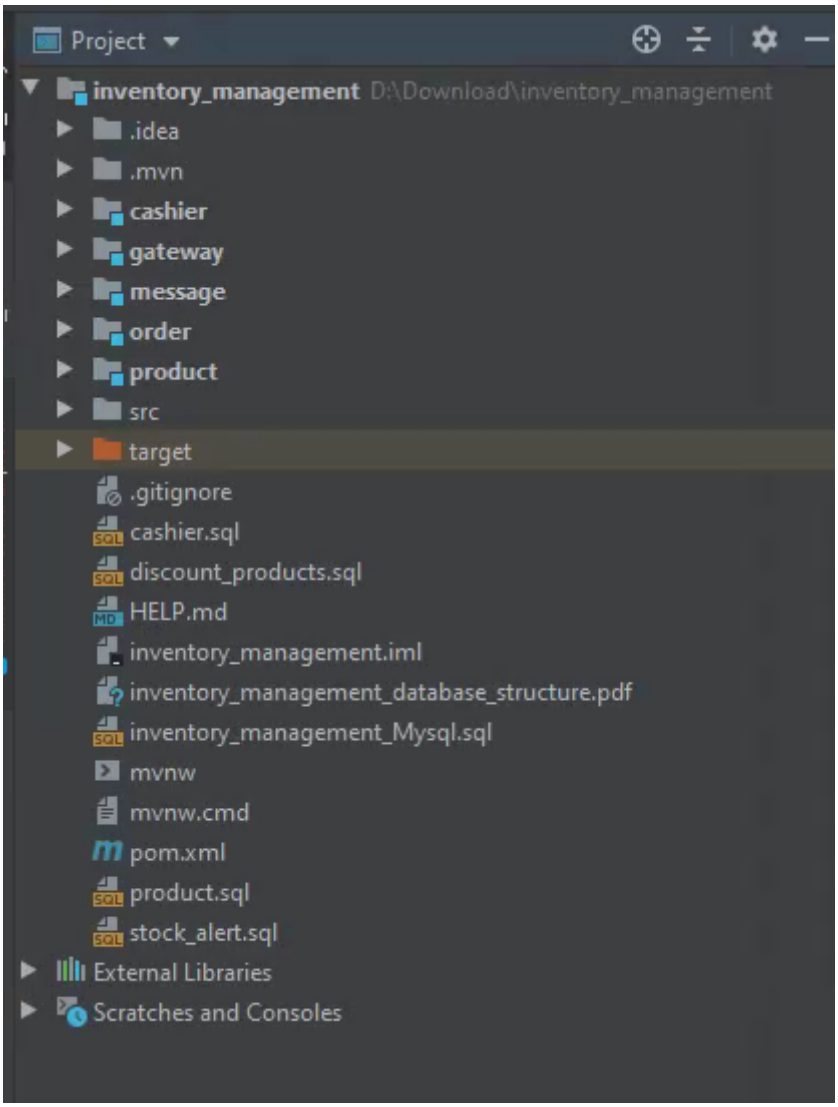
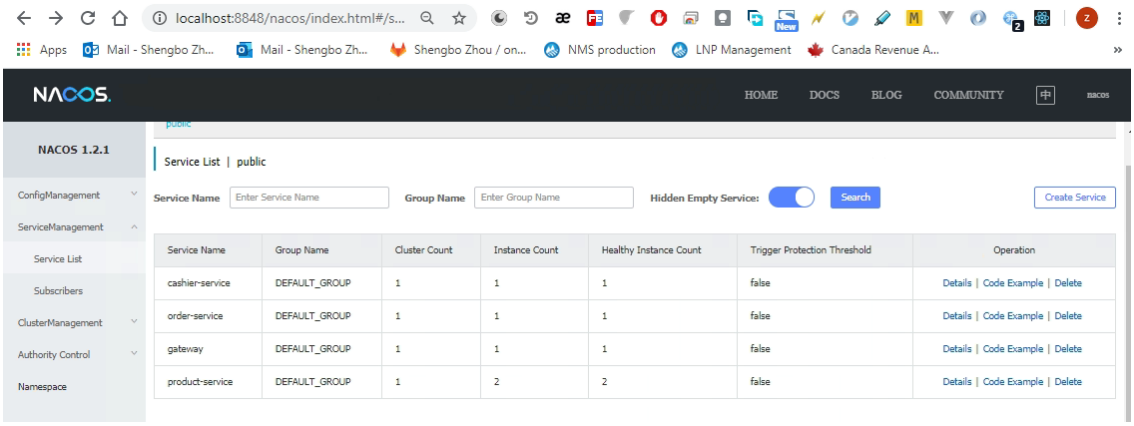
API Document

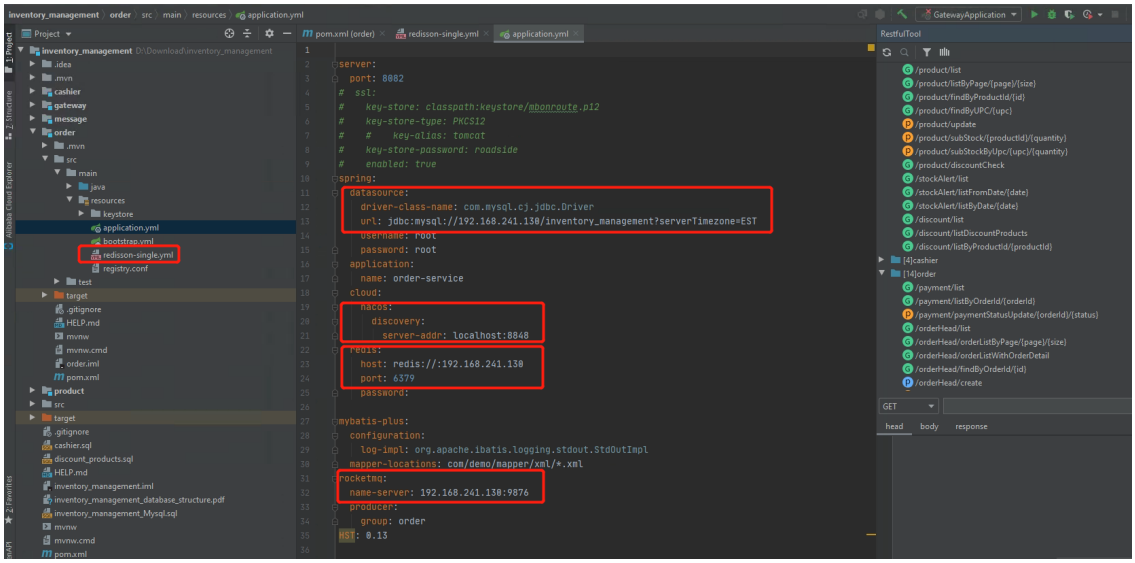
Brief introduction:

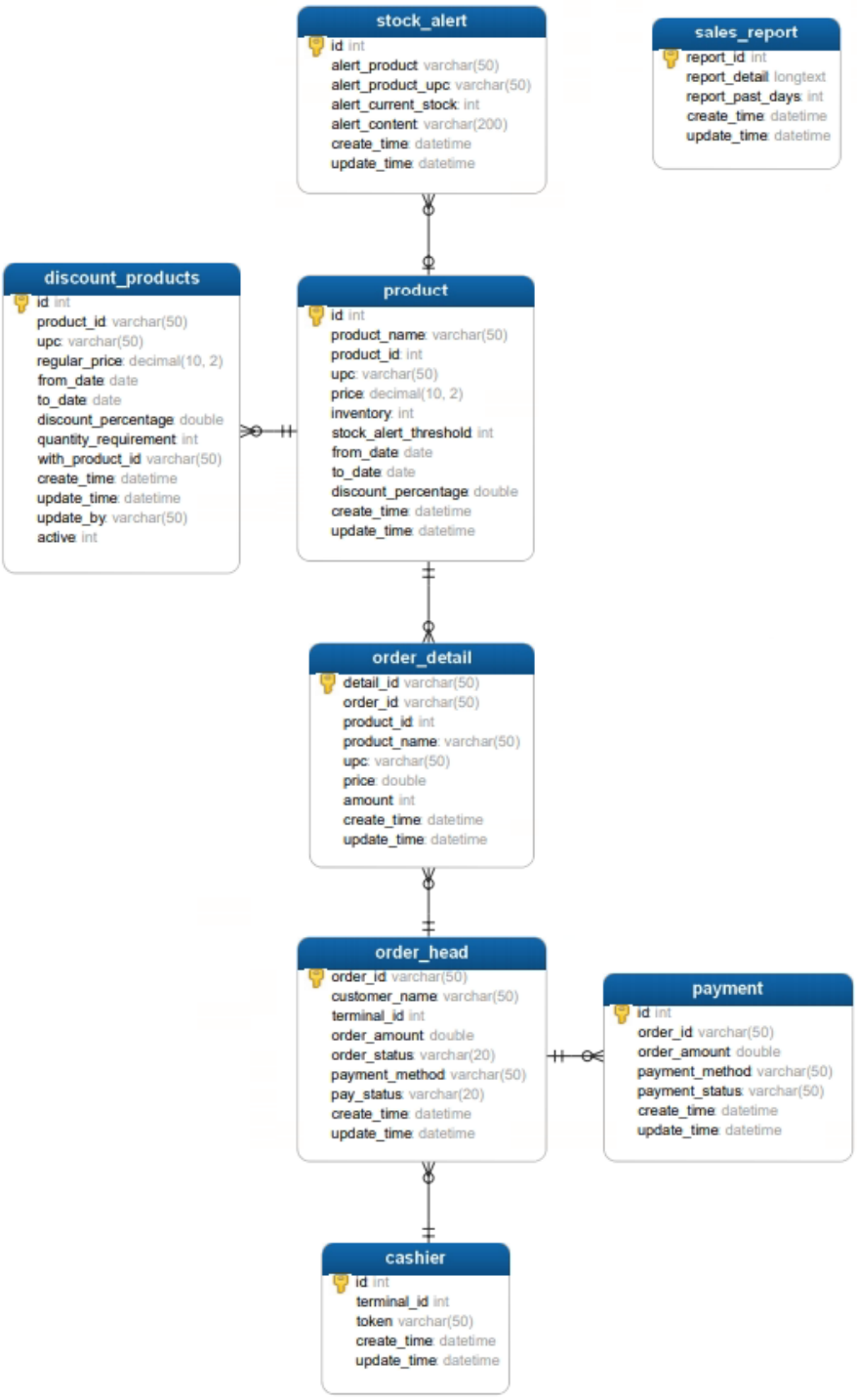
1. use Java, Spring Boot, Spring Cloud to create the microservices and RestFul APIs, Nacus to realize service registry and discovery, Gateway as Router, Feign & Ribbon as Load Balancer which can realize weighted rule, service can be scaled horizontally by deploying multiple instances



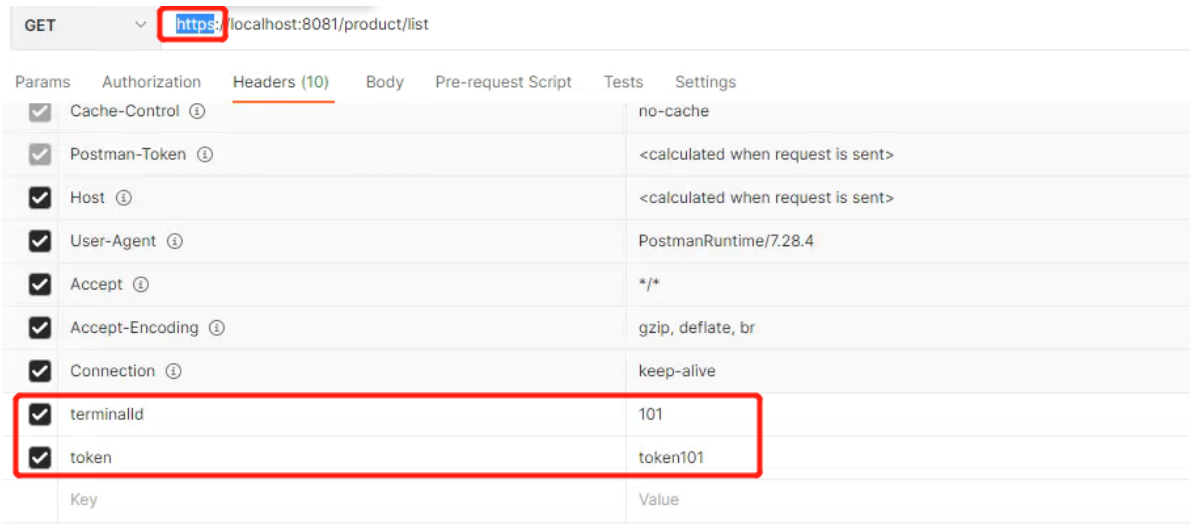


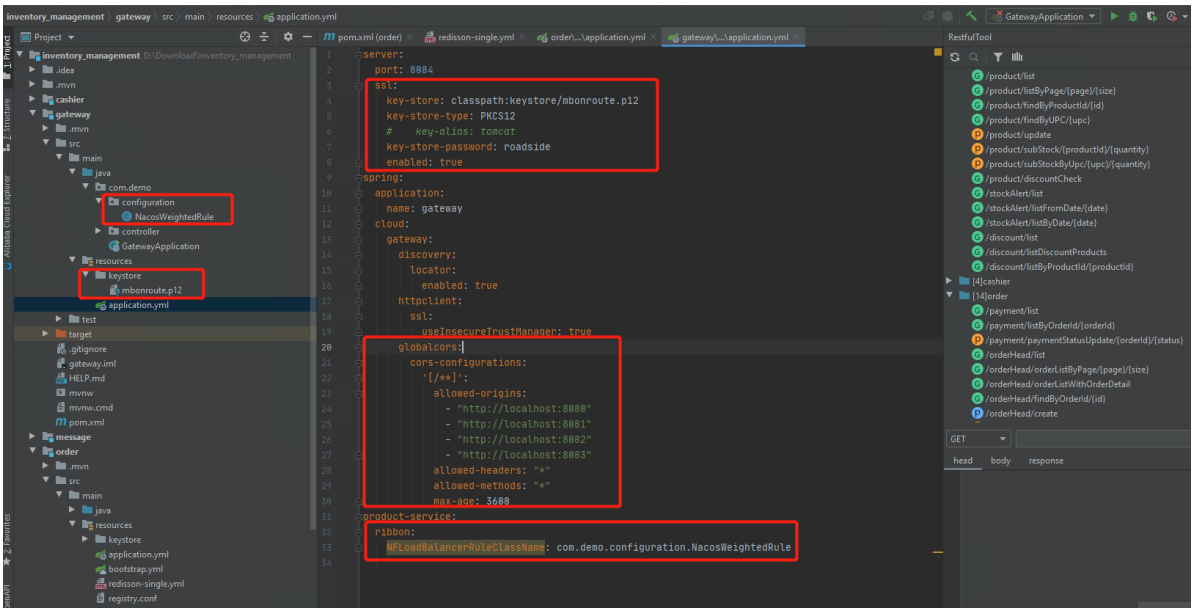
2. Mysql as the database, Redis for cache and distributed lock, Mybatis & Mybatis plus as ORM framework





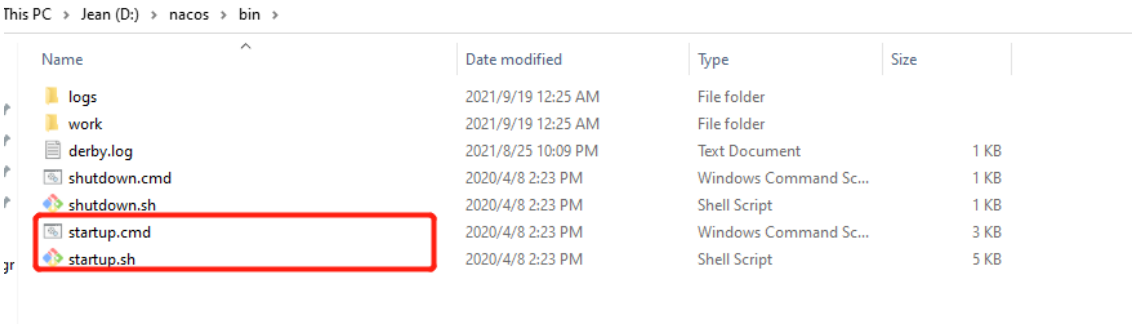
3. Header in request for authentication and https certificate call are set for security

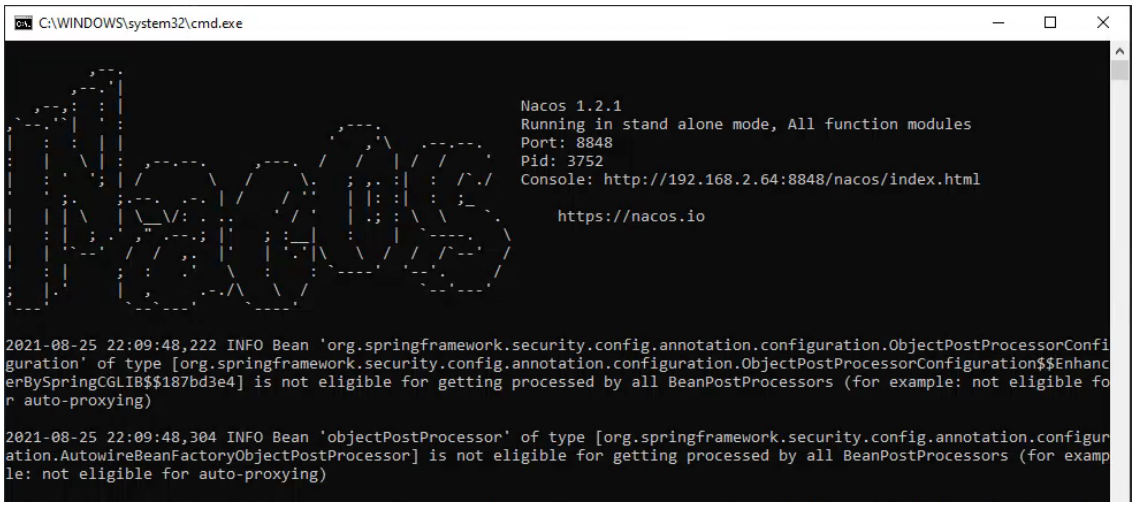




Project starting process:

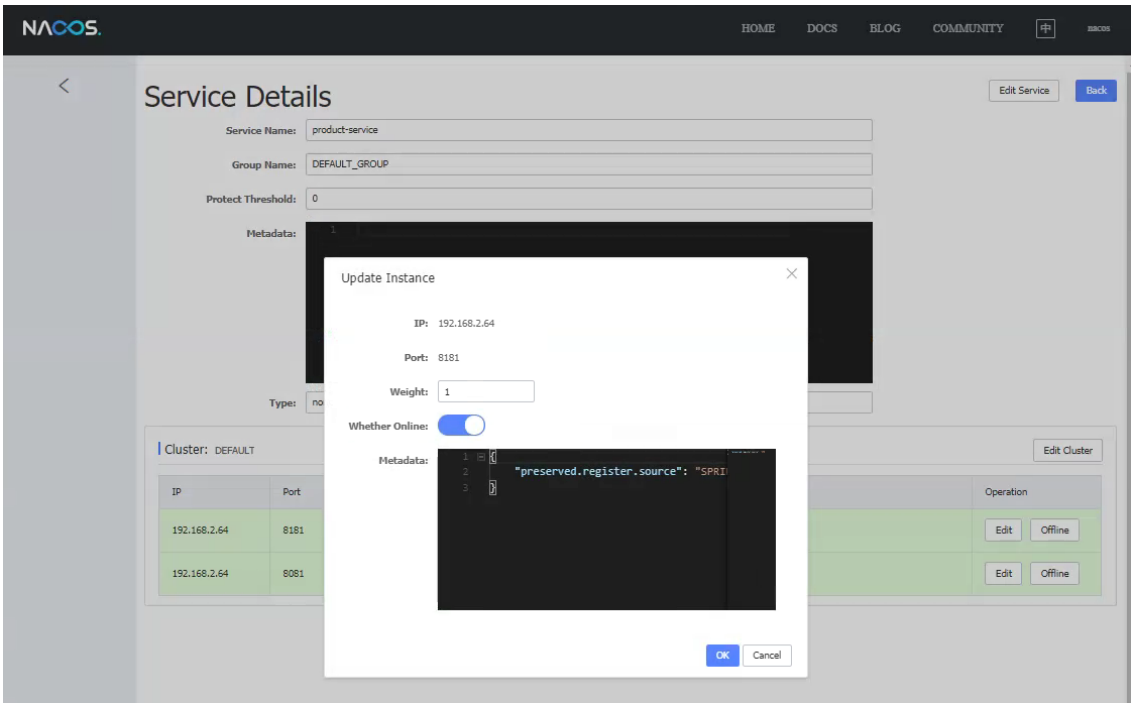
1. First run the inventory_management_Mysql.sql to set the database for the application
2. Second need to start Nacus for the microservices registry and discovery





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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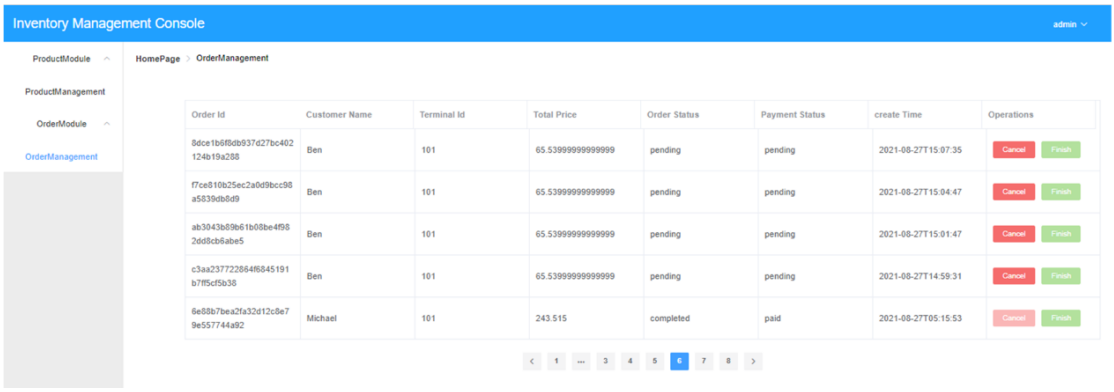
updates and to do list

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.

Main updates:

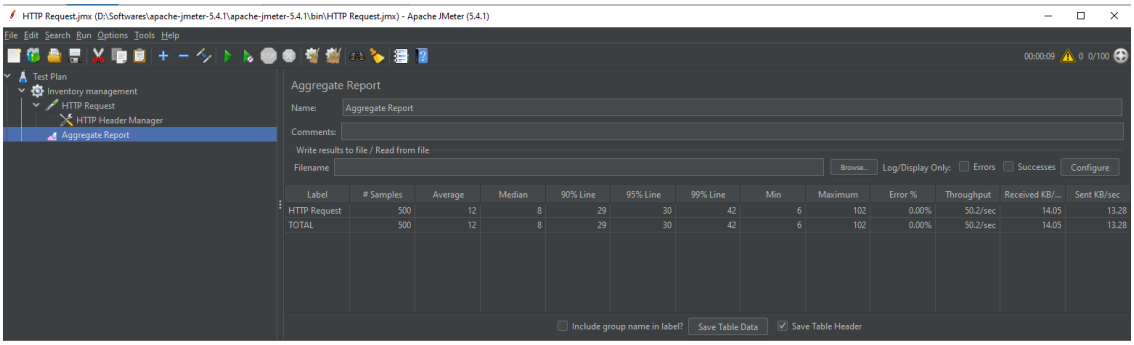
1. Use ResponseEntity to regulate the http response in Controller which would make the code more clear and regular.
2. Spilt the original one database to different databases, like Product, Order, Cashier, for different microservices, as a distributed project we should use different database for different microservice.
3. Import Spring Cloud Alibaba Seata solution tool to realize the distributed transactional business for the distributed project.
4. Import MQ and create another message service to send and receive the message, which could reduce the coupling and improve efficiency, the coming function I want to realize is using the webSocket to realize when placing order successfully, MQ will send the message actively and automatically to the front end from backend, which will tell the admin to handle the order in time.
5. Use @RestControllerAdvice and @ExceptionHandler to handle the exceptions globally, handle the self-defined exception like Product, Order exception, RuntimeException and the general Exception which will make it more friendly to the client.
6. create a simple front end admin console for this project, so from the website we can call our backend api and handle the real business

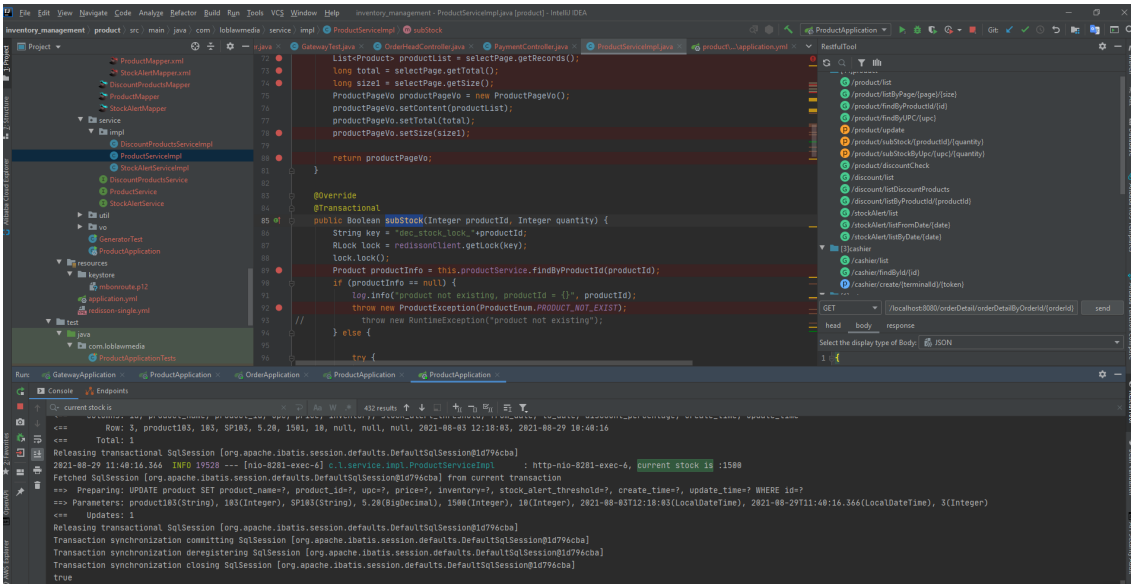


7. use Docker-compose to deploy the microservices (not finished yet, since in the docker environment some mysql and Redis setting error, I still need to find the main cause)
8. Use @Scheduled(cron="0 0 12 * * ?") to realize some scheduled actions like sales statistic and stock alert

To do list:

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 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.





3. 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