

University Information Design based on SOA Architecture

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Abstract

With the rapid change of the Internet business environment, we urgently need a new architecture to dynamically adapt to the rapid development of the business environment. The birth of a large number of information systems indicates that the problem of low level of information in the past no longer exists, and the new problem lies in the lack of unified planning of information and the redundancy of a large number of data generated by the information system. As the data of the same aspect exist in different systems, the data presents a state of fragmentation, and the connection between the data becomes difficult, and the system is very messy. This paper analyzes the SOA architecture from the existing problems, and then takes the university information system based on SOA architecture as an example to provide some ideas for information construction.

Keywords

SOA architecture; Service science; SOL.

1. Introduction

With the rapid change of business environment, many problems have been exposed in the process of enterprise informatization. There are too many information systems, which lead to the wide distribution of information islands and data redundancy. The multifarious data of various departments and inconsistent information make it difficult to integrate data, and also bring difficulties to cross-Internet business operations. In addition, heterogeneous technologies in information systems and rapidly changing business models make IT difficult for less flexible IT facilities to adapt. The previous information systems were designed to be used locally in a small range, while the current systems should be completed in the distributed design mode on the Internet platform, which requires the global distribution of data, users and platform systems together, and can be organized in a large range and cooperate with each other. The emergence of SOA is the answer to the above questions. The initial concept of SOA architecture technology theory is to sort out the complex IT system with "service" as the software structure unit in a service-oriented way. SOA architecture is a service-oriented architecture. Unlike previous component-based software architecture styles, SOA is not just implemented at the implementation or design stage, but is incorporated into the concept of SOA at the system design modeling stage. SOA mainly plays the role of a large-scale integration of Internet resources, integrating the discrete systems of different departments, different enterprises and even cross-industries into the same system.

2. Principles of architecture theory

2.1. Basic characteristics and necessity of SOA

SOA is called Service-Oriented Architecture. The positioning of SOA is an architecture, in which the typical representative of Services is Web Services. The typical characteristics include software encapsulation, component, loose coupling, dynamic binding, open standard protocol and so on. The open standards protocol means that as long as it meets the standards, it can be

added to the architecture, which shows that SOA also conforms to the coarse-grained design philosophy of the software engineering discipline.

The necessity of SOA lies first in the problem of enterprise informatization. Newly developed businesses need distributed operation across networks, but it is difficult for information systems in the past to cooperate due to data and technology. However, it is very difficult to design a new coordinated IT system from a blank sheet of paper to adapt to business changes. From the point of view of the integration capability of SOA, SOA is a good solution to this problem. The integration ability of SOA technology is mainly reflected in the development. The technology driving of SOA can shield the heterogeneity between different systems, different component technologies and different components, and then carry out a high degree of integration and extraction, and extract the commonness between scattered information systems. Such a common refinement is to rewrap the technology as a whole in a larger black box, providing an interface to the outside world with "services" as the wrapping unit, forming a new service-oriented architecture that will be more reusable. The business integration capability of SOA mainly reflects the corresponding agility of the business. Driven by SOA, IT changes can be quickly responded to, and systems are interconnected and collaborative.

2.2. SOA architecture design method

Architectural design needs to follow SOA design principles. First of all, it must correspond to business processes, and SOA will be meaningless if it is not service-centric. Modularity can be viewed from two perspectives. First, a service in an SOA can be viewed as a loosely coupled component, but it needs to be dynamically federated internally through standardization with well-connected interfaces. Secondly, services in SOA can be seen as a business logic, which is broader than the concept of functions. Services are not only functions, but are reflected in all levels of the business. The "service" must be an integral part of the business link. If it is a single component at other levels, it can't be called a service. Third, when extracting the scope of service, it is necessary to expand the scope of abstraction, determine the scope coarsely and reduce details to maintain flexibility. Service boundaries are determined based on business processes, and a componentized approach is adopted for the implementation of each business process.

2.2.1 SOA methodology.

SOA is not isolated with the original methodology part. It is actually an integrated development in the current methodology. The implement of SOA at the application level still have to depend on the functions and objects, but its characteristic part of enterprise architecture is the architecture level must be aligned with the business. This analogy puts more emphasis on business process analysis. SOA methodology includes service-oriented analysis and design, service-oriented development process, SOA maturity analysis and SOA governance. SOA concepts need to be implemented throughout the development process, such as the need to analyze the maturity between the existing system and the target system. SOA governance is about ensuring the integration of SOA design concepts throughout the process, rather than emphasizing SOA only during the design phase and ignoring it during the development phase.

2.2.2 SOA service modeling architecture

Service-oriented Modeling and Architecture (SOMA) in the SOA solution development approach is an input-output approach. SOMA has three steps: one is service identification, which extracts desired IT system services from business functional domains, processes, objectives, and existing systems. The second is service specification, which determines which of the candidate services can be retained. Third, service realization decision, service technology feasibility analysis and so on. These three steps are cyclic, and each stage may iterate.

2.2.3 SOI Integration Mode

Service Oriented Integration (SOI) is a part of SOA and is responsible for Integration. SOI needs to solve non-technical problems, such as how to solve cross-department, cross-organization, cross-industry collaboration.

3. Design of university information system based on SOI

3.1. SOI application architecture Mode

From the perspective of process, the parallel process model should be adopted in the business model of colleges and universities. Its advantage lies in the sequential execution of a series of business processes, and can effectively coordinate the work of different departments and different organizations. This is designed to reduce process processing time without the need to consolidate results after they have been returned by multiple service providers, instead handing them directly to the service provider.

From the perspective of data, there are a lot of business data in universities, and different data have different access rights. Therefore, the data centralization model should be used in business processes where data flows less frequently. The reason lies in the teaching and daily operation of colleges and universities with a lot of common data. The data will be used more flexibly and more responsive across departments, and the data will be secured by temporary databases in a centralized schema. One disadvantage is that the large amount of data in universities may overload the central database, so it is suitable for designing some small organizations. For frequently accessed businesses, such as the academic affairs office, the data federation model is better. This is because the data federation mode can reduce the number of data replication and supports multiple users to simultaneously read and write data.

3.2. SOI operating architecture mode

The operation architecture mode is ESB Gateway mode. Gateway endpoints are able to control access, which is a good way to avoid access by unauthorized users. In addition, for a certain business of the university, the endpoint of the Gateway can divide the business level.

3.3. SOI design mode

3.3.1 Message channel mode

The message channel pattern can choose either publish-subscribe pattern or message bus pattern. For businesses that need to broadcast a large number of messages but do very little, the publish-subscribe model can be used. For example, exam notice, holiday notice and so on. For the frequent information interaction, the message bus mode for services is better. The message bus pattern is a composite pattern capable of complex information operations.

3.3.2 Message creation mode

This kind of design needs to refer to the communication principle of computer network, because the normal communication between data has many protocols to follow. Some patterns are common, such as store-and-forward mechanisms that need to be subordinate to all message channels to ensure information integrity. Different communication modes should be designed for different departments. Examples include the Push and Pull models in event messages. The Push model sends both document and event messages. The Pull model sends only event messages and document messages if there is an instruction request.

3.3.3 Message routing mode

When a large business requires a division of tasks, the composite routing pattern can be used. The combined routing pattern can decompose a message and then classify it into a complete message. For situations where more than one person is working on a task, the distribution aggregator pattern can be used. This pattern collects all the solutions for a task and performs a preferred algorithm.

4. Summary

This paper introduces the basic principles of SOA architecture, and expounds the characteristics and basic methods of SOA. Then from the angle of service-oriented integration, the architecture scheme of university information construction is put forward, and the design of each level is described.

References

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