Construction of a campus Q&A platform based on big data and microservice architecture

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Abstract. As an indispensable part of the network education system, the network answering system has become a research hotspot in the computer field. Based on the current campus platform construction, this paper proposes a campus Q&A platform based on big data and microservice architecture. The microservice framework uses Springcloud and its related components, and the big data component is a combination of components using ElasticSearch and Kafka and Storm. The platform has been put into operation for the construction of the majority of college students and has good practicability.

1. Introduction
With the development of education informatization entering the 2.0 era, school informatization construction has also developed from a digital campus to a smart campus, and information technology is increasingly integrated with education and teaching work, promoting the modernization of education[1]. In recent years, with the continuous evolution of software system architecture from monolithic architecture to service-oriented architecture, service-oriented architecture has been widely used in enterprise-level applications due to its flexibility, decoupling, and standardization[2]. For campus informatization construction, the demand for information acquisition and answering questions runs through students' study and life. Researching the use of big data technology and micro-service architecture to build a question answering platform has practical value and significance, which is conducive to the construction of college campus informatization. At present, all colleges and universities have arranged a Q&A session during the teaching process. The main task is to answer the questions encountered by the students in the study, so as to timely solve the concepts and concepts that the students have not understood and mastered in the classroom teaching and after-class exercises. Methodological issues, thereby shortening learning time and improving teaching efficiency[3]. The campus Q&A platform based on big data technology and micro-service architecture can achieve the goal of accurately assisting the informatization construction of college campuses through the system’s automatic answering, real-time push of hot concerns and personalized content recommendation[4]. The platform is being operated at Sichuan Agricultural University. On the one hand, it can solve the troubles of complicated questions in the management process and improve management efficiency and accuracy. On the other hand, it is a major innovation in response to the call of the national university informatization construction. Taking the lead in realizing the informatization and intelligence of answering questions is bound to make the school stand out in the informatization reform and set a benchmark for the informatization reform of colleges and universities. At the same time, real-time
calculations based on big data technology and accurate and intelligent answering have good adaptability and scalability, and can be promoted in major universities.

2. Microservice architecture

2.1. Concept
Microservice architecture is a new technology for deploying applications and services in the cloud. The basic idea of microservices is to consider creating applications around business domain components that can be independently developed, managed, and accelerated. The use of microservice cloud architecture and platforms in dispersed components makes deployment, management, and service function delivery easier. Microservices are born on the basis of the rapid development of virtualization technology and DevOps culture under the background that the traditional single architecture cannot adapt to the rapidly changing IT architecture. Its main function is to split the single application system into multiple independent applications. These micro and small services are all running in separate processes, and the services are coordinated through RESTful API. Each micro and small service revolves around a certain item or a certain degree of coupling in the system. High business functions are built, and each micro and small service maintains its own data storage, business development, automated testing, and independent deployment mechanism[5][6].

In this article, the microservice framework built uses SpringCloud and its related components. Spring Cloud is an ordered collection of a series of frameworks. It uses the development convenience of springboot to cleverly simplify the development of distributed system infrastructure, such as service discovery registration, configuration center, message bus, load balancing, disconnection, data monitoring [7]. Spring Cloud does not repeat the manufacturing of wheels. It just combines the relatively mature and practical service frameworks developed by various companies, and uses Spring Boot style to repackage and shield the complex configuration and implementation principles. This is also a microcore realization of service architecture[8].

2.2. Architecture
The core of the architecture is to decompose application functionality into multiple instances of a set of services. In this article, three different angles of X-axis, Y-axis and Z-axis are used to build the structure.

The X axis refers to the load balancing of requests among multiple connected instances. Run multiple instances of the application after the load balancer. The load balancer distributes requests among N identical instances, which is a good way to improve the throughput and availability of the application. The specific working principle is shown in Figure 1.

Fig.1 Microservice load balancing architecture diagram

Unlike the X axis, the Z axis is determined according to a certain condition in the request. In the following example, each application is responsible for a part of id users. For applications that need to deal with increased transaction and data volume, Z-axis expansion is a good way to expand. The specific working principle is shown in Figure 2.
The Y-axis divides the application into services based on function. X-axis and Z-axis expansion effectively improve the throughput and usability of the application. However, these two methods have not solved the increasing development problems and application complexity, so Y-axis expansion is required. The specific working principle is shown in Figure 3.

3. Big data components
The platform first stores the data set through elasticsearch, then uses storm and kafka to clean the data set, and then obtains various indicators related to the business scenario, and finally performs batch processing and statistical query on the data of various indicators[9].

Elasticsearch is a Lucene-based search server, which provides a full-text search engine with distributed multi-user capabilities. It is developed in the Java language and released as an open source under the terms of the Apache license. It is a popular enterprise search engine. Its advantage is that it can search in time, is stable, reliable, fast, and easy to install and use.

Kafka is a high-throughput distributed publish-and-subscribe messaging system that can process all the action flow data of consumers on the website. These data are usually resolved by processing logs and log aggregation due to throughput requirements. The Storm real-time computing system can easily write and expand complex real-time calculations in a computer cluster, reducing the complexity of real-time processing. Storm is often used in real-time analysis, online machine learning, continuous computing, distributed remote calls, and ETL.

The framework of the entire system is shown in Figure 4.
4. Conclusion

In recent years, the Internet has developed faster and faster, and the management of colleges and universities has gradually changed from offline management to the management of the education system. The construction of the campus Q&A platform can not only effectively solve the students’ confusion, but also reduce human and financial resources, and efficiently improve the rational use of school resources. The campus platform in this article has been put into the application of schools, has achieved good results, and has good prospects.

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