containers manually
- 2. Using Docker Compose



1. Linking Containers Manually

- Overview
- Non-containerized application
- Containerized application
- Building the MySQL image
- Building the application image
- Running containers



Overview

- In a realistic application, you'll have lots of containers. For example:
 - Container #1 running MySQL
 - Container #2 running an application that talks to container #1
- We're going to show how to link these containers together
 - So the application can get data out of the MySQL database



A Non-Containerized Application

- Take a look at demo-docker-compose-before
 - It's a Spring Boot app that accesses data in a MySQL database
 - It's not containerized yet
- application.properties specifies connectivity info
 - It assumes MySQL is running on localhost
 - We'll need to change this property if MySQL is in a container

```
spring.datasource.url=jdbc:mysql://localhost:3306/MYSCHEMA?serverTimezone=UTC
spring.datasource.username=root
spring.datasource.password=c0nygre
```

application.properties



Containerized Application

- Now take a look at demo-docker-compose-after
 - This is a containerized version of the app, with 4 new files...
- Dockerfile-mysql and myschema.sql
 - Builds a Docker image for MySQL, using the SQL script to create and populate tables
- Dockerfile-app
 - Builds a Docker image for the Spring Boot app
- docker-compose.yaml
 - Uses Docker Compose to simplify things (see later)



Building the MySQL image

- Dockerfile-mysql builds an image for MySQL
 - Based on the standard MySQL image, with our database schema

```
FROM mysql:8.0.28

EXPOSE 3306

ENV MYSQL_ROOT_PASSWORD=cOnygre

COPY myschema.sql /docker-entrypoint-initdb.d Dockerfile-mysql
```

To build this image, run the following command:

```
docker build -f Dockerfile-mysql -t emps/mysql .
```



Building the Application Image (1 of 2)

Dockerfile-app builds an image for the Spring app

```
FROM openjdk:21

ADD target/employee-app-0.0.1.jar app.jar

RUN sh -c 'echo spring.datasource.url=jdbc:mysql://mysql:3306/MYSCHEMA?serverTimezone=UTC > application.properties'

RUN sh -c 'echo spring.datasource.username=root >> application.properties'

RUN sh -c 'echo spring.datasource.password=c0nygre >> application.properties'

ENTRYPOINT ["java","-jar","/app.jar"] Dockerfile-app
```

- Note it creates a new application.properties file,
 which overrides the one embedded in the JAR
- Connects to a machine named mysql (not localhost)



Building the Application Image (2 of 2)

You can build the "Spring Boot app" Docker image as follows:

docker build -f Dockerfile-app -t emps/app .



Running Containers

Run a MySQL container as follows:

```
docker run --name mysql -d -p 3306:3306 emps/mysql
```

Run an application container as follows:

```
docker run --name app --link mysql:mysql emps/app
```

- Note the --link option
- 1st mysql is the name of the container we want to link to
- 2nd mysql is the alias by which we'll refer to it in our container



2. Using Docker Compose

- Overview
- How Docker Compose works
- Defining a Docker Compose configuration file
- Building images and running containers



Overview

- In the previous section, you ran each container individually
 - This is quite a manual process
 - You have to remember to get the ports and names correct
 - This is very error-prone!

- A better approach would be to automate the creation of Docker images and containers via a configuration file
 - You can achieve this using a tool called Docker Compose



How Docker Compose Works

- You supply a configuration file
 - By default, you name the file docker-compose.yaml

- The configuration file specifies:
 - A list of services (how to build an image and run a container)
 - What volumes or mount points are needed by the containers
 - How the containers are linked together



Defining a Docker Compose Config File (1)

 Here's the structure of the Docker Compose configuration file for our example:

```
version: '3.0'
services:

mysql:
    # Details for the MySQL service ...

app:
    # Details for the Spring Boot app service ...

docker-compose.yaml
```



Defining a Docker Compose Config File (2)

```
mysql:
                              Here's how we configure the MySQL service
   container name: mysql
   build:
      context: .
      dockerfile: Dockerfile-mysql
   image: emps/mysql
   ports:
      - "3306:3306"
   volumes:
      - /docker/emps/mysql:/var/lib/mysql
   restart: always
   environment:
      MYSQL ROOT PASSWORD: c0nygre
   command: --explicit defaults for timestamp
                                                          docker-compose.yaml
```



Defining a Docker Compose Config File (3)

```
app:
                              Here's how we configure the App service

    Note the link to the mysql container

   container name: app
   build:
      context: .
      dockerfile: Dockerfile-app
   image: emps/app
  depends on:
      - mysql
   links:
      - mysql:mysql
                                                           docker-compose.yaml
```



Building Images and Running Containers

- You can run the Docker Compose file as follows
 - Builds images if they don't already exist
 - Runs container instances

docker-compose up



Summary

- Linking containers manually
- Using Docker Compose

