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METHODS OF CONNECTING SERVICES AND ENSURING LOAD BALANCING IN MICROSERVICE SYSTEMS

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Abstract

With the emergence and development of new software architectures such as microservices, how to effectively handle the service load and ensure the service capability of the system has become an urgent problem to be solved. Load balancing technology needs to achieve high availability of microservices without affecting the delayed response of requests. According to different principles of adoption, mainstream load balancing technologies have emerged, such as polling methods, hash algorithms, and artificial intelligence technologies.

Keywords: Load balancing, method, microservice, connecting.

INTRODUCTION

In recent years, the new generation of information technology, represented by big data and cloud computing, has triggered a new wave of scientific and technological revolution and industrial transformation. The demands of emerging industries and the new model of sharing economy have brought new challenges and requirements to the evolution of software architecture. Software system architecture is an abstract description of the overall structure and construction of software. It is the sketch of software system and the basis of building computer software practice. Typical architecture models include Monolithic Architecture, Distributed Architecture, and Service-Oriented Architecture(SOA), etc. Among them, Microservices, Middleground, and Cloud Native have become popular new development trends in the current software system architecture field.

MATERIALS AND METHODS

Currently, microservice architecture mainly includes service registration and discovery, service monitoring, service communication, load balancing, elastic scaling, fault-tolerant mechanism, configuration center and other microservice

governance technologies[2]. The microservice architecture can be simplified as shown in Figure 1 below:

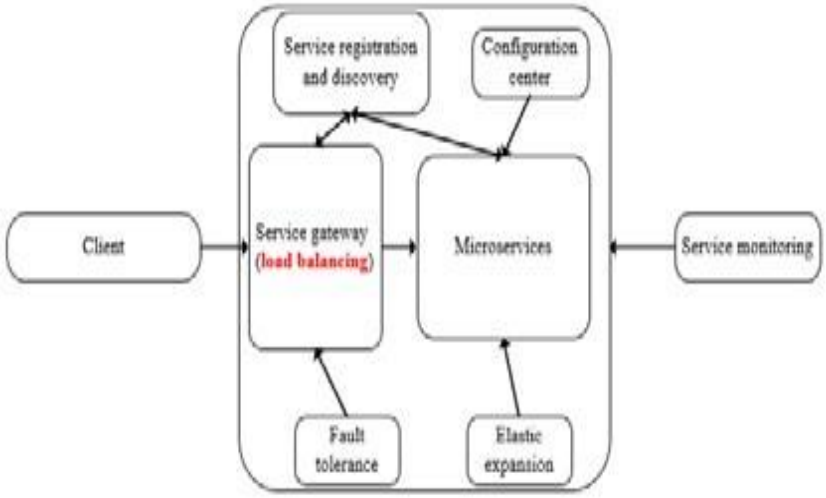

Fig. 1. Mainstream architecture of microservices.

Load balancing refers to the uniform forwarding of user's access requirements to the back-end service carrier through a certain strategy. Under the microservice architecture, cluster scheduling and the granularity of expansion is reduced to the level of microservice instances, and the microservice governance technologies such as service communication and invocation are facing greater challenges. Through the load balancing technology for microservice architecture, it can effectively reduce the request delay, make the system have higher availability, and effectively improve the service ability and resource utilization ofthe system.

RESULTS AND DISCUSSION

The advantages of the polling method are its simple and efficient technical principle, while the disadvantages are that the network load and link call problems existing in the microservice framework are not considered, which will lead to uneven load of servers and work nodes.

Table 1. Mainstream load balancing method for microservice architecture.

Algorithm name	Classifications	Advantages	Shortcomings
Polling Method	Static State	It has the advantages of balance, high efficiency,simple implementation and easy horizontal expansion.	Without considering the performance and resource problems of the server, the overall performance of the cluster will be affected by the server with poor performance.
Random Method	Static State	It is efficient, simple to implement, easy to expand horizontally, andthe more the number of requests, the closer to the even distribution.	Without considering the performance and resource problems of the server, the overall performance of the cluster will be affected by the poor performance of the server.
Source Address Hashing Method	Static State	The implementation is simple, and the same IPaddress can ensure that requests are sent to the same server.	The overall performance will be affected when the number ofservers changes.
Consistent Hash Method	Static State	It has fault tolerance andis easy to expand horizontally.	In the case of small cluster, uneven server mapping maylead to load imbalance.
Weighted Polling Method	Static State	Taking the performanceof the server into consideration, the efficiency of the cluster is optimized.	The production environment iscomplex and changeable, and the server performance cannotbe dynamically adjusted after being statically set.
Minimum Connection Number Method	Dynamic	It can be dynamically adjusted according to the real-time connection of the server.	The complexity is increased,and the disconnection and connection of each request need to be counted.
Fastest Response Method	Dynamic	It can be dynamicallyadjusted according to the server's real-timeresponse speed.	The complexity is increased, and the response speed needs tobe calculated.

In order to solve the above problems, domestic researchers have improved and summarized it. By collecting the request load perceived by the microservice chain, Analyze the requested microservice invocation chain, and the load analysis model is constructed by using the relationship of microservice invocation chain. Then, the cost function is designed to traverse all service invocation combinations, and select the optimal path with the shortest time required, and carry out load balancing scheduling in turn, which effectively reduces the average delay of requests and significantly improves the availability of services[3].

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CONCLUSION

Microservice is a new development trend in the field of software system architecture. Load balancing is an important content of microservice architecture technology, which determines the service performance and resource utilization of the whole system. This paper classifies the load balancing methods for microservice architecture at first, describes the basic principles and advantages and disadvantages of mainstream load balancing technologies, and finally introduces the load balancing mechanism strategies of Kubernetes and spring cloud framework, which have absolute market share.

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