

E-commerce Service System for Cloud Stall Application of Big Data

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ABSTRACT

With the country's comprehensive recovery of "stall economy", the accompanying problems can not be ignored. Based on this, in the field of Internet technology and big data, e-commerce system as an online trading platform, has a pivotal role. Due to the continuous expansion of user groups and the increasingly complex business functions of e-commerce system in the new era, the traditional single architecture model has been difficult to meet the needs of the future development of the website. This paper studies the design and implementation of e-commerce service system based on cloud stall.

Keywords: E-commerce system; big data; Cloud stall; Internet technology

1 INTRODUCTION

After the official inauguration of China's "Beijing" pilot Free Trade Zone, Shunyi group in the international business service zone is one of the three featured highlights, and has made new progress in the field of cross-border finance.

And free trade zone to provide characteristic professional financial services for key areas such as airport economy, automobile industry, cross-border e-commerce and business exhibition in Shunyi, and help Shunyi's economic and social development and industrial transformation and upgrading.

"After forming a comprehensive strategic cooperative relationship with Shunyi district government, China Merchants Bank Beijing Branch will combine its own characteristics and advantages to contribute to the construction of Shunyi district through cross-border finance, investment, commercial bank integration, wealth management and financial technology. It will vigorously publicize the guiding policies of Shunyi District and promote more enterprises to understand Shunyi and enter Shunyi." The relevant person in charge of China Merchants Bank Beijing Branch said that the relevant person in charge of China Merchants Bank said.

In recent years, Shunyi has taken advantage of the comprehensive experimental demonstration zone approved by the national pilot city of industrial integration, the expanded opening of Beijing's service industry, the capital's Industrial Finance Center, the gathering place of Beijing's financing "financial" leasing and the headquarters base of Beijing listed enterprises.

Relying on the physical space of 20 square kilometers and 19.8 million square meters, build three major financial development platforms, "housha Yu financial business district, Mapo financial city and airport financial leasing Industrial Park", make full use of the superposition advantages of "two regions" policies, and strive to implement various pilot policies in Shunyi to create a new situation of financial openness. Figure 1 below shows the financial openness of e-commerce innovation.

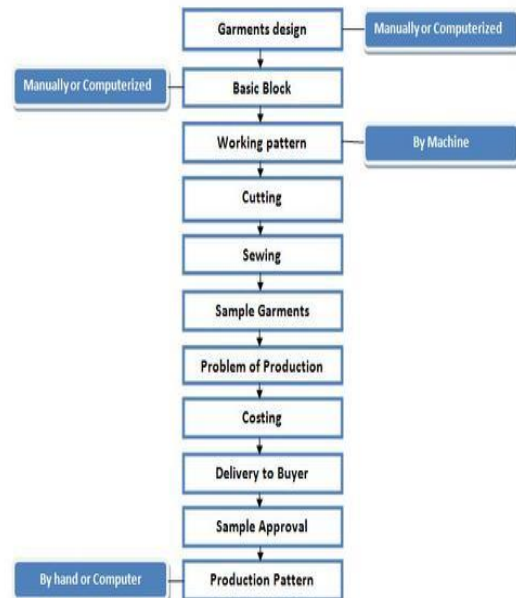


Fig. 1. Financial openness of e-commerce innovation

With the popularity of personal computers and the continuous development and reform of mobile Internet

technology, people ushered in the era of rapid rise in the level of information technology. Internet has the characteristics of large information capacity, efficient information dissemination, high information transparency and convenient information acquisition. After the novel coronavirus pneumonia was controlled, the state resumed the economy in full scale, and there appeared the night markets and streets that allowed vendors to set up stalls. However, stalling in the street is easy to cause mass gathering, and individual personnel did not take safety measures in accordance with the requirements of epidemic prevention, which seriously hindered the progress of epidemic prevention and control. Therefore, using today's big data information network and skillfully combining with Internet technology, we have a long way to go to develop an application that can go beyond the "traditional stall" to effectively solve the problems of insufficient supply of people's needed goods, overstocking of business goods in warehouses, crowd gathering and environmental health caused by "stall economy". These advantages have brought a huge impact on the traditional offline physical commodity trading mode[1]. People prefer the online shopping mode of staying at home and enjoying services. Relying on the surging tide of the Internet, e-commerce appears with the trend. This kind of online trading mode, by connecting the supply and demand sides in the world, makes the commodity trading get rid of the limitation of time and space, increases the span of the market, helps the rational allocation of resources, and thus obtains vigorous development. It has become an indispensable part of China's economic system.

2 RELATED WORK

With the steady development of Internet technology, the scale of the website is larger and larger, the functions are more and more, the visits are higher and higher, and the business logic is more and more complex. The traditional vertical project architecture has been unable to cope with the challenge of high concurrency and high availability. Therefore, we consider extracting the core business between vertical applications and building them into services, In order to better and faster adapt to the changing project requirements, the system is a logical transition to the era of SOA architecture. As shown in Figure 2.

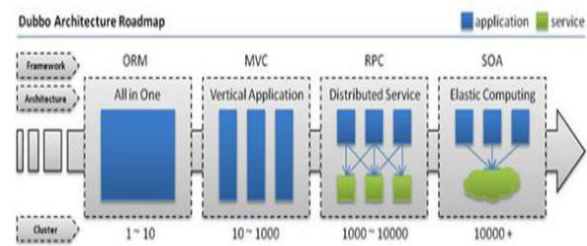


Fig. 2. Dubbo architecture development roadmap

However, with the expansion of the service scale, it is more and more difficult to manually configure and manage the service URL, and the pressure of load balancer is gradually increasing; In addition, the dependency relationship between services is complex, it is difficult to sort out the topology of multiple services, and the proportion of each service is also changing dynamically. It may be that the capacity of the service machine with high call frequency is not enough, but the service with low call frequency takes up most of the machine resources, resulting in low cluster utilization and resource waste, There is an urgent need for a service scheduling center to dynamically evaluate and manage all services. Dubbo is an open source distributed service framework of Alibaba company, which can provide transparent and high-performance RPC remote service invocation scheme and SOA Service governance scheme. Because the SOA architecture system divides the project into presentation layer and service layer, the presentation layer is responsible for processing the interactive data transmission with the front-end page, and the service layer realizes the business logic by calling services[2]. Many scheduling problems such as service consumption and service provision need to be solved between the presentation layer and the data persistence layer to make the system run stably, Dubbo, as a tool of management middle layer, uses RPC remote call mode and communicates through socket, which has high transmission speed; There is a registration center for service registration and search, and the monitoring center for multi-dimensional service call statistics and report generation. The system structure of Dubbo is shown in Figure 3.

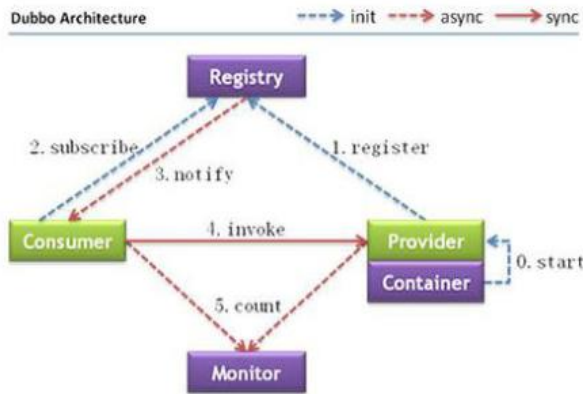


Fig. 3. Dubbo architecture

The system is divided into five parts: register, monitor, container, provider and consumer. First of all, the service provider relies on the service running container to start running. At the same time, the service provider registers with the registry. After the service caller starts, the service provider subscribes to the registry.

$$E(t)\Delta\dot{x}_{k+1}(t) = f(t, x_d(t)) - f(t, x_{k+1}(t)) \quad (1)$$

$$x = f(t, x_d(t)) - f(t, x_{k+1}(t)) \quad (2)$$

3 DATA ANALYSIS

3.1 Project requirement analysis

In order to solve the employment crisis after the epidemic, most parts of China have relaxed the management of "stall economy". According to big data technology, a lot of information found in Baidu shows that search content like "stall skills" has increased dramatically, and its popularity is the highest in recent years. After Premier Li Keqiang's call during his inspection tour in Yantai, Shandong Province from June 1 to 2, 2020, the "stall economy" is developing rapidly. Young people have a high enthusiasm for responding to national policies to set up stalls, so they have a higher acceptance of the application of "cloud stall" and are more willing to participate in the "cloud stall" project.

3.2 Project functional requirements analysis

Combined with big data and Internet technology, "cloud stall" application has set up four roles: user, merchant, city administrator and system administrator. Among them, users have the functions of Browsing Goods and paying; It has the functions of setting up stalls, inputting and modifying commodity information and trading[3]; City managers have the function of

managing offline stalls; The system administrator can manage the whole system and have the maximum authority.

This application can help businesses to set up stalls more conveniently and safely, and it is also convenient for city managers to manage offline stalls, and it also reduces the risk of cross infection when setting up stalls outside during the epidemic period[4]. At the same time, users can also make new friends by chatting with other users or businesses (the positioning system makes the users or businesses they meet are nearby people). It has achieved the goal of promoting urban economic recovery, and is in line with the development of stall economy and epidemic prevention and control measures proposed by Premier Li Keqiang.

3.3 Overall framework design of application system

The system uses three-tier architecture to achieve, the project will be divided into three layers: presentation layer, business logic layer, data access layer. The presentation layer will receive the request from the client and return the request response to the client. The business logic layer deals with the request of the client, and it is also a layer to connect with the database[5]. It processes the function of adding, deleting, modifying and querying with the database. The data access layer is to solve the problems of the system, and finally transfer the results to the client. The overall framework of the "cloud stall" application system is shown in Figure 4.

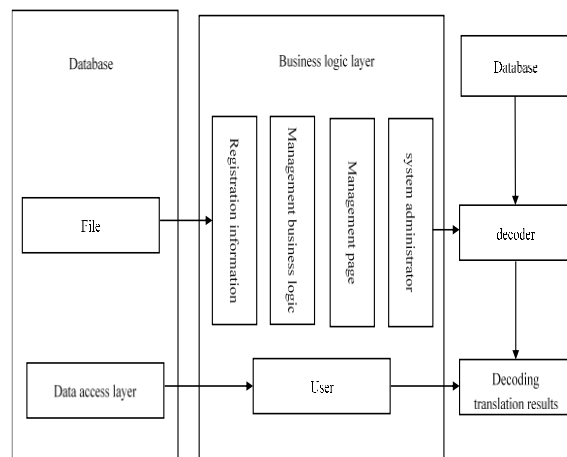


Fig. 4. "Cloud stall" application three tier architecture system

4 EXAMPLE ANALYSIS

If the e-commerce shopping system is treated as a black box, its working principle is a bit similar to the producer consumer model with supervisors. The resources of production are analogous to commodities; E-commerce system is similar to resource container; The producer is similar to the merchant and provides the commodity resources for the system; Compared with ordinary users, consumers consume resources when they buy goods; Compared with administrators, supervisors have the highest authority to manage producers, consumers and commodities. As shown in Figure 5, the cloud booth e-commerce system[6].

Thus, the users of the system include users, businesses and administrators. For users, it should meet the basic functions of user registration, user login, personal information modification and other functions such as commodity search, commodity browsing, shopping cart operation, order operation, payment operation. For businesses, it should meet the basic functions such as business entry, business login, business information modification and other functions such as commodity search, commodity management operation[7]. For administrators, it should meet the user management, business management, commodity search, commodity management, report management and other functions. To sum up, the cloud stall e-commerce system needs to realize the following three modules: user module, business module and administrator module.

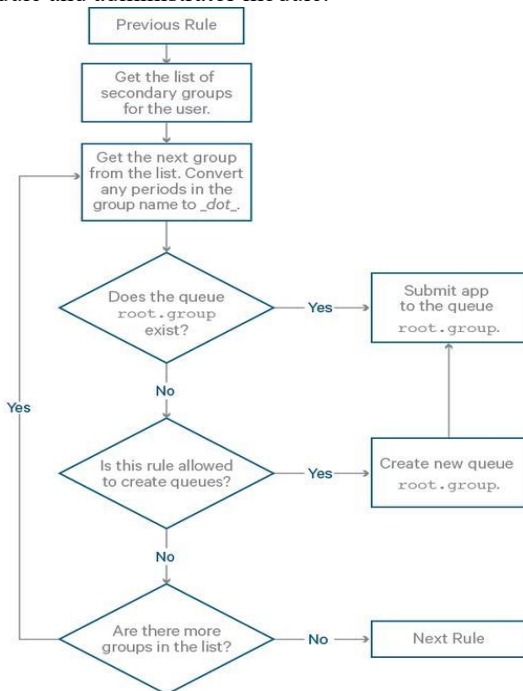


Fig. 5. Cloud booth e-commerce system

4.1 functional requirements of user module

E-commerce website is a platform to meet the needs of buyers and sellers to successfully complete the transaction. As the buyer's user, it is the core user of the whole website, with relatively more functional requirements. The following is a detailed analysis and summary of basic functional requirements and advanced functional requirements[8].

(1) Basic functional requirements module. As a basic function, it should meet the user account registration, login, personal information modification, including password modification, mobile phone number modification, receiving address management, including receiving address increase, receiving address delete, receiving address update, receiving address query[9].

(2) Advanced functional requirements module. As an advanced function, the correct and timely completion of commodity trading task is the most important. Product search, product browsing and shopping cart operation not only provide convenient and accurate shopping guarantee for users to choose products, but also provide strong support for businesses to recommend and sell products. Order operation and payment operation provide safe and reliable transaction guarantee for users to complete commodity purchase.

$$\|\Delta x_{k+1}(t)\| \leq (pk_f + m_2 + m_3) \int_0^t \Delta x_{k+1}(\tau) d\tau + \int_0^t (m_1 \|\Delta u_k(\tau)\| + pd) d\tau \quad (3)$$

$$\|\Delta x_{k+1}(t)\| \leq \int_0^t e^{(pk_f + m_2 + m_3)(t-\tau)} (m_1 \|\Delta u_k(\tau)\| + pd) d\tau \quad (4)$$

4.2 business module function requirements

Business is the provider of transaction resources in the whole system, which plays an important role. For the functional requirements of business module, the system should be divided into business management function and commodity management function[10]. The business management sub module meets the functions of business settlement (store information submission, audit), business login, business information modification, etc. Commodity management sub module meets the commodity search, commodity management (including adding commodities, off shelf commodities, modifying commodity information) and other functions[11].

(1) Business management sub module function requirements. The business management sub module is the key module of the business access system. It should support the filling and submission of business information, so that it can be provided to the administrator for authentication and audit. After passing, the business identity can

log in to the system normally to complete the business settlement; Support the normal login of businesses, and realize the management of the products on the shelves; Support business reset login password and business personal information modification and improvement.

(2) Commodity management sub module function requirements. As the manager of commodities, businesses should be able to query all their commodities through the keywords of commodities, including those that have been approved, those that have not been approved, and those that have been removed, and support the display of commodities by status[12]. Moreover, the query result set can be sorted according to different dimensions, and the commodity search function can be realized through the above two ways, which is convenient for businesses to manage commodities.

After more than a year of pilot, on August 3, the cross platform joint prevention and control system in the field of e-commerce in Beijing was officially launched[13]. The system will collect illegal data from various e-commerce platforms, establish a closed-loop working mechanism, risk data reporting, data processing, data application and data sharing, and transform their respective platforms into the common governance of the whole network, so that serious offenders have nowhere to hide.

Establish and improve the collaborative supervision mode of the network market, build and form a "three in one" network market supervision system framework of diversified governance and coordinated governance with the support of platform self-discipline, government supervision and social supervision, and constantly innovate the pre post monitoring mode of multi data sharing applications, Effectively improve the modernization level, e-commerce management system and governance ability[14-16].

5 CONCLUSION

In the era of big data, we combine "stall economy" with E-commerce Internet. Compared with the traditional mode of stall, the application of "cloud stall" does not require entrepreneurs to invest a lot of money, and there will be no inventory. With the combination of "stall economy" and the Internet, stall owners can not only get enough goods, but also have the credit to operate online. If they also have stalls offline, they can attract more consumers.

In the field of e-commerce service system technology and big data, this paper first designs the overall application framework of "cloud stall" project, and uses the three-tier architecture thinking to design the three-tier architecture of the application system. After that, the

system function modules are designed in detail. Finally, the system function is realized. Follow up research will further improve the entire application, so that "cloud stall" has a broader application prospect.

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