Take-Home Challenge - Funds Transfer

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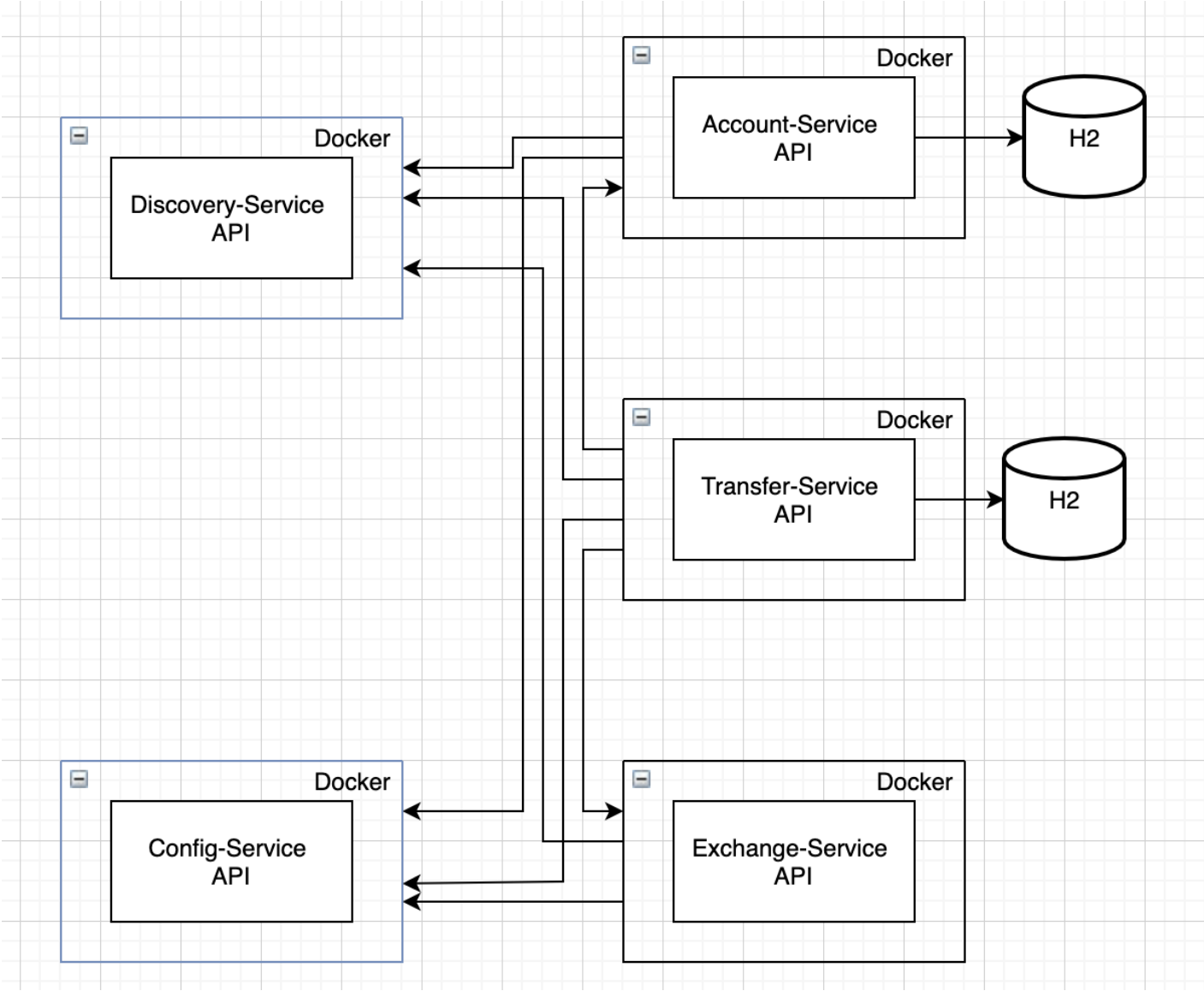
Introduction

The project's general goal is move money from an account to other account using microservices. To do it, I decided to use Spring Boot, Maven, Docker, Cucumber, JUnit, and other dependencies. I implemented three micreoservices which each of them holds an specifict business unit -Transfers, Accounts and Rates Exchange. Furthermore, I implemented two additional microservices one for discoverability and one to store and serve the configs used by each microservice.

Architecture



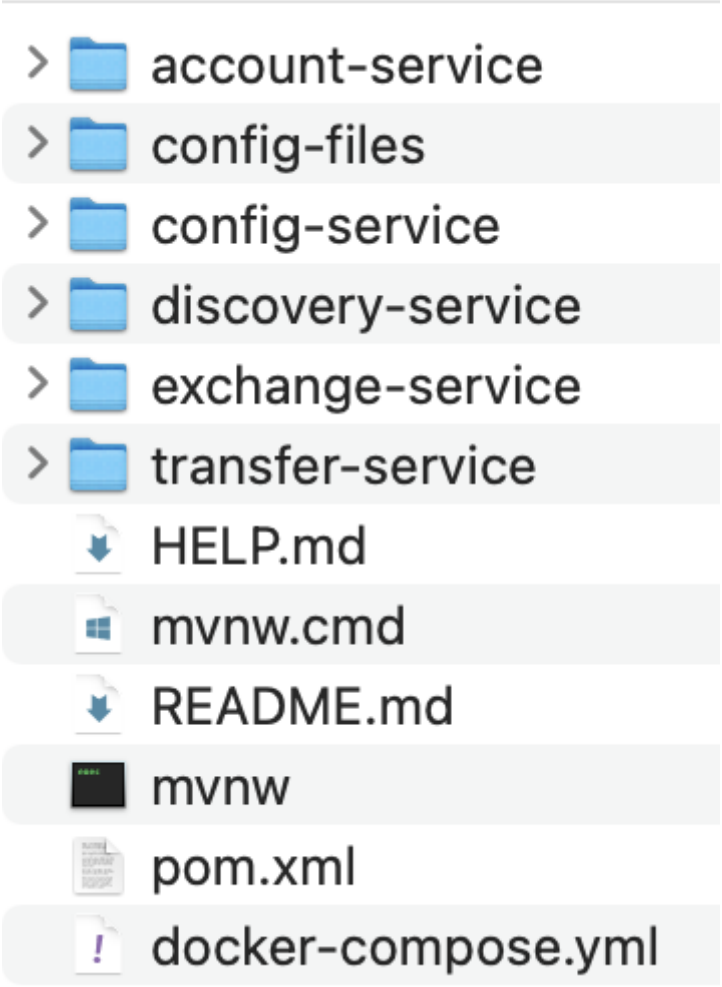
There are a total of five microservices and each API is using a Docker images.

- **Transfer-Service**
  In charge of handle requests for transfer funds from an account to another. Furthermore, it consumes the Account-Services and Exchange-Service to update the account's balance and change the tax currency respectively. Also, it stores the transfer request and result.
- **Account-Service**
  In charge of handle requests related to the account i.e. creates accounts and credit and debit from the account's balance. Furthermore, it stores the account data in an H2 database.
- **Exchange-Service**
  In charge of exchange an amount of money from a currency to another one. It calls http://api.exchangeratesapi.io/ to get the current rate value for a determined currency and uses that value to convert the given value to its equivalent value in another currency.
- **Discovery-Service**
  Uses Netflix Eureka to make it easy for each API to find each other. It implements the Spring Cloud with Netflix Eureka integration dependency.

- **Config-Service**
  API in charge of providing the config files to the other APIs. It implements the Spring Cloud Config Server dependency.

Project Structure

The image below shows the project structure.



Although the APIs are in the same maven project and directory they run independently. I decided to hold all the APIs' sources under the same directory for agility at development time. Thus, if you need to run a specific API you should put yourself in the source directory and run `mvn spring-bot:run`.

Build and Run

> Due to the docker and docker-compose are failing on the start-up time -I'm trying to figure out what is happening- we need to run all the APIs manually.

We need to be inside each APIs' source directory to be able to run the following commands.

Note: the execution order is important. First, we must run `discovery-service` and then `config-service`. Then, we can start-up the other APIs.

```
mvn clean package
```

and

```
mvn spring-boot:run
```

On the `account-service` startup two account will be created por testing and with the following information

account	accountBalance
111222333	100000.00
444555666	70000.00

Testing

Unfortunately the only project that have unit and integration tests is `transfer-service`. You can run them with the next command.

```
mvn clean test
```

Note: Remember that you need to be under the `transfer-service` directory.

The Cucumber Feature file holds the integration test. This file is located at `funds-transfer/transfer-service/src/test/resources/features/TransferFunds.feature`

The cucumber report can be found at `funds-transfer/transfer-service/target/cucumber-reports.html`.

And, the Jacoco report at `funds-transfer/transfer-service/target/site/jacoco/index.html`

Using the APIs

Transfer Service API

The `transfer-service` API has only one endpoint which is used to perform a transfer of funds.

```
curl --location --request POST 'localhost:8080/' \
--header 'Content-Type: application/json' \
--data-raw '{
    "amount": 5000.0,
    "currency": "USD",
    "origin_account": "111222333",
    "destination_account": "444555666",
    "description": "Hey dude! I am sending you the money you loaned to me last week"
}'
```

> I worked more on this service. There you can find some integration and unit tests and a coverage report with Jacoco.

Account Service API

The `account-service` API has four endponts.

Create Account

To call the create account endpoint execute the next command.

```
curl --location --request POST 'http://localhost:8082/account/create' \
--header 'Content-Type: application/json' \
--data-raw '{
    "account": "11223344",
    "account_balance": 50000.00
}'
```

Find Account

To call the find account endpoint execute the next command.

```
curl --location --request POST 'http://localhost:8082/account/find' \
--header 'Content-Type: application/json' \
--data-raw '{
    "account": "111222333"
}'
```

Debit Funds

To call the debit funds endpoint execute the next command.

```
curl --location --request POST 'http://localhost:8082/account/debit' \
--header 'Content-Type: application/json' \
--data-raw '{
    "account": "111222333",
    "amount": 1000.00
}'
```

Credit Funds

To call the credit funds endpoint execute the next command.

```
curl --location --request POST 'http://localhost:8082/account/credit' \
--header 'Content-Type: application/json' \
--data-raw '{
    "account": "111222333",
    "amount": 1000.00
}'
```

Exchange Service API

The `exchange-service` only has an endpint to exchange an amount of money to other.

> So far this API only can convert from USD to CAD currencies

Convert

To call the the convert endpoint execute the next command.

```
curl --location --request GET 'localhost:8084/exchange/convert?source=USD&output=CAD
```

> The service needs a Access Key provided by https://exchangeratesapi.io/. This access key needs to be placed on the `config-service/exchange-service.properties` file.

Enhancements

The following list contains some ideas to enhance the application.

- The code can be refactored. There are duplicated code and not clear enough.
- There is not enough code documented
- Improve fields validation.
- Implement a better Exception handler.

- Enhance the responses based on the exceptions thrown by the APIs.
- Take advantage of the HTTP Status Codes to enhance the different kind of responses
- Use JWT to protect the endpoints.
- Documentation with Swagger.
- Hide endpoints that a user does not need to call such as account-service's debit and credi endpoints.
- Implement more unit and integration test using Cucumber y Junit
- Implement on all APIs Jacoco to measure the test coverage - currently implemented just on `transfer-service`.

Known Issues

These are some known issues that I'd like to fix.

- There aren't enough unit and integration tests.
- The dependency dockerfile-maven does not work. I guess is because there are some extra configurations to do on an macbook with M1.
- Docker compose cannot init the containers. I guess is because the same previous problem.
- There isn't a propper way to handle exceptions.
- Can be create accounts duplicated. The db is missing some constraints to avoid this.
- Despite implementing Netflix Eureka, it isn't completelly functional and implemented at APIs.