Handover Document

Fontys Module Management System

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Chapter 1

Software Architecture

Chapter 2

Build

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Chapter 4

Run with Docker

For each part of the project there is a docker[1] file which can be used to run the software. The docker file automates the build process and encapsulates it into a container. These containers runs on every operating system and does not need any external dependencies besides the installed docker daemon. You can compose the separate containers to a full services which includes all parts of the project.

4.1 Database

To setup a database server and create the proper users and databases can be very error-prone. Therefore a docker container can be used which automatically sets up the user, the database and tables.

During the creation process, the SQL files in the "scripts" directory are executed, sorted by name (that's why there are numbers in front of the filenames). The database repository only contains the table structure and does not contain any data. Nevertheless, data can be automatically imported by copying a proper SQL file into the "scripts" directory before building the container.

When running the database as a docker container, please make sure that there are no other databases running on port 5432 or change the port mapping.

```
1 cd database
2 # Build container
3 docker build -t fmms-database .
4 # Run container
5 docker run -d --name fmms-database -p 5432:5432 fmms-database
```

Listing 4.1: Build and run Database Container

4.2 Backend

The configuration of the Backend API can be done without any changes to the source code. During initialization, environment variables [2] are read and the values will be used as configuration. There are basically three important parts to configure:

- The Backend URI containing port and base url
- The database connection

[1] https://www.docker.com/get-docker
[2] https://en.wikipedia.org/wiki/Environment_variable

- Username and password for restricted actions

Restricted actions are all actions which can change the data in the database. The backend uses HTTP Basic authentication to authenticate users who wants to perform restricted actions. The credentials are currently hard-coded into the configuration and can be set via environment variables.

The default values has been chosen to allow the software to be run locally. For server deployment other values need to be entered. The default database URL contains the default docker host ip address, which implies that a PostgreSQL server is bound to the port 5432 of the host.

The environment configuration can be given into the docker containers using the docker environment functionality (see the Docker documentation [3]).

Name	**Default Value**	
HOST	0.0.0.0	IP Address to bind server socket to. Usually the default value will do the job.
PORT	8080	Server port to listen on
BASE	/fmms	API Base URI
DB	172.17.0.1:5432/modulemanagement	DB URL for JDBC postgres driver format: <IP>:<PORT>/<databasename>
DB_USER	fmms	Username to access the database
DB_PASSWD	fmms	Password to access the database
AUTH_USER	fmms	Username for restricted actions
AUTH_PASSWORD	modulemanagement	Password for restricted actions

Table 4.1: Environment Configuration for Backend

```
1 cd backend
2 # Build container
3 docker build -t fmms-backend .
4 # Run container
5 docker run -d --name fmms-backend -p 8080:8080 fmms-backend
```

Listing 4.2: Build Backend Container

4.3 Frontend

The frontend configuration needs to be done inside the source code before building the container. The default configuration works only for local use and is not suitable for server deployment. The configuration is done via environment files which are loaded based on cli arguments. [4]

```
1 cd frontend
2 # Build container
3 docker build -t fmms-frontend .
4 # Run container
5 docker run -d --name fmms-frontend -p 4200:4200 fmms-frontend
```

Listing 4.3: Build Frontend Container

[3] https://docs.docker.com/engine/reference/run/#env-environment-variables
[4] http://tattoocoder.com/angular-cli-using-the-environment-option/

4.4 Compose

To run all parts of the software inside docker containers, Docker Compose[5] can be used to run and supervise the docker containers. Therefore a docker compose file is needed which defines the structure of the application and the needed parameters. The following listing shows a docker compose file which contains all needed configuration to run the project on your local machine.
To use docker compose perform the following steps:

1. Install Docker and Docker-Compose
2. Build Database, Backend and Frontend as explained in sections 4.1, 4.2 and 4.3
3. Put the content of listing 4.4 into a file named „docker-compose.yml“
4. Run shell command „docker-compose up -d“ in the directory with the file created in the previous step

[5] `https://docs.docker.com/compose/install/`

```
version: '2'

networks:
  fmms:
    driver: bridge

services:
  database:
    restart: always
    image: fmms-database
    ports:
      - 5432:5432
    networks:
      - fmms

  backend:
    restart: always
    image: fmms-backend
    ports:
      - 8080:8080
    environment:
      - HOST=0.0.0.0
      - PORT=8080
      - BASE=/fmms
      - DB=database:5432/modulemanagement
      - DB_USER=module
      - DB_PASSWD=fmms
      - AUTH_USER=fmms
      - AUTH_PASSWORD=fmms
    volumes:
      - maven:/root/.m2
    networks:
      - fmms

  frontend:
    restart: always
    image: fmms-frontend
    command: ["--no-live-reload", "--no-watch"]
    depends_on:
      - backend
    ports:
      - 4200:4200
    networks:
      - fmms

volumes:
  maven:
    driver: local
```

Listing 4.4: Docker Compose File

4.5 Deployment on server