Dockerize Node.js Express and MySQL example – Docker Compose

Last modified: September 2, 2021 (https://www.bezkoder.com/docker-compose-nodejs-mysql/) bezkoder (https://www.bezkoder.com/author/bezkoder/) Deployment (https://www.bezkoder.com/category/deployment/), Docker (https://www.bezkoder.com/category/docker/), Node.js (https://www.bezkoder.com/category/node-js/)

Docker (https://www.docker.com/) provides lightweight containers to run services in isolation from our infrastructure so we can deliver software quickly. In this tutorial, I will show you how to dockerize Nodejs Express and MySQL example using Docker Compose (https://docs.docker.com/compose/).

Related Posts:
– Build Node.js Rest APIs with Express & MySQL (https://www.bezkoder.com/node-js-rest-api-express-mysql/)
– Build Node.js Rest APIs with Express, Sequelize & MySQL (https://www.bezkoder.com/node-js-express-sequelize-mysql/)
– Upload/store images in MySQL using Node.js, Express & Multer (https://www.bezkoder.com/node-js-upload-image-mysql/)
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– Node.js Express: Token Based Authentication & Authorization (https://www.bezkoder.com/node-js-jwt-authentication-mysql/)

Dockerize the fullstack:
– Docker Compose: React, Node.js, MySQL example (https://www.bezkoder.com/docker-compose-react-nodejs-mysql/)

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Node.js and MySQL with Docker Overview

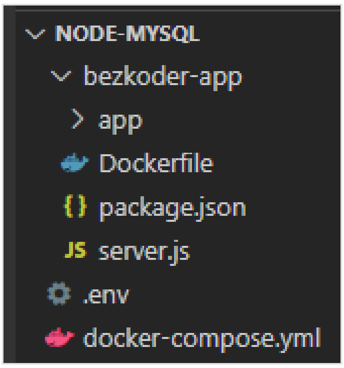
Assume that we have a Nodejs Application working with MySQL database.
The problem is to containerize a system that requires more than one Docker container:

- Node.js Express for 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 Nodejs App working with MySQL database.
- Create Dockerfile for Nodejs App.
- Write Docker Compose configurations in YAML file.
- Set Environment variables for Docker Compose
- Run the system.

Directory Structure:



```
NODE-MYSQL
  bezkoder-app
    app
    Dockerfile
    package.json
    server.js
  .env
  docker-compose.yml
```

Create Nodejs App

You can read and get Github source code from one of following tutorials:
– Build Node.js Rest APIs with Express & MySQL (https://www.bezkoder.com/node-js-rest-api-express-mysql/)
– Build Node.js Rest APIs with Express, Sequelize & MySQL (https://www.bezkoder.com/node-js-express-sequelize-mysql/)
– Upload/store images in MySQL using Node.js, Express & Multer (https://www.bezkoder.com/node-js-upload-image-mysql/)
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– Node.js Express: Token Based Authentication & Authorization (https://www.bezkoder.com/node-js-jwt-authentication-mysql/)

Using the code base above, we put the Nodejs project in **bezkoder-app** folder and modify some files to work with environment variables.

Firstly, let's add `dotenv` module into *package.json*.

```
{
  ...
  "dependencies": {
    "dotenv": "^10.0.0",
    ...
  }
}
```

Next we import `dotenv` in *server.js* and use `process.env` for setting port.

```
require("dotenv").config();
..
// set port, listen for requests
const PORT = process.env.NODE_DOCKER_PORT || 8080;
app.listen(PORT, () => {
  console.log(`Server is running on port ${PORT}.`);
});
```

Then we change modify database configuration and initialization.

app/**config**/*db.config.js*

```
module.exports = {
  HOST: process.env.DB_HOST,
  USER: process.env.DB_USER,
  PASSWORD: process.env.DB_PASSWORD,
  DB: process.env.DB_NAME,
  port: process.env.DB_PORT,
  dialect: "mysql",
  pool: {
    max: 5,
    min: 0,
    acquire: 30000,
    idle: 10000
  }
};
```

app/**models**/*index.js*

```
const dbConfig = require("../config/db.config.js");

const Sequelize = require("sequelize");
const sequelize = new Sequelize(dbConfig.DB, dbConfig.USER, dbConfig.PASSWORD, {
  host: dbConfig.HOST,
  dialect: dbConfig.dialect,
  port: dbConfig.port,
  operatorsAliases: false,

  pool: {
    max: dbConfig.pool.max,
    min: dbConfig.pool.min,
    acquire: dbConfig.pool.acquire,
    idle: dbConfig.pool.idle
  }
});

...
```

We also need to make a *.env* sample file that shows all necessary arguments.

bezkoder-app/*.env.sample*

```
DB_HOST=localhost
DB_USER=root
DB_PASSWORD=123456
DB_NAME=bezkoder_db
DB_PORT=3306

NODE_DOCKER_PORT=8080
```

Create Dockerfile for Nodejs App

Dockerfile defines a list of commands that Docker uses for setting up the Node.js 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 node:14

WORKDIR /bezkoder-app
COPY package.json .
RUN npm install
COPY . .
CMD npm start
```

Let me explain some points:

- `FROM` : install the image of the Node.js version.
- `WORKDIR` : path of the working directory.
- `COPY` : copy *package.json* file to the container, then the second one copies all the files inside the project directory.
- `RUN` : execute a command-line inside the container: `npm install` to install the dependencies in *package.json*.
- `CMD` : run script `npm start` 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` (Nodejs) 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: unless-stopped
    env_file: ./.env
    ports:
      - $NODE_LOCAL_PORT:$NODE_DOCKER_PORT
    environment:
      - DB_HOST=mysqldb
      - DB_USER=$MYSQLDB_USER
      - DB_PASSWORD=$MYSQLDB_ROOT_PASSWORD
      - DB_NAME=$MYSQLDB_DATABASE
      - DB_PORT=$MYSQLDB_DOCKER_PORT
    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 Node 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 with MySQL

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

NODE_LOCAL_PORT=6868
NODE_DOCKER_PORT=8080
```

Run Nodejs MySQL with Docker Compose

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

Docker will pull the MySQL and Node.js 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 "node-mysql_default" with the default driver
Creating volume "node-mysql_db" with default driver
Pulling mysqldb (mysql:5.7)...
5.7: Pulling from library/mysql
33847f680f63: Pull complete
5cb67864e624: Pull complete
1a2b594783f5: Pull complete
b30e406dd925: Pull complete
48901e306e4c: Pull complete
603d2b7147fd: Pull complete
802aa684c1c4: Pull complete
5b5a19178915: Pull complete
f9ce7411c6e4: Pull complete
f51f6977d9b2: Pull complete
aeb6b16ce012: Pull complete
Digest: sha256:be70d18aedc37927293e7947c8de41ae6490ecd4c79df1db40d1b5b5af7d9596
Status: Downloaded newer image for mysql:5.7
Building app
Sending build context to Docker daemon  17.41kB
Step 1/6 : FROM node:14
14: Pulling from library/node
08224db8ce18: Pull complete
abd3caf86f5b: Pull complete
71c316554a55: Pull complete
721081de66bf: Pull complete
239fb482263d: Pull complete
26d24e5f0efd: Pull complete
4a43fffd53dd: Pull complete
4e10c266ec1a: Pull complete
6c4e1d6ce241: Pull complete
Digest: sha256:adbbb61dab70ea6e5a6c2ad7fba60e4d1047ba98ad1afcd631c15553163b22b7
Status: Downloaded newer image for node:14
 ---> e0ab58ea4a4f
Step 2/6 : WORKDIR /bezkoder-app
 ---> Running in 6ab4079d2f00
Removing intermediate container 6ab4079d2f00
 ---> 59e985358175
Step 3/6 : COPY package.json .
 ---> cc619b75b822
Step 4/6 : RUN npm install
 ---> Running in 90bccd42e0d7

added 88 packages from 144 contributors and audited 88 packages in 7.655s
found 0 vulnerabilities

Removing intermediate container 90bccd42e0d7
 ---> c9f5592ab65a
Step 5/6 : COPY . .
```

```
 ---> 65d7d8927e3c
Step 6/6 : CMD npm start
 ---> Running in 2b7b5fe7dbb3
Removing intermediate container 2b7b5fe7dbb3
 ---> 9d0109ff706c
Successfully built 9d0109ff706c
Successfully tagged node-mysql_app:latest
WARNING: Image for service app was built because it did not already exist. To rebuild thi
Creating node-mysql_mysqldb_1 ... done
Creating node-mysql_app_1     ... done
```

Now you can check the current working containers:

```
$ docker ps
CONTAINER ID   IMAGE            COMMAND                  CREATED         STATUS
b8b12819d371   node-mysql_app   "docker-entrypoint.s…"   2 minutes ago   Up About a minut
b0d665c00073   mysql:5.7        "docker-entrypoint.s…"   2 minutes ago   Up 2 minutes
```

And Docker images:

```
$ docker images
REPOSITORY           TAG            IMAGE ID       CREATED         SIZE
node-mysql_app       latest         9d0109ff706c   5 minutes ago   965MB
node                 14             e0ab58ea4a4f   6 minutes ago   944MB
mysql                5.7            8cf625070931   6 minutes ago   448MB
```

Stop the Application

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

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`

Conclusion

Today we've successfully created Docker Compose file for MySQL and Nodejs application. Now we can deploy Nodejs Express and MySQL with Docker on a very simple way: *docker-compose.yml*.

You can apply this way to one of following project:
– Build Node.js Rest APIs with Express & MySQL (https://www.bezkoder.com/node-js-rest-api-express-mysql/)
– Build Node.js Rest APIs with Express, Sequelize & MySQL (https://www.bezkoder.com/node-js-express-sequelize-mysql/)
– Upload/store images in MySQL using Node.js, Express & Multer (https://www.bezkoder.com/node-js-upload-

image-mysql/)
– Node.js: Upload CSV file data into Database with Express (https://bezkoder.com/node-js-upload-csv-file-database/)
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– Node.js Express: Token Based Authentication & Authorization (https://www.bezkoder.com/node-js-jwt-authentication-mysql/)

Or Heroku instead: Deploying/Hosting Node.js app on Heroku with MySQL database (https://bezkoder.com/deploy-node-js-app-heroku-cleardb-mysql/)

Dockerize the fullstack:
– Docker Compose: React, Node.js, MySQL example (https://www.bezkoder.com/docker-compose-react-nodejs-mysql/)

Happy Learning! See you again.

Source Code

The source code for this tutorial can be found at Github (https://github.com/bezkoder/docker-compose-nodejs-mysql).

You can deploy the container on Digital Ocean (https://www.digitalocean.com/?refcode=560b7a03275b&utm_campaign=Referral_Invite&utm_medium=Referral_Program&utm_source=CopyPaste) with very small budget: **5$**/month.
Using referral link below, you will have **100$** in credit over **60** days. After that, you can stop the VPS with no cost.

Powered by DigitalOcean (https://www.digitalocean.com/?

refcode=560b7a03275b&utm_campaign=Referral_Invite&utm_medium=Referral_Program&utm_source=badge)

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docker compose (https://www.bezkoder.com/tag/docker-compose/)
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