Marcura Java Developer Test

Problem

Marcura requires an internal API for exchange rates to consolidate throughout all of its applications how exchange rates are calculated for 2 given currencies. Furthermore analytics on data usage needs to be collected for analysis further down the line.

It was agreed that Marcura will use https://fixer.io/ for the source of exchange rates. An API is provided and documented in the given link (free subscription is required). Marcura does not want to depend on the source API constantly, so it was agreed that the application will download all rates against USD and store them in a local database. This data collection should happen once a day automatically at 12:05 AM GMT. The API mentioned above returns also the day of when the exchange rate was calculated. This needs to be stored alongside the exchange rate value as historical information needs to be maintained.

Together with the exchange rate, each currency is associated with a spread percentage (these values will be given below in the Appendix 2). In simple lay terms, the spread is the percentage that one will lose when trading forex. For example if I am exchanging USD to EUR and the exchange rate is 0.8, when I go to a foreign exchange outlet, they will trade for 0.75 and pocket 0.05 EUR for every 1 USD. That would make the spread 6.25% calculated as:

$$\frac{0.8 - 0.75}{0.8} \times 100\% = 6.25\%$$

The exchange rate calculation needs to take into consideration the highest spread of the 2 currencies, hence it should be calculated as follows:

$$\frac{toCurrencyExchangeRateToUSD}{fromCurrencyExchangeRateToUSD} \times \frac{100 - MAX(toCurrencySpread, fromCurrencySpread)}{100}$$

Let's take the following example:

	EUR	PLN
Exchange Rate to USD	0.8	3.7
Spread	1%	4%

The exchange rate to convert EURs into PLNs would be worked out as:

$$\frac{3.7}{0.8} \times \frac{100 - 4}{100}$$
$$= 4.625 \times 0.96$$
$$= 4.44$$

Goals

An APIs to calculate the exchange rates need to be exposed defined here under:

- *GET /exchange?from=EUR&to=PLN&date=2020-12-05*
  - from and to parameters should accept currency codes
  - date should accept ISO8601 date format (date only)
  - 2020-12-05, EUR and PLN are used as examples
  - Should return the exchange rate between the provided currencies
  - Should use the exchange rate of the day provided in the query parameter date, if not found return 404 not found
  - date is optional, if not present latest exchange rate information should be used
  - Result should be in JSON format as shown in Appendix 1
  - All the information should be retrieved from the cached data in the database
  - A counter in the database should be incremented for both currencies indicating a request was made for the date selected
    - Please make sure this solution is thread safe

To be able to retrieve the data, a scheduler also needs to be implemented that runs at 12:05 AM GMT and inserts the exchange rates into the database from http://data.fixer.io/api/latest using USD as base.

Base Currency

While in all the examples above USD was used as base currency, https://fixer.io/ is now giving access to only 1 random base currency for the free subscription. For this project please use as base currency whatever https://fixer.io/ selects for your API key.

Technologies

The application must be written in Java 11 or later using Spring Boot 2.3 or later. Build tool should be Maven. Hibernate should be used as the data access layer. No restriction on database used as long as it is a relational database.

Optional requirements

Exchange rate calculation needs to be as accurate as possible, additional marks will be given for calculations using BigDecimal rather than double or float.

API documentation via Swagger or RAML will also lead to additional marks.

Additional API (*PUT /exchange)* to manually trigger retrieval of latest exchange rates. It should be able to insert or update rates without losing the usage count.

Appendix 1

```
{
      "from" : "EUR",
      "to" : "PLN",
      "exchange": 4.44054875654132541240
}
```

Appendix 2

Currency	Spread Percentage
Base Currency	0.00%
JPY, HKD KRW	3.25%
MYR, INR, MXN	4.50%
RUB, CNY, ZAR	6.00%
Everything else	2.75%