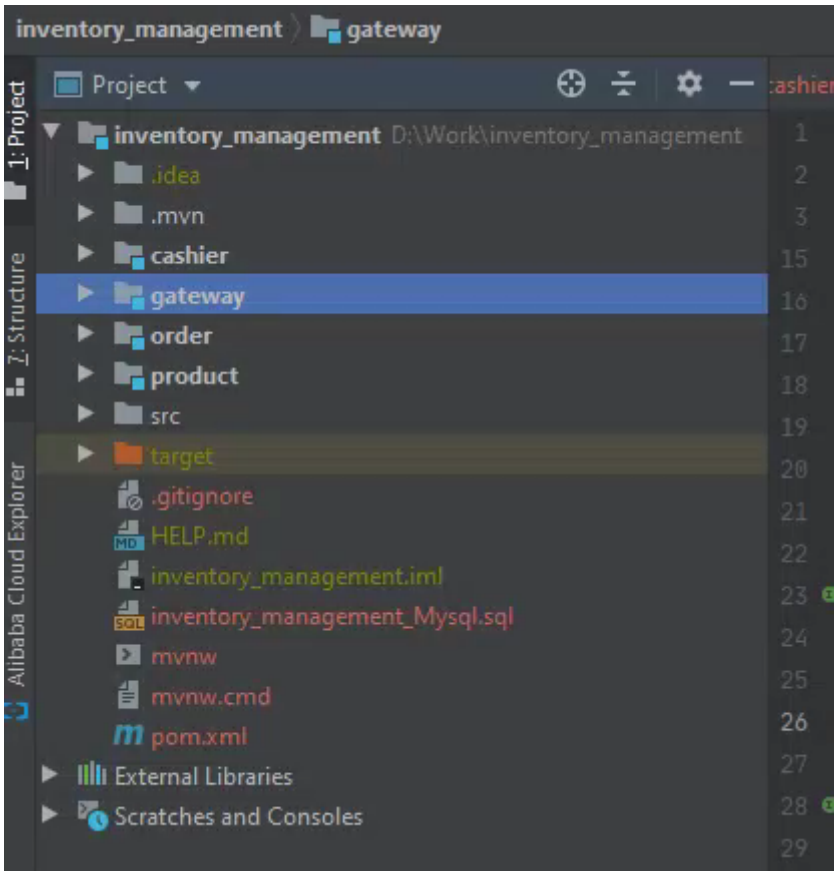
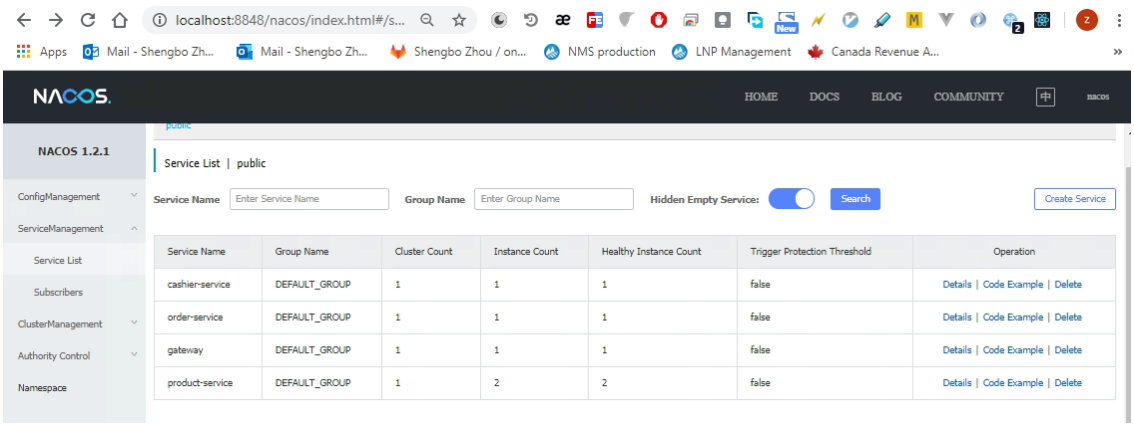
API Document

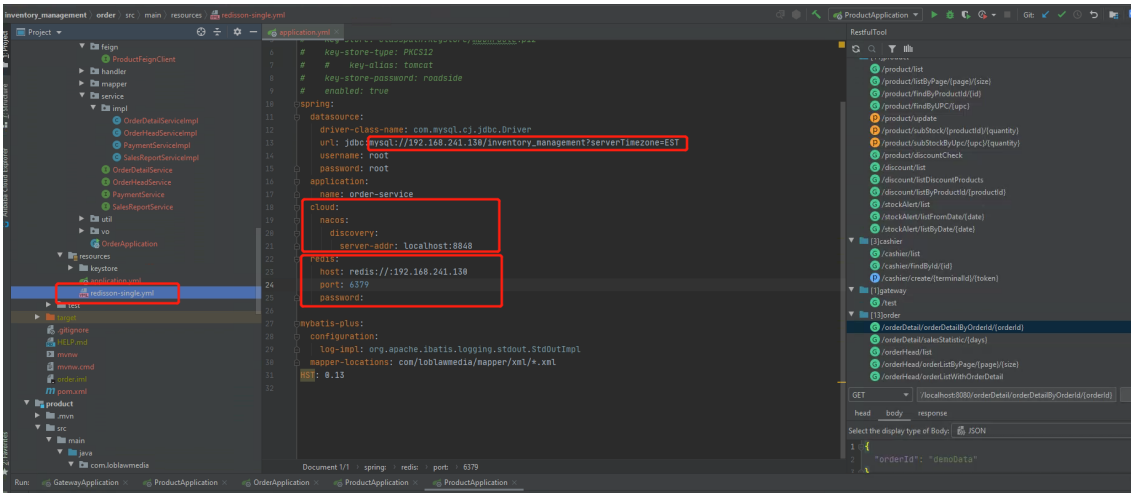
Brief introduction:

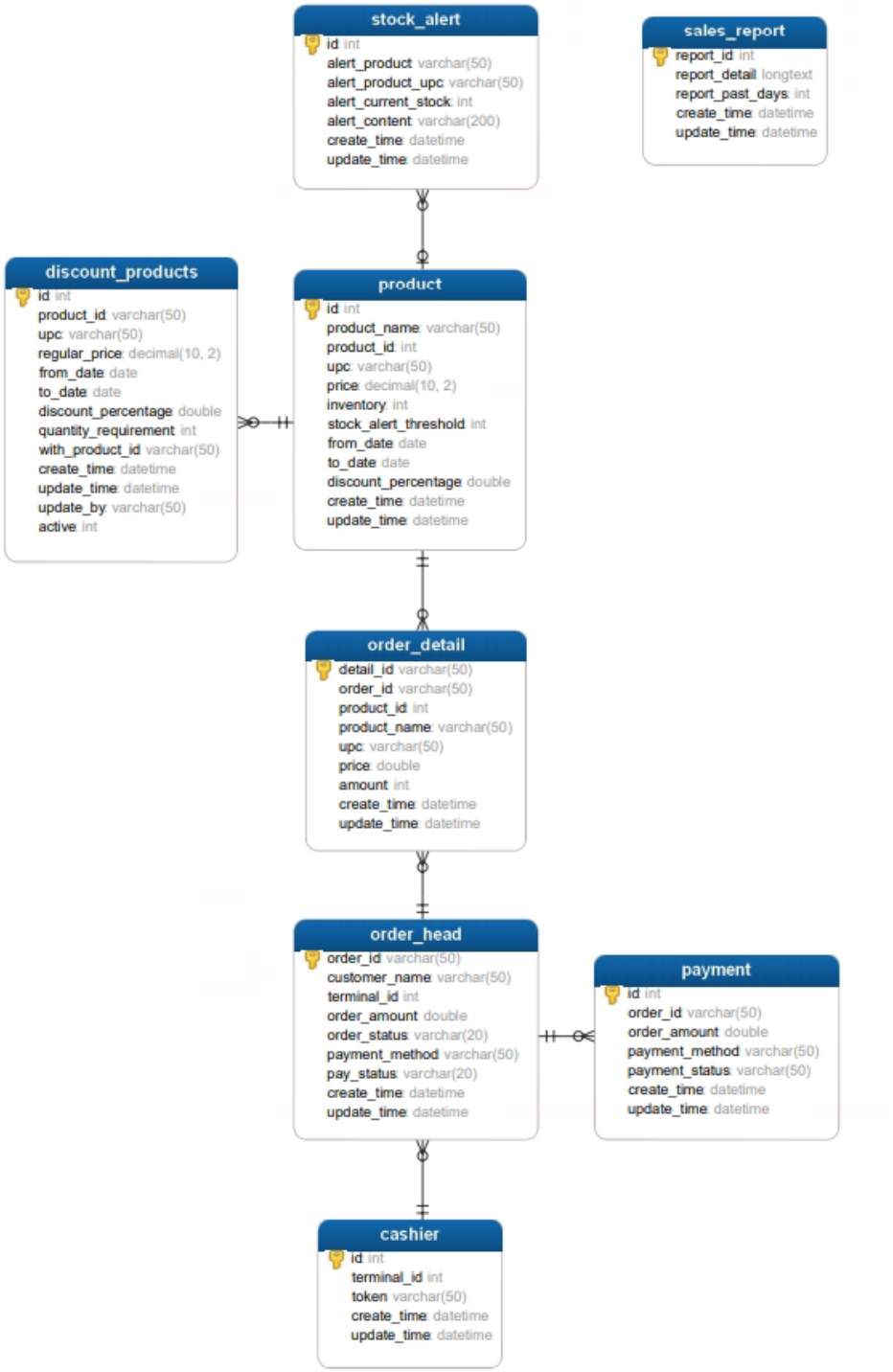
1. use Java, Spring Boot, Spring Cloud to create the microservices and RestFul APIs, Nacus to realize service registry and discovery, Gateway as Router, Feign & Ribbon as Load Balancer which can realize weighted rule, service can be scaled horizontally by deploying multiple instances



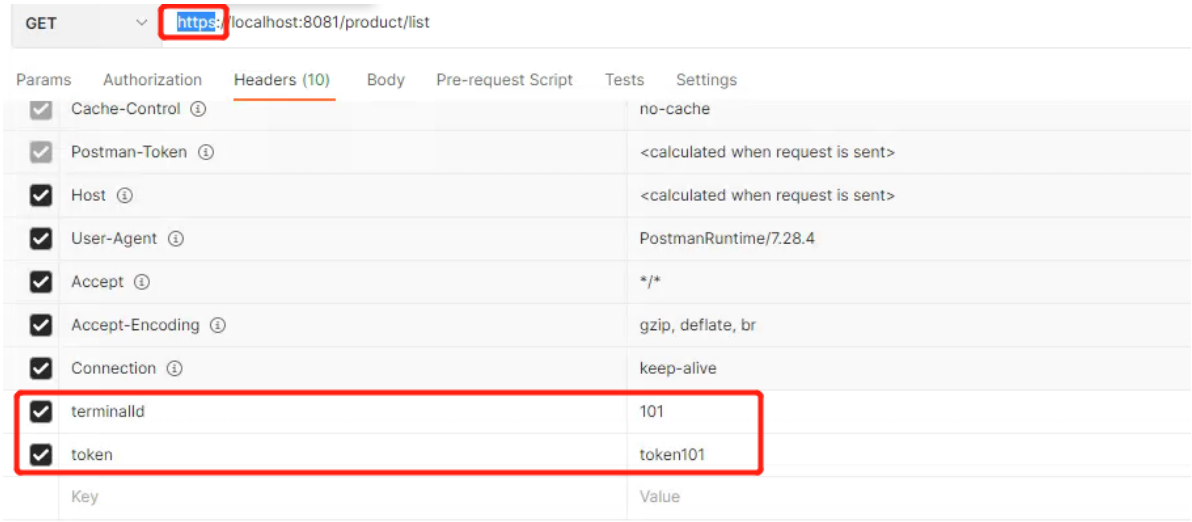


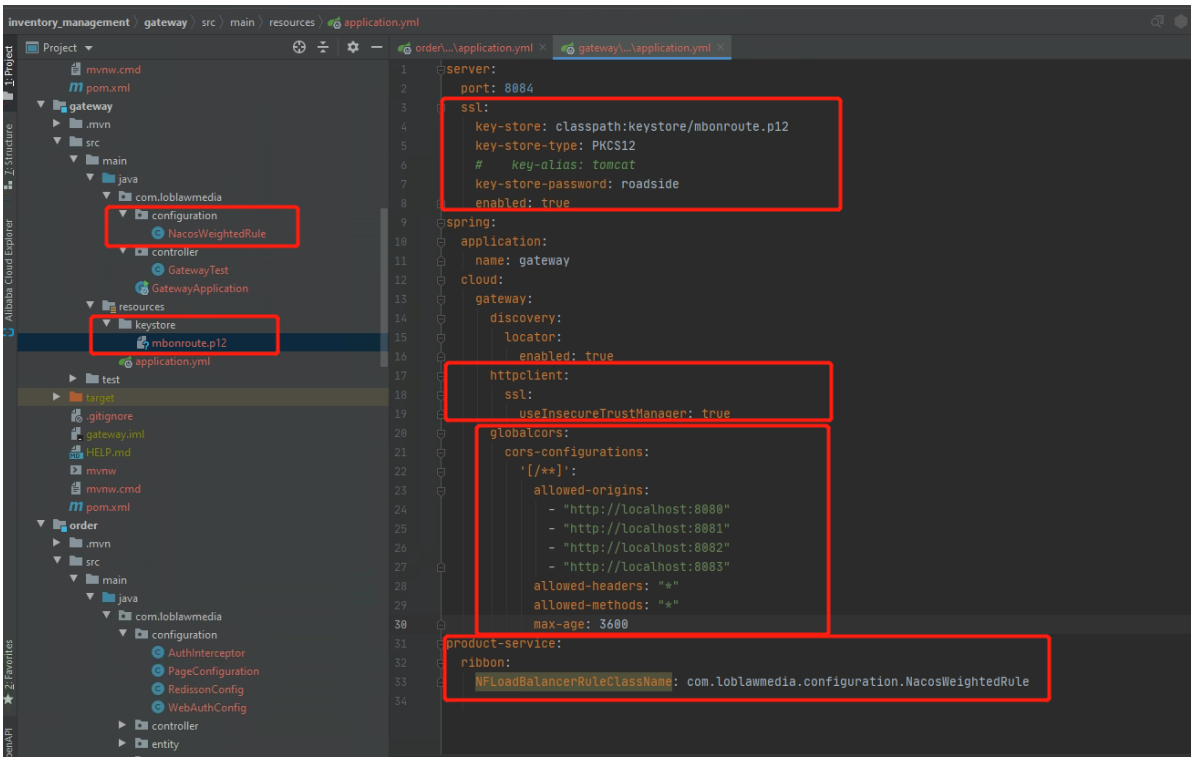
2. Mysql as the database, Redis for cache and distributed lock, Mybatis & Mybatis plus as ORM framework





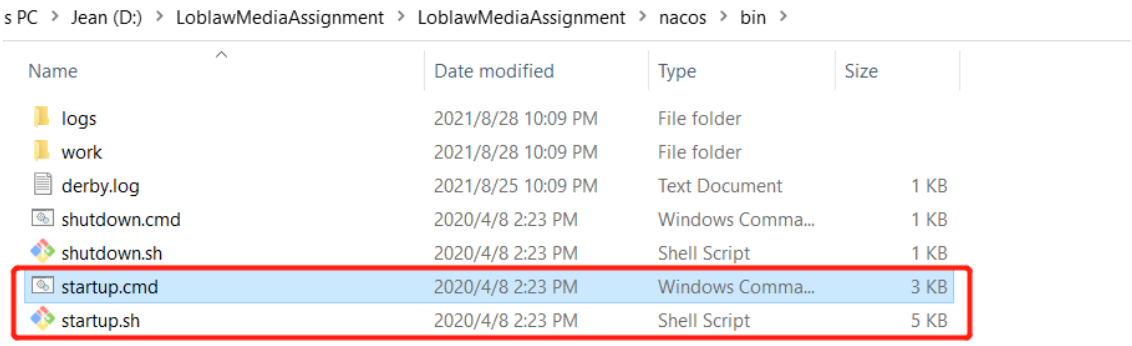
3. Header in request for authentication and https certificate call are set for security

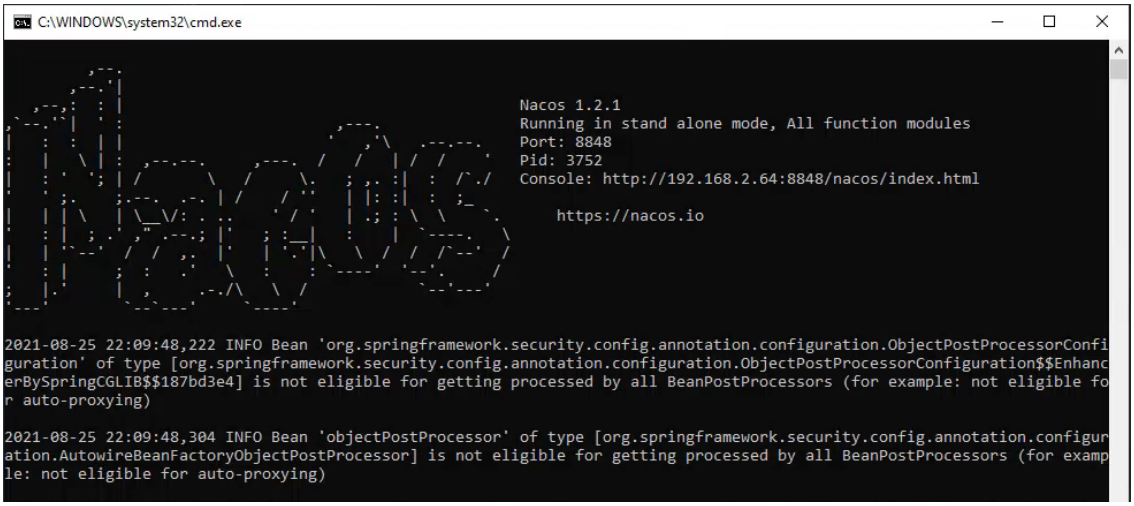




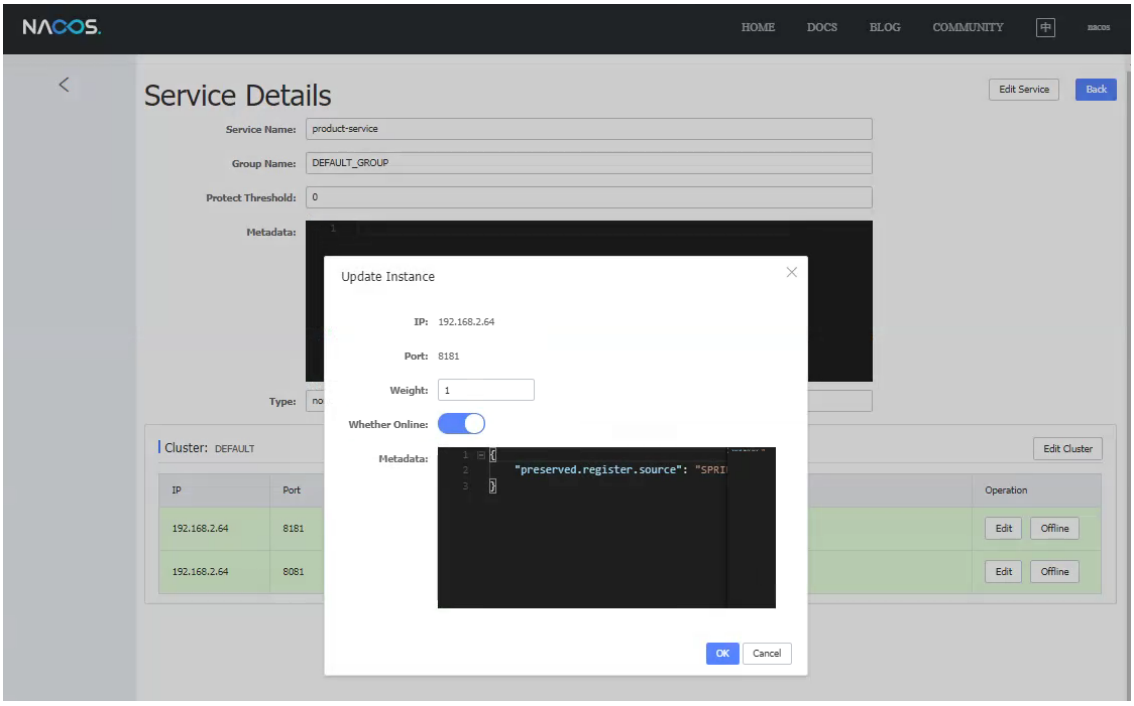
Project starting process:

1. First run the inventory_management_Mysql.sql to set the database for the application
2. Second need to start Nacus for the microservices registry and discovery





3. then can start gateway, product, order, cashier microservices, each service has to set the application name in application.yml so it can be discovered and registered into Nacus, the gateway can set Https certificate and the Cors configuration so no need for each service to set separately.
4. the same service can start several instances and set different weight in Nacus service configuration



5. go on testing whether all apis working fine or not

Summary of task completion from the assignment:

1. Considerations
   • Payment must be made in full before an order can be closed.

   ```
   before closing the order, application will first check payment status, once payment in full, will set the order status to completed, otherwise will send "payment not paid" response to the front end
   ```

   • Cashier should not be able to add products to an order without enough inventory.

   ```
   application will judge whether stock is enough or not for any product in the order, if not will throw RuntimeException and log stock not enough.
   ```

   • Error handling
   • Multiple instances of the service may be deployed to balance the load horizontally.

   ```
   Using Nacos and Gateway, microservice can deploy many instances to scale horizontally and load balanced.
   ```

   • The service maybe queried frequently during rush hours. It might not be a good idea to run all tasks synchronously on API calls.

   ```
   Need to import MQ to lower the coupling and improve service efficiency
   ```

   • Sales Report

   ```
   sales statistics of past xx days
   https://localhost:8082/orderDetail/salesStatistic/7
   ```

• Recall

```
Recall check by UPC
https://localhost:8082/orderHead/recallCheck/SP104
```

• Inventory Alert

```
when stock is lower than threshold, will create an alert record and save into database, in the future can  use MQ and web socket to realize sending message and remind in the admin console of inventory management
```

• Security

```
use https and header authentication setting in request to realize simple authentication, and also  need to encryp token for the front end when sending request
```

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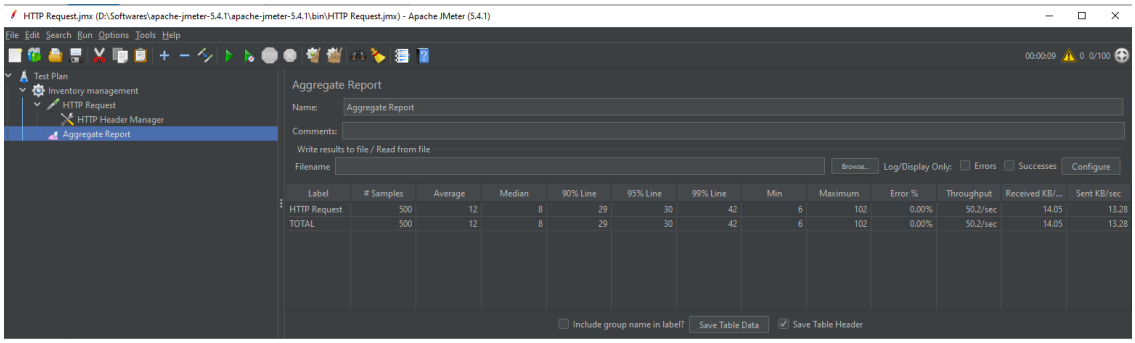
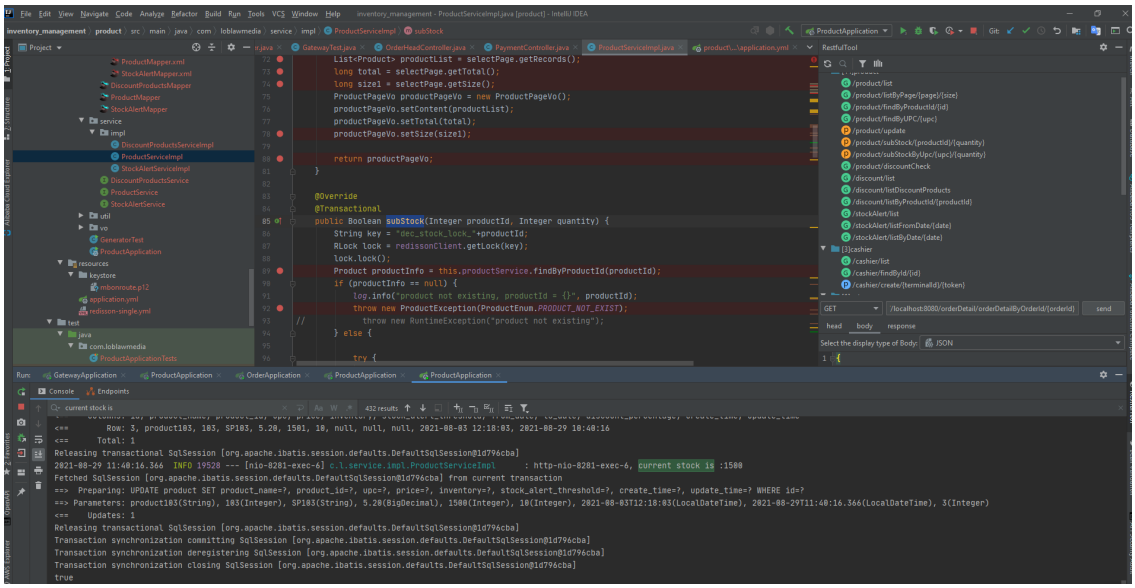
to do

Since time limitation, some functions are not fully realized and need to be improved.

Looking forward an opportunity to discussing with you for more details.

1. Database structure design is not quite reasonable and still needs some optimization about the relations according to the real business logic which should discuss with BA and DBA for details.
2. Distributed transactional business: As for database design, for the moment just put all the tables in the same database and use @Transactional annotation to assure the transaction business's ACID. In reality, different microservice should use different database to realize distributed transaction, we can import some solution Tool like Seata and then just use @GlobalTransactional annotation to handle the data consistency, the use of Seata is very easy but the configuration in the server and database is kind of complicated, in order to run the application on your side successfully, for the moment, not use the distributed solution, just the same database for convenience.
3. Distributed lock and pressure test: As a distributed project for multi threads and high concurrency scenarios, the application should set Distributional Lock in the application, I put the Redisson Lock into application, start 100 threads and 3 application instances, and implemented the pressure test using Jmeter, the product subtract stock function seems working fine. Still needs code optimization and more pressure test.





4. Message Queue: Can import MQ into the application to lower the coupling and improve efficiency, for the stock alert can use MQ to send message to Management console.

5. CI/CD Automation: use Gitlab, Jenkins, Docker to realize CI/CD automation process, use Kubernetes for automating deployment, scaling, and management of applications.

Stay safe and take care.

Sincerely,

Tony Zhou