International Journal of Electronic Engineering and Computer Science
Vol. 5, No. 4, 2020, pp. 33-40
http://www.aiscience.org/journal/ijeecs

Design and Implementation of Software Industry Quality Inspection Service Platform Based on SSM

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Abstract

With the rapid development of Internet technology, the number of software products increases rapidly, which also leads to great differences in software quality. At present, the testing process of software products still follows the traditional manual approval and submission. That is, fill in the software product testing authorization letter and testing application form, and submit to the local testing center, and then the local testing center entrusting a third party qualified organization to carry out the testing. This process is often complex and time-consuming, while the software industry product updates and iterates quickly, and the traditional detection service mode is bound to affect the development speed of the industry. Therefore, to simplify the software detection process and improve the timeliness of software detection services has become an urgent problem to be solved. This paper draws lessons from the e-commerce shopping model, constructs a one-stop inspection and testing service platform with software products as the core, and develops a new one-stop comprehensive service model. To promote the software inspection service of the quality inspection organization online. The realization of the software industry standards, measurement, inspection and testing, certification and accreditation of information connectivity interaction. The traceability of the whole detection process can be realized to ensure the transparency of the detection process and improve the development quality of the software industry. Based on SSM framework, this platform applies Redis system to build database, and realizes high-performance retrieval by virtue of Solr technology, which can meet instantaneous mass user access. By testing the business logic and stability of the system, all the indicators meet the expected requirements. The system can be widely used in quality inspection institutions.

Keywords

SSM, Software Quality Inspection Service, Redis, Solr

Received: October 26, 2020 / Accepted: November 25, 2020 / Published online: December 24, 2020

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1. Introduction

The development trend of the Internet industry in China is more and more rapid, and the number of software products on the market shows an explosive growth. The quality of software varies widely [1].

The establishment of a software product quality inspection service integration platform can solve the problems such as the imbalance of software quality technology foundation in central and western China and the monopolization of quality product inspection institutions in each region. At the same time, it is also convenient to release the productivity of universities, research institutes, state-owned enterprises, institutions and other institutions with testing service ability. Users with software product testing requirements can find the most suitable testing services on this platform. The most important thing is that relevant government departments can monitor the real-time trend of product quality in the software industry, which will strengthen the government's supervision

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ability, improve the quality of software products, correct the market situation, and have good social and economic benefits. According to the mass quality inspection data generated by software inspection and testing, dynamic collection and analysis of public opinion information, complaint information, evaluation information, product accident information, etc., can predict the market trend of the software industry.

The software industry quality inspection service platform based on SSM (Spring spring MVC My Batis) comes into being under such a big background. The construction of an e-commerce inspection and testing cooperation service platform, the integration of multiple data such as technical institutions, industry experts and conquering supervision, as well as the scientific deployment of NQI (National Quality Infrastructure) strategy in the software industry, are closely related to the inspection and testing, certification and accreditation [2]. This will be an opportunity for China's quality inspection industry to catch up with western developed countries, but also a huge challenge.

2. Methods

2.1. System Requirements Analysis and System Framework

The business logic function of this system is mainly divided into seven modules.

It includes inspection user module, inspection standard index module, inspection standard management module, order business module, standard purchase vehicle function module, classified information management module, and inspection agency service management module [3].

Bootstrap framework and HTML language were used for the front-end, Dubbo and SSM frameworks were used for the back-end, MySQL and Redis were used for the database, and IntelliJ IDEA was used as the development tool. In terms of hardware, various kinds of large-capacity hard disks and servers with high performance and high load have been very common in the market, and the hardware can fully support the operation of this system. The front-end and back-end of the system are separated, and the independent development of each module is also convenient for the future maintenance and upgrade of the system.

Nonfunctional requirements

High concurrency requirements of the system.

This detection service platform is oriented to a large number of inspection institutions and inspection users. It is inevitable that huge concurrent visits will occur. Due to the performance ceiling of traditional databases and common servers, problems such as slow user request response time and server crash may occur. In order to meet the current and future demand, the detection service platform needs to carry up to 10000 instantaneous concurrent visits, the response time of each page in the system should not exceed 2s at most, and the success rate should reach 97%. This article will address the read-write performance of relational databases under high concurrent access by adding Redis cache to the database functional module. Then, by setting up various clusters, such as Redis and Solr, etc., the application services of the system are distributed to multiple servers to ensure high concurrency requirements of the system. Taking Nginx as the image proxy server of this system as an example, it explains how the system bears the pressure of mass user access. In the early Web projects, there was only one Tomcat server, and the pictures and files of the system were all placed in the same server. When massive data access was encountered, the performance of the server would decline sharply, leading to the crash of the application service. [4] This system distributes application services to multiple servers, USES Nginx to distribute requests from clients, such as polling, random, IP address hash, etc., and distributes user access requests to multiple servers, and independently builds a picture server Img Server dedicated to storing pictures in the system. After the requests are scattered across different Tomcat, all the image information is retrieved from Img Server.

System security requirements.

Because there are a lot of information of users and organizations stored on the software detection service platform, the security of the system is very important. The account passwords of the detection institutions and the users to be inspected are transmitted and stored in encryption to ensure information security.

System architecture design

After the launch of the software detection platform, the detection service platform will face to a large number of inspection institutions and inspection users, and inevitably there will be a huge number of concurrent visitors. Therefore, service-oriented distributed system is the first choice of this platform. The distributed system can make the system run healthily and efficiently.

The architecture of the detection service platform is mainly divided into three layers: presentation layer, service layer and persistence layer. The function of the presentation layer is to complete the messaging between the system and platform consumers. The presentation layer is mainly built by Bootstrap to receive the front-end page request and display the response information back to the front-end interface, which ACTS as a link between the system and users. The

service layer is the concrete implementation of the system business logic, and its main task is to process the business logic according to different requests. The main task of the persistence layer is to access the database or code that processes the data, mainly interacting with the database.

Middleware Dubbo associates the service layer and the presentation layer. In the service layer, MySQL, Redis and Solr in the persistence layer are used to add, delete, change and check the data. Finally, the business logic is completed and the results are returned to the presentation layer. Use Active MQ message queue to distribute and store messages in presentation layer and service layer. The producer of the message does not care about the processing result of the message, and the consumer of the message does not care about the source of the message. The coupling degree of each functional module in the system is improved, which also speeds up the processing speed of the system to the business. The system architecture is shown in Figure 1:

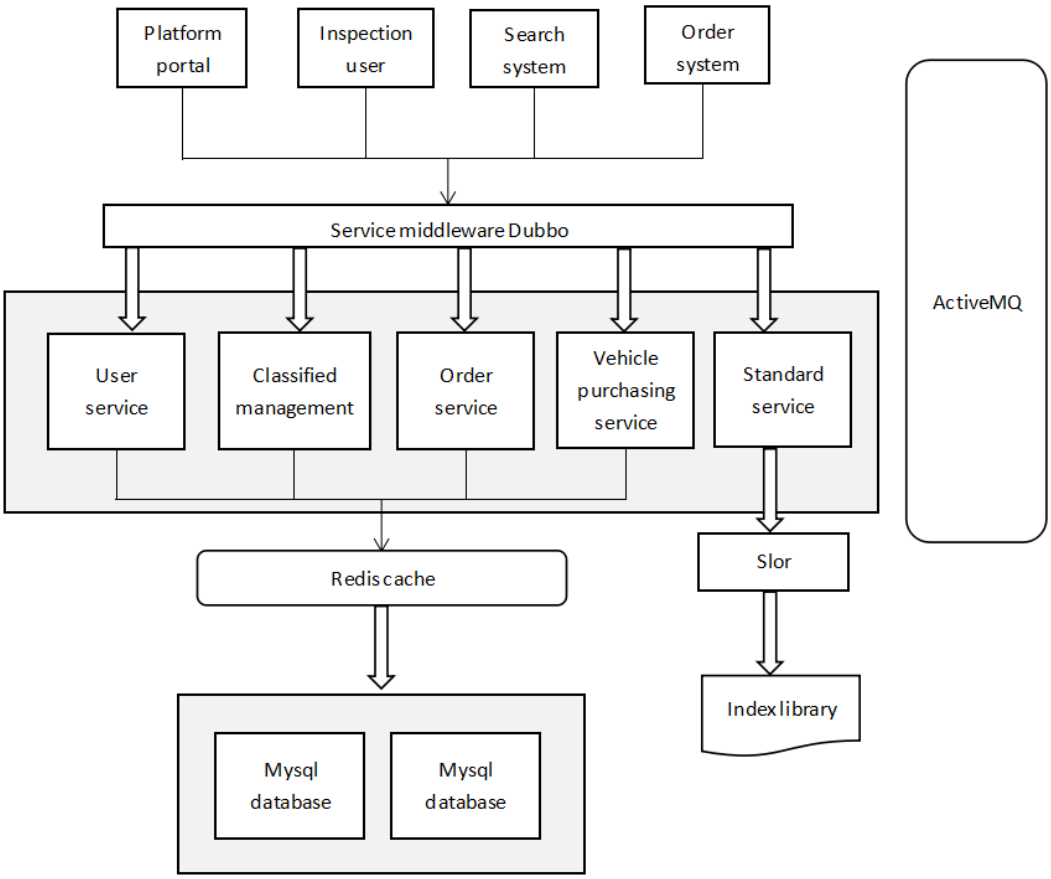

Figure 1. System architecture design.

The database needs to design six tables. Including inspection user information table (deposit makes customer information), detection standard table (basic information storage test standard), order list (stored makes customer submits the order information), the standard purchase car table (for standard information about purchasing a car), classification table type node (deposit classification information of nodes), inspection agencies table (store information about testing institutions).

2.2. System Design and Implementation

We will introduce seven functional modules, namely, the user module, the index module of inspection standards, the management module of inspection standards, the order business module, the functional module of standard purchase vehicles, the classified information management module, and the service management module of inspection institutions.

The development process mainly used Bootstrap front-end framework, Spring framework, My Batis framework, Nginx load balancing, Redis and caching technology, server cluster and other key technologies.

2.2.1. Check customer Function Module

The customer module can realize the functions of user registration, login and information maintenance. Users can log in through the login page and have the login memory function, the registration page has the repeated registration detection function, and the information maintenance page can realize the modification of the login information. The class design of the submitted user module is shown in Figure 2.

Figure 3 is the login rendering.

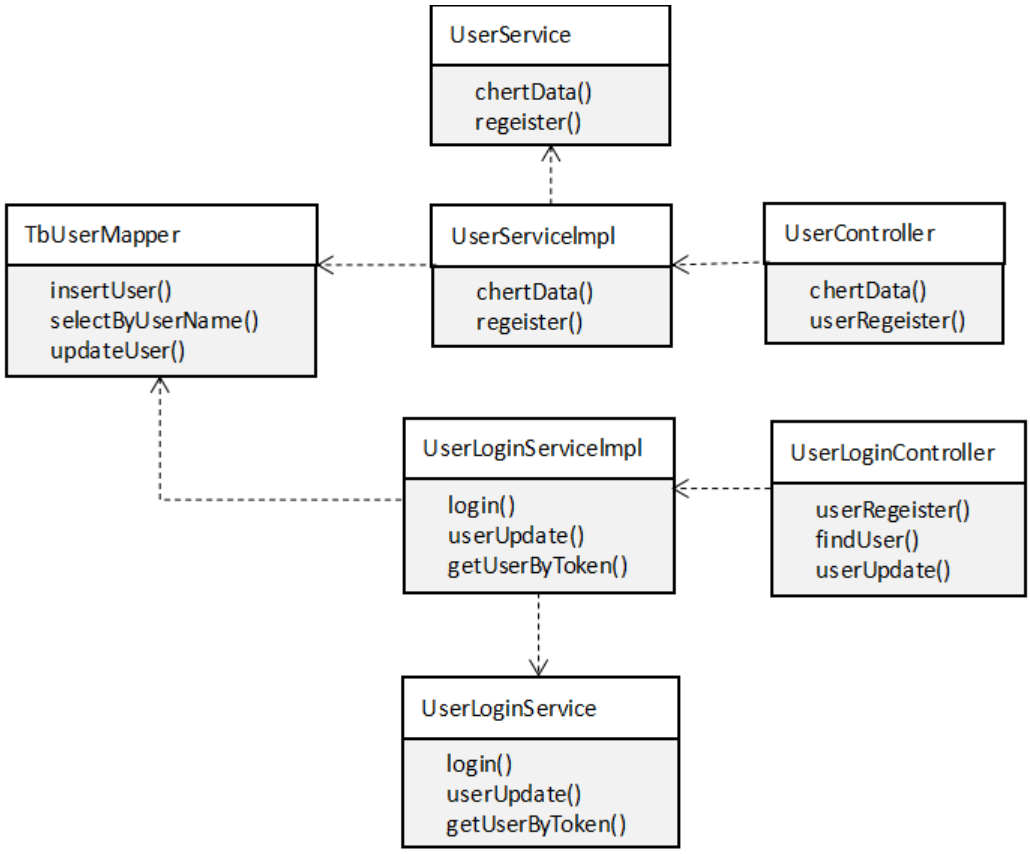

Figure 2. Class diagram of the submitted user module.

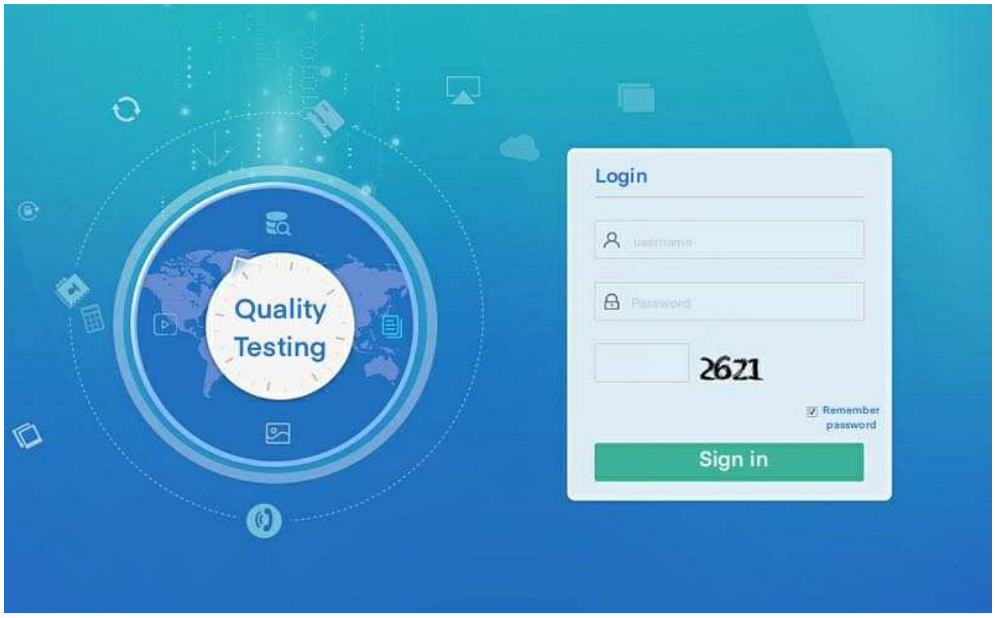

Figure 3. User login renderings.

2.2.2. Test Standard Management Module

Includes the deletion, adding and unmounting of test standards, and has the function of batch import of test standards. The business flow chart of the test standard management module is shown in Figure 4.

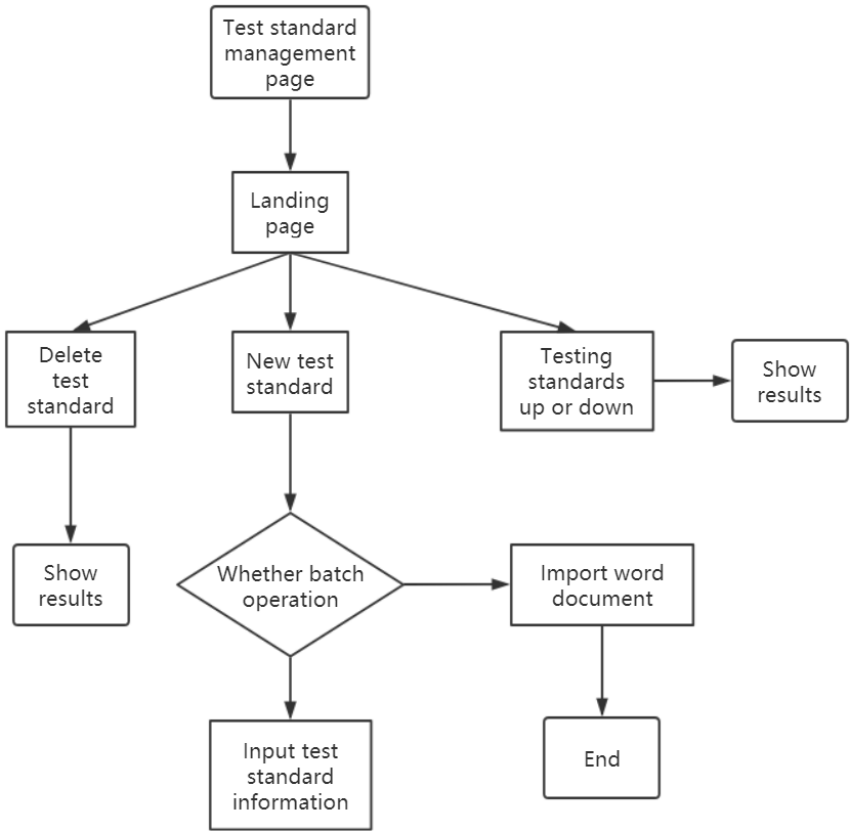

Figure 4. Flow chart of test management function.

2.2.3. Detect Standard Index Module

Including the establishment of detection standard index database, keyword retrieval, condition retrieval. The condition retrieval part can be further screened according to the detection standard, specification and detection address. At the same time, Solr search server is applied to cope with the surge of instantaneous traffic and high concurrent search, so as to ensure the stable operation of the database. The index diagram of detection criteria is shown in Figure 5.

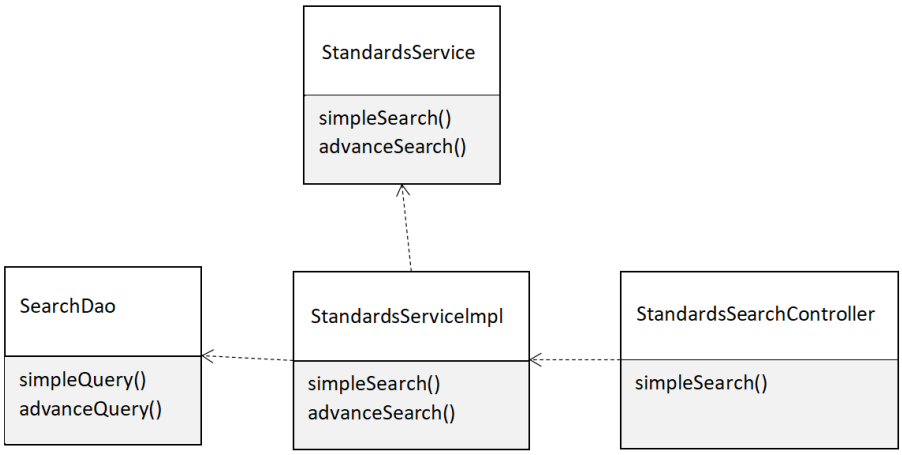

Figure 5. Detection standard index module diagram.

2.2.4. Order Management Module

After the inspection customer logs in, the order management module provides users with functions such as submitting orders, searching, modifying, and deleting existing orders [5]. The order management module is shown in Figure 6:

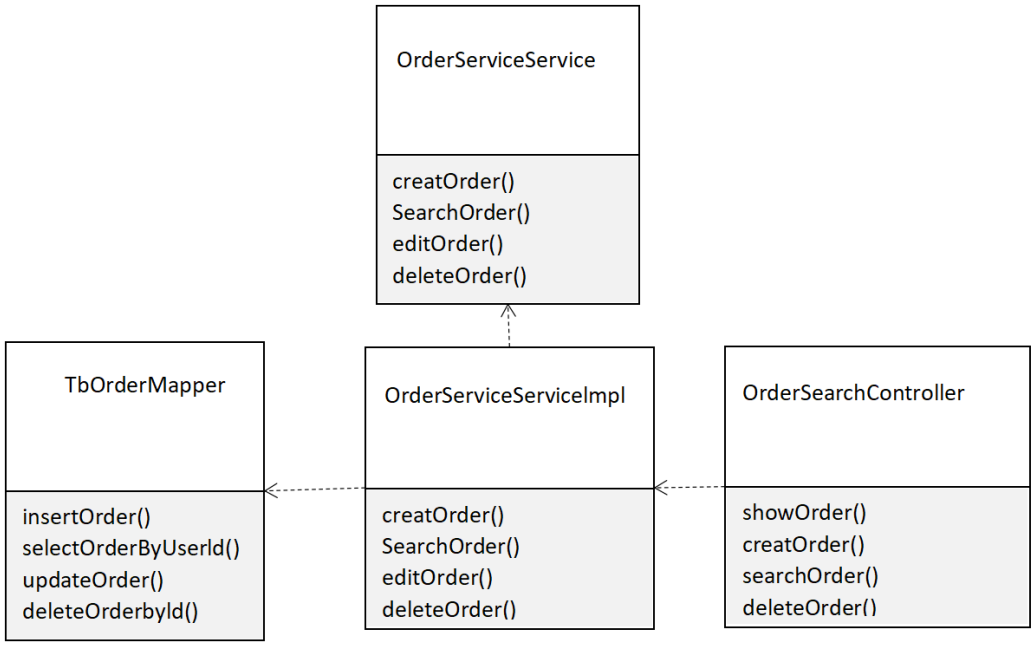

Figure 6. Diagram of order management module.

2.2.5. Standard Purchasing Vehicle Function Module

In actual applications, the customer submitting for inspection may have multiple software products to be tested, and different software products correspond to different testing requirements. At this time, it is necessary to select multiple testing standards and put them into the testing standard purchase cart. The functions provided by the inspection standard purchase vehicle to the customers for inspection include adding inspection standards to the purchase vehicle, editing the quantity of inspection standards in the purchase vehicle, and calculating the settlement price of the inspection standards. The standard shopping cart function module is shown in Figure 7:

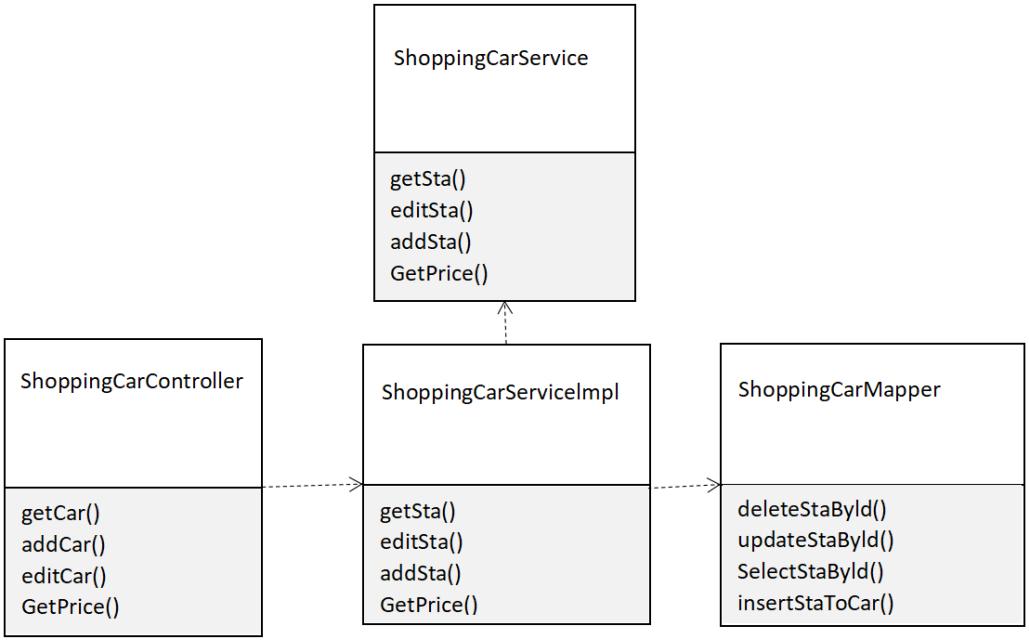

Figure 7. Standard shopping cart module.

2.2.6. Classification Information Management Module

The main business function is to add, modify, and delete classified entries.

The business flowchart of classified information management is shown in Figure 8:

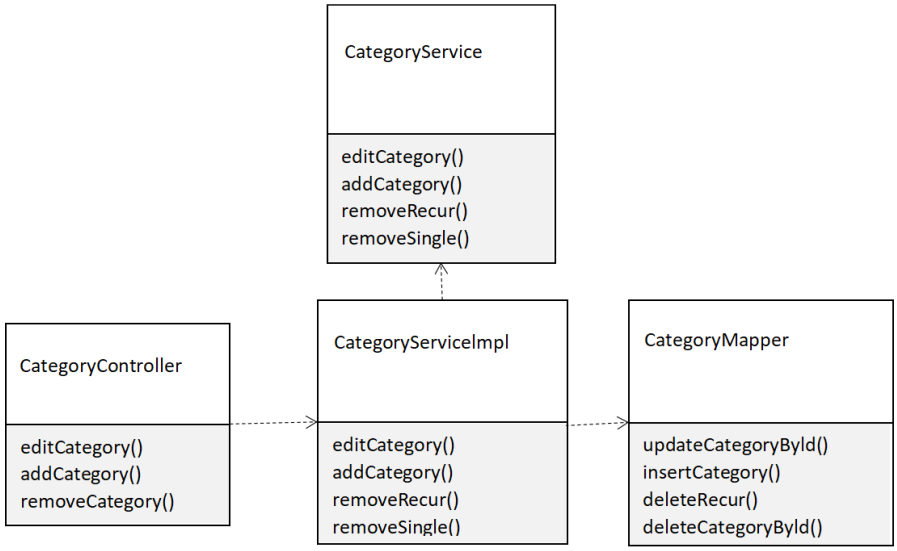

Figure 8. Classification information management process module.

2.2.7. Testing Agency Service Management Module

The main function realized is that the administrator can uniformly manage the testing service organizations in the platform. It mainly involves the inquiries of testing agencies and the entry of testing agencies, and its business process is similar to the previous inspection user module and testing standard index module.

The service management module of the testing organization is shown in Figure 9:

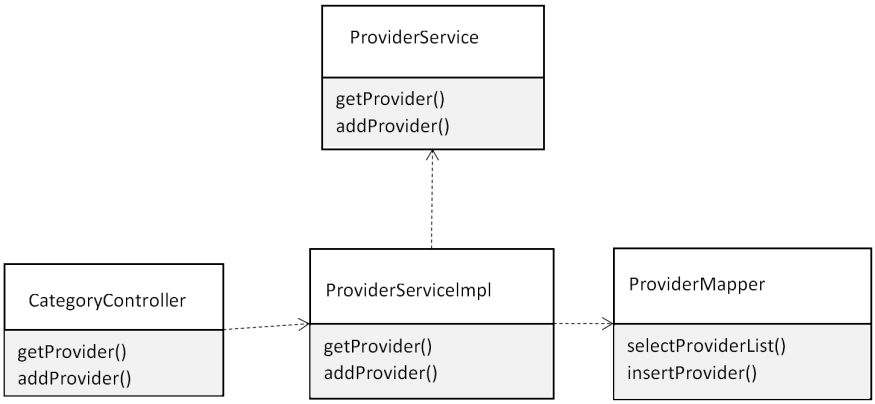

Figure 9. Service management module of testing organization.

3. Experiment and Result

By testing the functions and performance of the software testing service platform. Including functional testing of the above modules, customer login stress testing, data query stress testing, and non-functional testing [6]. All functional tests meet the design requirements.

The system login stress test results are shown in Table 1. It can be seen that the average response time and error rate increase with the increase of platform concurrency. When the instantaneous concurrency is around 10,000, the average time consumed by the user login operation is less than two seconds, and the success rate of the platform login function is greater than 97%.

Table 1. System login stress test.

Concurrency	Average response time	Success rate
1000	566ms	99.88%
5000	920ms	98.62%
10000	1890ms	97.39%

Simultaneously simulate multiple users to perform a data query function stress test according to a single condition query. The test results show that when the basic data query volume is less than 10,000, the average response time of the platform login is less than 2s, and the error rate is less than 2%.

4. Discussion

To sum up, this paper has completed the design and

development of the software industry quality inspection service platform based on SSM, but there are still many functions to be improved. For example, online payment function and evaluation function can realize immediate feedback of service and improve service quality. The user page design still needs to be improved, and the characteristics of the software inspection service platform need to be further highlighted to reduce the difficulty of users and inspection institutions. Each business operation of the system also needs to be further streamlined, in the case of ensuring the correctness of the business process to streamline the use of user steps. The function of complaint can also be added. For the relevant organizations with major problems in the inspection and testing service, consumers can put forward reasonable demands according to their personal wishes.

5. Conclusions

This article designs and implements an SSM-based software industry quality inspection service platform for users with software inspection needs and various institutions with software inspection capabilities. The business logic function of the whole system is explained, the performance is tested, and the realization degree and performance level of the system are analyzed according to the test status. The emergence of the software product testing service platform will break the regional differences and monopolistic behavior of the software testing service industry, and create a market environment with high software product quality and fair and just testing services.

Acknowledgements

This paper is supported by State Key Laboratory of Computer Architecture (ICT, CAS) under Grant No. CARCH 201806.

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Biography

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