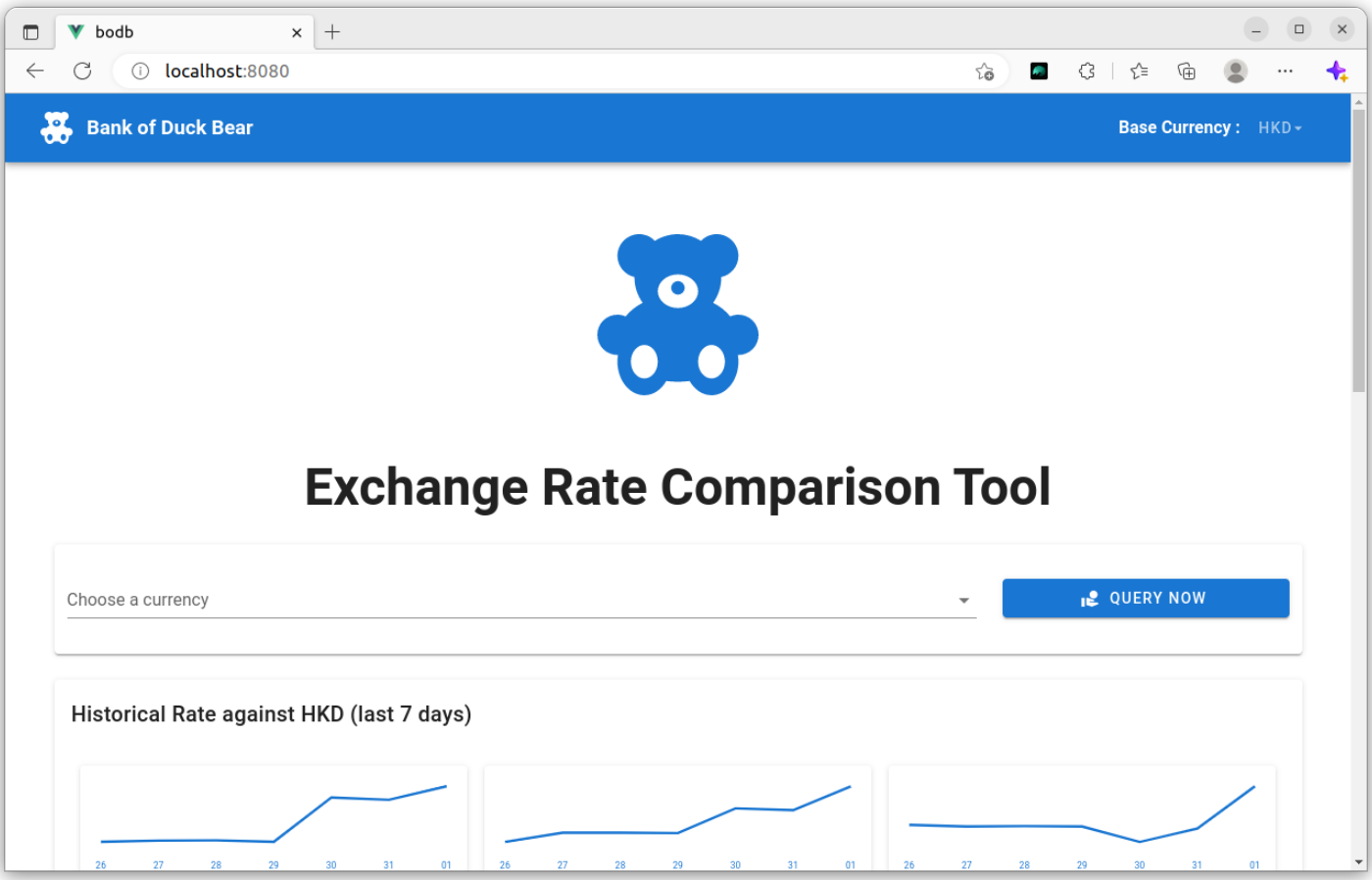
BODB Exchange Rate Comparison Tool

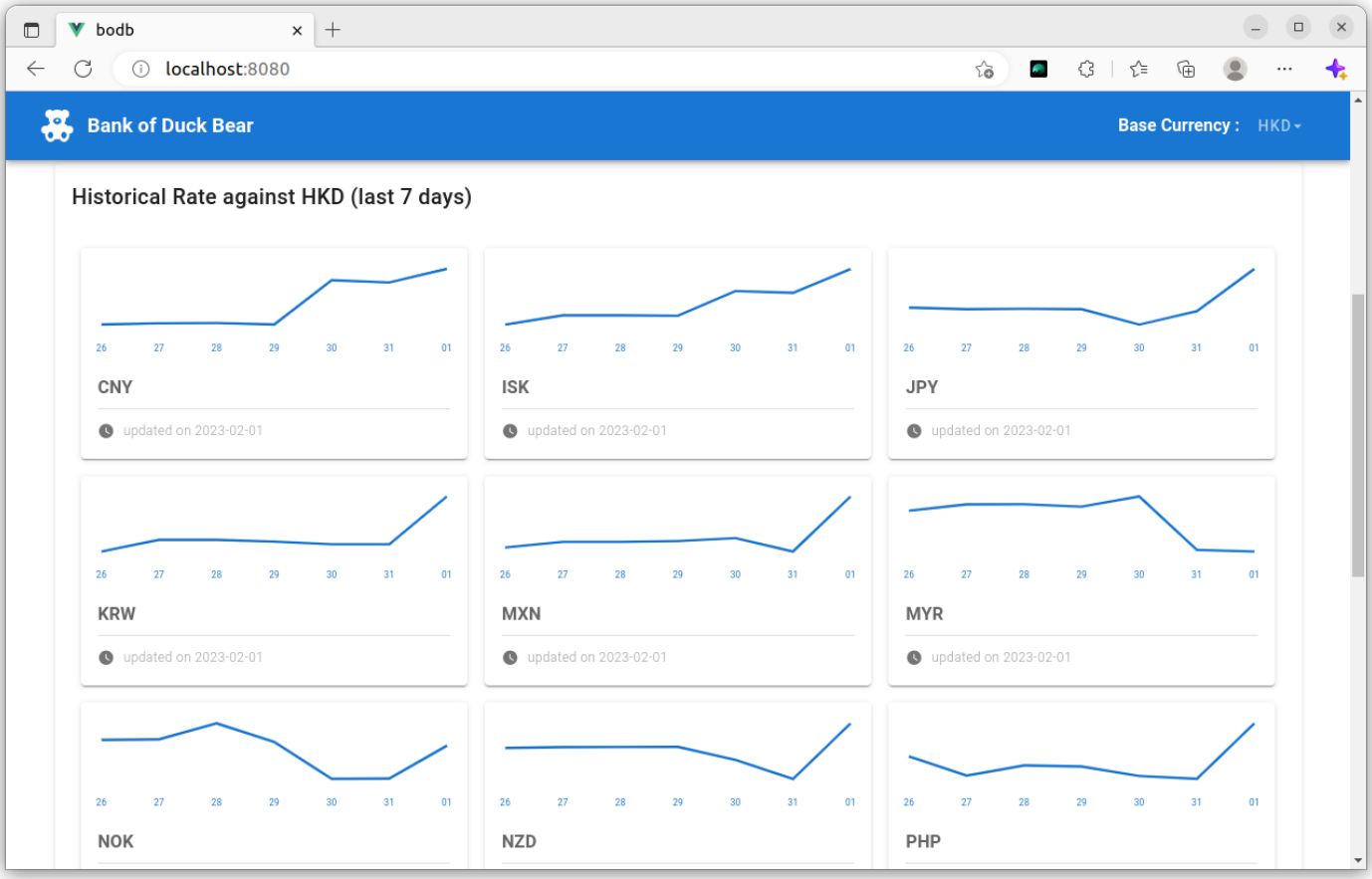
Introduction



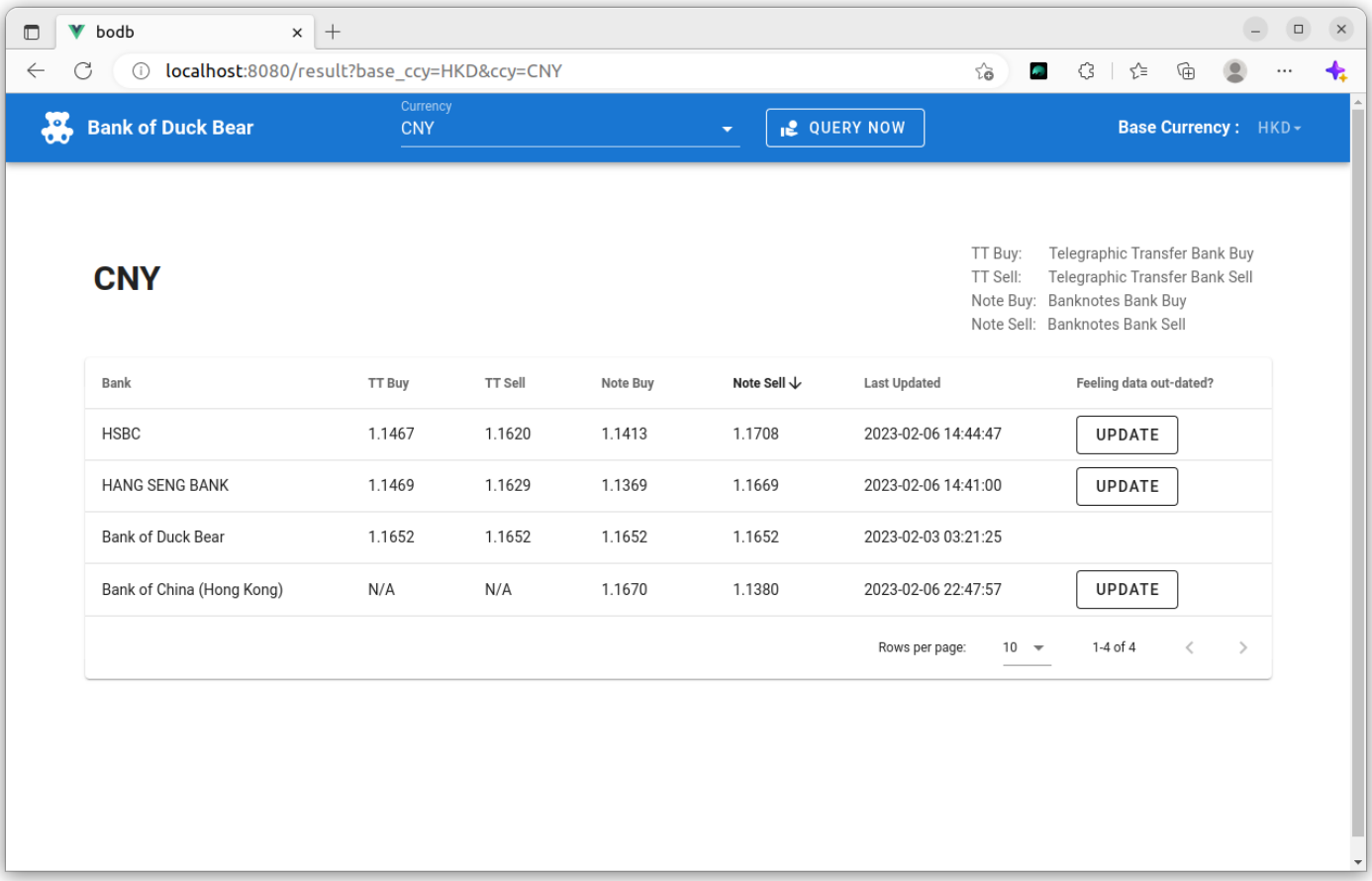
Bank of Duck Bear Exchange Rate Comparison Tool helps you know about the latest exchange rate trend and lists telegraphic transfer buy, telegraphic transfer sell, banknotes buy, banknotes sell provided by major banks, so that you can make a decision on where to buy your currencies!

The tool is currently deployed on http://47.115.201.81:8080 for testing. Feel free to try it!

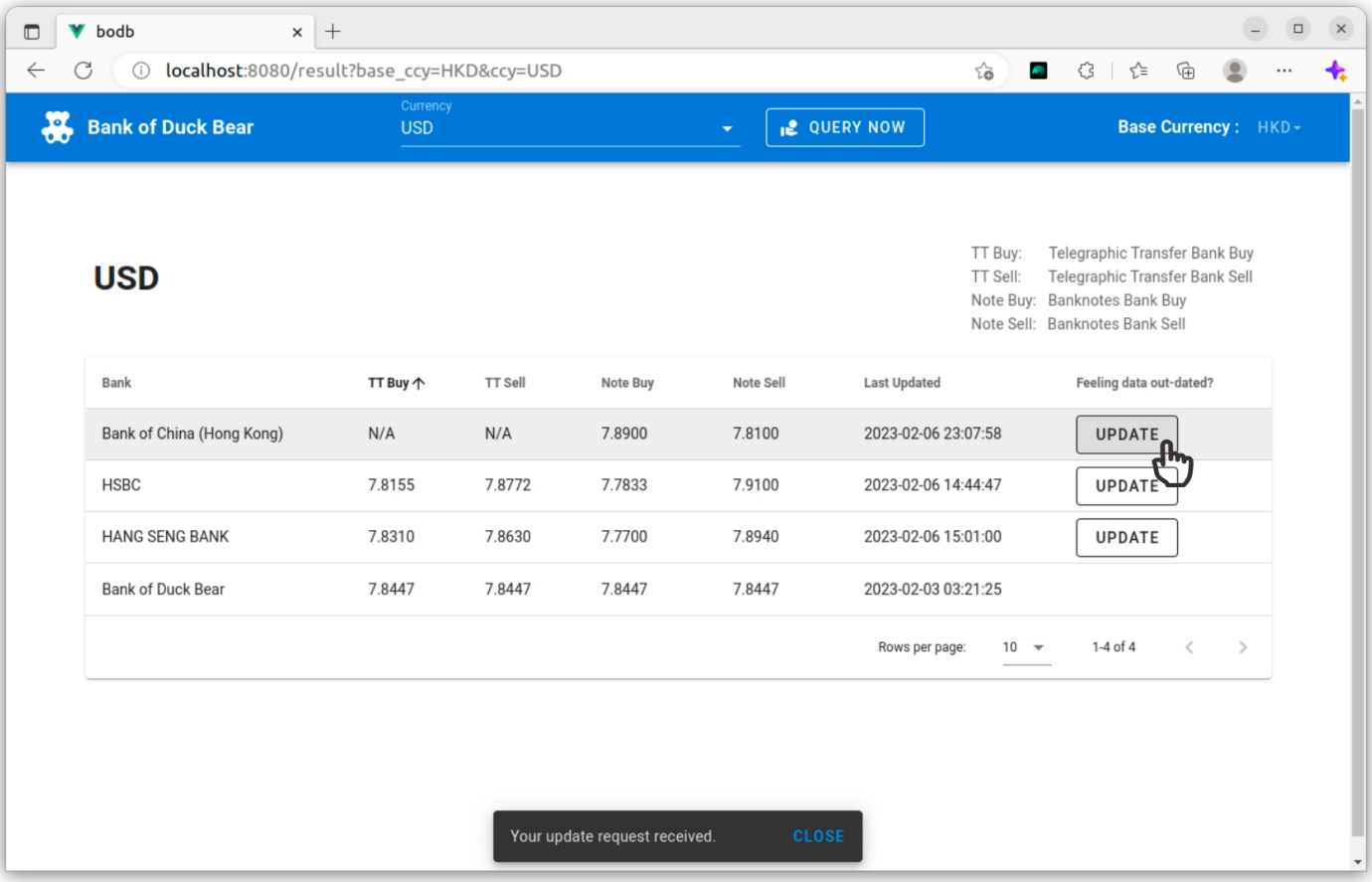
Taking a Glance at Recent ER Trend



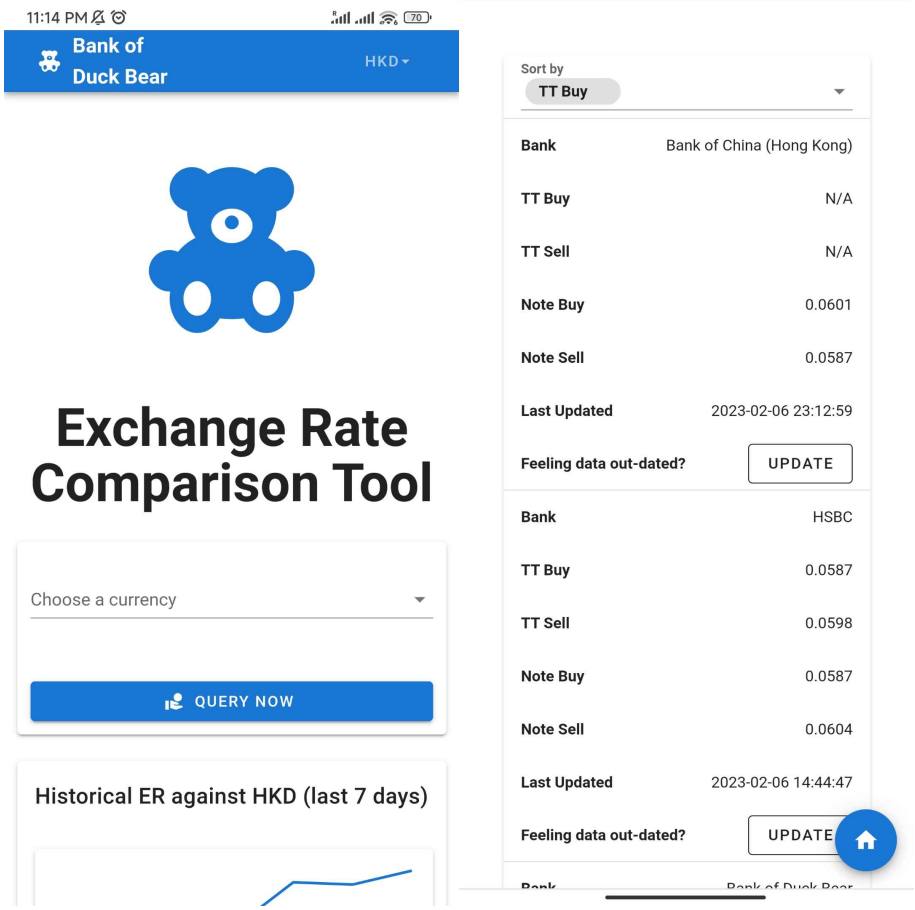
Find a Bank with the Best Offer



Request for Latest Data

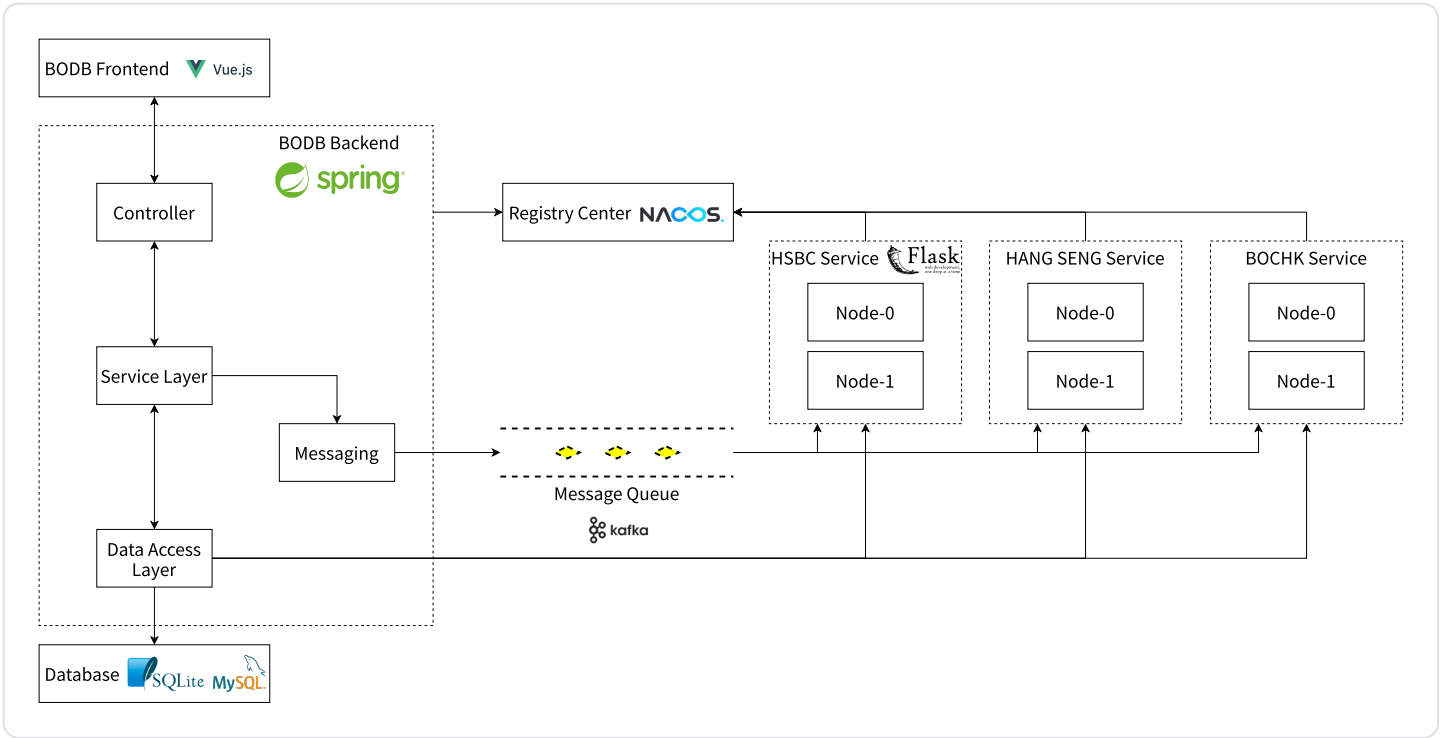


Mobile Supported

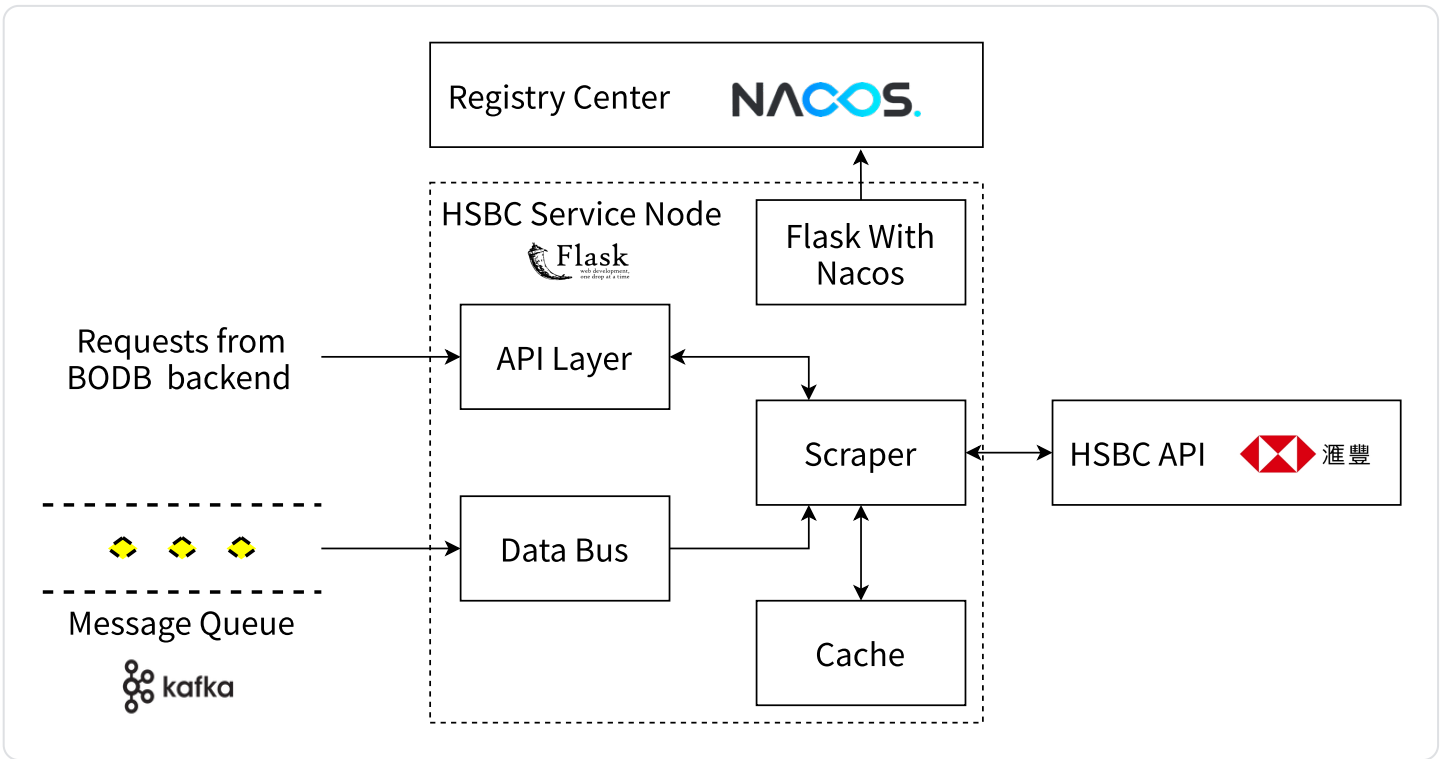


Architecture

Overall



Inside a Third Party Bank Service



Among the overall architecture, BODB frontend is the user interface, developed by Vue.js. It requests BODB backend based on Spring. BODB backend, together with third party bank services (HSBC, BOCHK, HANG SENG), are automatically registered to Nacos on startup, so that BODB backend is allowed to send load-balanced REST requests to third party bank services.

Also, BODB maintains some self-owned data, such as our own exchange rates, stored in SQLite (instead of MySQL to reduce complexity when deploying the whole system). Meanwhile, when a user sends a request to update data, the backend produces a message to the message queue Kafka.

Inside a third party bank service instance, the API layer is designated for handling requests from BODB backend. The data bus consumes messages of updating requests from users. The scraper deals with scraping requests from both API Layer and Data Bus. It caches requested data for a short preiod of time, so that we do not need to turn to HSBC API frequently. After all, APIs used in this project are not public paid APIs.

Third party bank services are developed based on Flask. However, Flask is merely a web framework that cannot be integrated with Nacos registry center. Worse still, although Nacos is one of the most popular registry centers in Java world, its Python SDK was not updated for a long time. On this occasion, I first fixed the bugs of Nacos Python SDK that I met, and then developed a package called *Flask with Nacos* so that I can combine Flask and Nacos together and let Flask register to Nacos automatically on startup.

Deploy in Development Environment from Source Code

In case of any accident in deployment, the system is deployed on http://47.115.201.81:8080 for testing.

Requirements

1. JDK 1.8 and Maven 3.
2. Python 3.7.
3. NodeJS 18.14.0 and NPM.

- Some of the following frameworks also rely on Linux to work, but are allowed to be deployed in Windows by Windows Subsystem of Linux.

Deploy Nacos (Require JDK 1.8+)

1. Download Nacos 1.3.2 (https://github.com/alibaba/nacos/releases/download/1.3.2/nacos-server-1.3.2.zip).
2. Unzip the downloaded file and

```
cd nacos
./bin/startup.sh -m standalone    # for Linux
./bin/startup.bat -m standalone   # for Windows
```

Deploy Kafka (Require JDK 1.8+, must run on Linux)

1. Dowload Kafka with Scala 2.4.1 with Scala v2.12 (https://archive.apache.org/dist/kafka/2.4.1/kafka_2.12-2.4.1.tgz).
2. Un-tar it and `cd kafka_2.12-2.4.1`.
3. Start ZooKeeper.

```
1 bin/zookeeper-server-start.sh config/zookeeper.properties
```

4. Start Kafka broker.

```
1 bin/kafka-server-start.sh config/server.properties
```

5. Create topics.

```
1 bin/kafka-topics.sh --create --bootstrap-server localhost:9092 --replication-
  factor 1 --partitions 1 --topic bochk
2 bin/kafka-topics.sh --create --bootstrap-server localhost:9092 --replication-
  factor 1 --partitions 1 --topic hsbc
3 bin/kafka-topics.sh --create --bootstrap-server localhost:9092 --replication-
  factor 1 --partitions 1 --topic hang-seng
```

Deploy Third Party Bank Services (Require Python 3.7)

We take HSBC as an example.

1. Find `hsbc` directory in source codes and `cd` into it.

```
1 cd hsbc
```

2. (Optional) Run the following command to create a Python virtual environment. The second "venv" is the path to the new virtual environment, which is often set to "venv" directly, that is, the following command can be run directly without change.

```
1 python3 -m venv venv
```

3. Install Python requirements.

```
pip3 install -r requirements.txt
```

4. Run `main.py`.

```
python3 main.py
```

5. (Optional) If willing to deploy one more HSBC service instance, the simplest way is to change the port number in `main.py` and run `python3 main.py` again and the new instance will register to Nacos automatically. In practice, I will use Kubernetes in this kind of scenario to deploy mulitiple same instances , but to avoid introducing too many extra requirements, I refer to this approach in this instruction.

```
import os

# set environment variables
os.environ['FLASK_ENV'] = 'prod'
os.environ['FLASK_APP'] = 'hsbc'


from hsbc import app, bus
import api


if __name__ == '__main__':
    bus.run()
    app.run(port=5001)     # <--------------- HERE!!!!!! -----------------
```

6. The procedures for HANG SENG and BOCHK are totally the same. They can be found in `hang_seng` and `bochk` directories respectively.

Deploy BODB Backend (Require JDK 1.8+ and Maven)

1. Find `duck-bear-bank` directory in source codes and `cd` into it.
2. Run `mvn clean && mvn package` to build.
3. `cd target` and you may find `duck-bear-bank-0.0.1-SNAPSHOT.jar` in the `target` directory.

4. Run `java -jar duck-bear-bank-0.0.1-SNAPSHOT.jar` to start the server. It will run on port 8081 by default.

Deploy BODB frontend (Require NodeJS 16+ and NPM)

1. Find `bodb` directory in source codes and `cd` into it.
2. Run `npm run install` to install requirements.
3. Run `npm run serve` to start the web server. By default it will use port 8080. Again, this approach is only for simplicity. In production mode, we may first build it into static files, and deploy it with Apache or Nginx.