**Docker Compose: Spring Boot and MySQL example**

[Docker](https://www.docker.com/) provides lightweight containers to run services in isolation from our infrastructure so we can deliver software quickly.

**Overview**

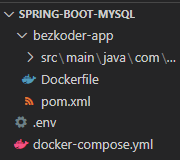
Assume that we have a Spring Boot Application working with MySQL database.  
The problem is to containerize a system that requires more than one Docker container:

* Spring Boot for Rest API
* MySQL for database

Docker Compose helps us setup the system more easily and efficiently than with only Docker. We’re gonna following these steps:

* Create Spring Boot App working with MySQL database.
* Create Dockerfile for Spring Boot App.
* Write Docker Compose configurations in YAML file.
* Set Spring Boot Docker Compose Environment variables.
* Run the system.

Directory Structure:



**Create Spring Boot App**

Using the code base above, we put the Spring Boot project in **bezkoder-app** folder without the need of **resources**/*application.properties*. It is because Environment variables will be exported to *.env* file.

**Create Dockerfile for Spring Boot App**

Dockerfile defines a list of commands that Docker uses for setting up the Spring Boot application environment. So we put the file in **bezkoder-app** folder.

Because we will use Docker Compose, we won’t define all the configuration commands in this Dockerfile.

**bezkoder-app**/*Dockerfile*

FROM maven:3.8.2-jdk-8

WORKDIR /bezkoder-app

COPY . .

RUN mvn clean install

CMD mvn spring-boot:run

* FROM: install the image of the Maven – JDK version.
* WORKDIR: path of the working directory.
* COPY: copy all the files inside the project directory to the container.
* RUN: execute a command-line inside the container: mvn clean install to install the dependencies in *pom.xml*.
* CMD: run script mvn spring-boot:run after the image is built.

**Write Docker Compose configurations**

On the root of the project directory, we’re gonna create the *docker-compose.yml* file. Follow [version 3](https://docs.docker.com/compose/compose-file/compose-file-v3/) syntax defined by Docker:

version: '3.8'

services:

mysqldb:

app:

volumes:

* version: Docker Compose file format version will be used.
* services: individual services in isolated containers. Our application has two services: app (Spring Boot) and mysqldb (MySQL database).
* [volumes](https://docs.docker.com/storage/volumes/): named volumes that keeps our data alive after restart.

Let’s implement the details.

*docker-compose.yml*

version: "3.8"

services:

mysqldb:

image: mysql:5.7

restart: unless-stopped

env\_file: ./.env

environment:

- MYSQL\_ROOT\_PASSWORD=$MYSQLDB\_ROOT\_PASSWORD

- MYSQL\_DATABASE=$MYSQLDB\_DATABASE

ports:

- $MYSQLDB\_LOCAL\_PORT:$MYSQLDB\_DOCKER\_PORT

volumes:

- db:/var/lib/mysql

app:

depends\_on:

- mysqldb

build: ./bezkoder-app

restart: on-failure

env\_file: ./.env

ports:

- $SPRING\_LOCAL\_PORT:$SPRING\_DOCKER\_PORT

environment:

SPRING\_APPLICATION\_JSON: '{

"spring.datasource.url" : "jdbc:mysql://mysqldb:$MYSQLDB\_DOCKER\_PORT/$MYSQLDB\_DATABASE?useSSL=false",

"spring.datasource.username" : "$MYSQLDB\_USER",

"spring.datasource.password" : "$MYSQLDB\_ROOT\_PASSWORD",

"spring.jpa.properties.hibernate.dialect" : "org.hibernate.dialect.MySQL5InnoDBDialect",

"spring.jpa.hibernate.ddl-auto" : "update"

}'

volumes:

- .m2:/root/.m2

stdin\_open: true

tty: true

volumes:

db:

– **mysqldb**:

* image: official Docker image
* restart: configure the [restart policy](https://docs.docker.com/config/containers/start-containers-automatically/#use-a-restart-policy)
* env\_file: specify our *.env* path that we will create later
* environment: provide setting using environment variables
* ports: specify ports will be used
* volumes: map volume folders

– **app**:

* [depends\_on](https://docs.docker.com/compose/compose-file/compose-file-v3/#depends_on): dependency order, **mysqldb** is started before **app**
* build: configuration options that are applied at build time that we defined in the *Dockerfile* with relative path
* environment: environmental variables that Spring Boot application uses
* stdin\_open and tty: keep open the terminal after building container

You should note that the host port (LOCAL\_PORT) and the container port (DOCKER\_PORT) is different. Networked service-to-service communication uses the container port, and the outside uses the host port.

**Docker Compose Environment variables**

In the service configuration, we used environmental variables defined inside the *.env* file. Now we start writing it.

*.env*

MYSQLDB\_USER=root

MYSQLDB\_ROOT\_PASSWORD=123456

MYSQLDB\_DATABASE=bezkoder\_db

MYSQLDB\_LOCAL\_PORT=3307

MYSQLDB\_DOCKER\_PORT=3306

SPRING\_LOCAL\_PORT=6868

SPRING\_DOCKER\_PORT=8080

**Run the Spring Boot microservice with Docker Compose**

We can easily run the whole with only a single command:  
docker-compose up

Docker will pull the MySQL and Maven images (if our machine does not have it before).

The services can be run on the background with command:  
docker-compose up -d

$ docker-compose up -d

Creating network "spring-boot-mysql\_default" with the default driver

Creating volume "spring-boot-mysql\_db" with default driver

Pulling mysqldb (mysql:5.7)...

5.7: Pulling from library/mysql

e1acddbe380c: Pull complete

bed879327370: Pull complete

03285f80bafd: Pull complete

ccc17412a00a: Pull complete

1f556ecc09d1: Pull complete

adc5528e468d: Pull complete

1afc286d5d53: Pull complete

4d2d9261e3ad: Pull complete

ac609d7b31f8: Pull complete

53ee1339bc3a: Pull complete

b0c0a831a707: Pull complete

Digest: sha256:7cf2e7d7ff876f93c8601406a5aa17484e6623875e64e7acc71432ad8e0a3d7e

Status: Downloaded newer image for mysql:5.7

Building app

Sending build context to Docker daemon 22.02kB

Step 1/5 : FROM maven:3.8.2-jdk-8

---> 80704b8c5fbd

Step 2/5 : WORKDIR /bezkoder-app

---> Running in f63e76f45fcc

Removing intermediate container f63e76f45fcc

---> 10802ac64cea

Step 3/5 : COPY . .

---> 9dcd16082f00

Step 4/5 : RUN mvn clean install

---> Running in 288bea890f74

[INFO] Scanning for projects...

Downloading from central: https://repo.maven.apache.org/maven2/org/springframework/boot/spring-boot-starter-parent/2.2.1.RELEASE/spring-boot-starter-parent-2.2.1.RELEASE.pom

Downloaded from central: https://repo.maven.apache.org/maven2/org/springframework/boot/spring-boot-starter-parent/2.2.1.RELEASE/spring-boot-starter-parent-2.2.1.RELEASE.pom (8.1 kB at 4.2 kB/s)

Downloading from central: https://repo.maven.apache.org/maven2/org/springframework/boot/spring-boot-dependencies/2.2.1.RELEASE/spring-boot-dependencies-2.2.1.RELEASE.pom

Downloaded from central: https://repo.maven.apache.org/maven2/org/springframework/boot/spring-boot-dependencies/2.2.1.RELEASE/spring-boot-dependencies-2.2.1.RELEASE.pom (127 kB at 201 kB/s)

...

[INFO] Installing /bezkoder-app/target/spring-boot-data-jpa-0.0.1-SNAPSHOT.jar to /root/.m2/repository/com/bezkoder/spring-boot-data-jpa/0.0.1-SNAPSHOT/spring-boot-data-jpa-0.0.1-SNAPSHOT.jar

[INFO] Installing /bezkoder-app/pom.xml to /root/.m2/repository/com/bezkoder/spring-boot-data-jpa/0.0.1-SNAPSHOT/spring-boot-data-jpa-0.0.1-SNAPSHOT.pom

[INFO] ------------------------------------------------------------------------

[INFO] BUILD SUCCESS

[INFO] ------------------------------------------------------------------------

[INFO] Total time: 02:41 min

[INFO] Finished at: 2021-08-18T04:10:08Z

[INFO] ------------------------------------------------------------------------

Removing intermediate container 288bea890f74

---> adddf4648410

Step 5/5 : CMD mvn spring-boot:run

---> Running in c81f8028e2eb

Removing intermediate container c81f8028e2eb

---> 1f710daedbf2

Successfully built 1f710daedbf2

Successfully tagged spring-boot-mysql\_app:latest

WARNING: Image for service app was built because it did not already exist. To rebuild this image you must use `docker-compose build` or `docker-compose up --build`.

Creating spring-boot-mysql\_mysqldb\_1 ... done

Creating spring-boot-mysql\_app\_1 ... done

Now you can check the current working containers:

$ docker ps

CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES

5ad28f104e8b spring-boot-mysql\_app "/usr/local/bin/mvn-…" 3 minutes ago Up 3 minutes 0.0.0.0:6868->8080/tcp, :::6868->8080/tcp spring-boot-mysql\_app\_1

ba9281773e7f mysql:5.7 "docker-entrypoint.s…" 3 minutes ago Up 3 minutes 33060/tcp, 0.0.0.0:3307->3306/tcp, :::3307->3306/tcp spring-boot-mysql\_mysqldb\_1

And Docker images:

$ docker images

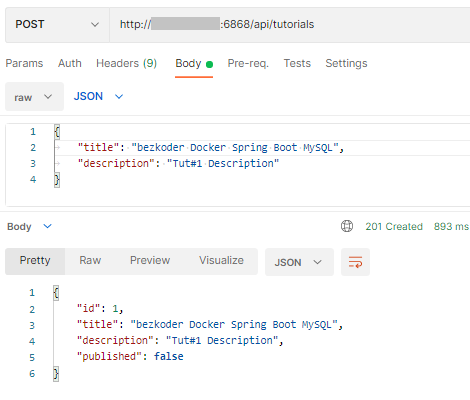
REPOSITORY TAG IMAGE ID CREATED SIZE

spring-boot-mysql\_app latest 1f710daedbf2 5 minutes ago 672MB

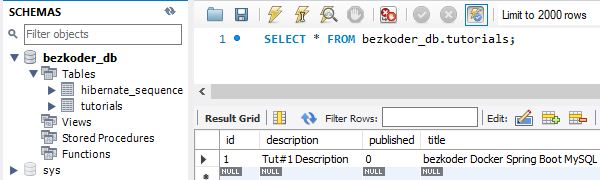
mysql 5.7 6c20ffa54f86 6 minutes ago 448MB

maven 3.8.2-jdk-8 80704b8c5fbd 6 minutes ago 525MB

Send a HTTP request to the Spring Boot – MySQL system:



Check MySQL Database:



**Stop the Application**

Stopping all the running containers is also simple with a single command:  
docker-compose down

$ docker-compose down

Stopping spring-boot-mysql\_app\_1 ... done

Stopping spring-boot-mysql\_mysqldb\_1 ... done

Removing spring-boot-mysql\_app\_1 ... done

Removing spring-boot-mysql\_mysqldb\_1 ... done

Removing network spring-boot-mysql\_default

If you need to stop and remove all containers, networks, and all images used by any service in *docker-compose.yml* file, use the command:  
docker-compose down --rmi all