Communications Solutions for Heterogeneous Systems Based on SOA

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Abstract

In order to address the gaps which widely used in business application architecture and problems of heterogeneous system communication, this paper provides a standardized framework of SOA, built in the application of a loose coupling between systems "server + proxy" data exchange platform, to achieve heterogeneous data exchange and data sharing, and developed a business based on Web services platform, making full use of the Web service, which makes the system has good scalability and maintainability, to solve the problem of heterogeneous system communication and widely used to make up for the current architecture lack of business applications.

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1. Introduction

With the rapid development of information technology, the industries have large number of applications, and the frequent exchanges between the various application systems, with increasingly urgent data exchange needs. Resource integration is based on the certain needs, relatively independent data objects of each resource system, function structures and their interactions were fusion, clustering and reorganized, renew as a new organic entity, forming a better performance and more efficient resource system. Resource integration including two levels of source integration and data integration, the source integration is for the database entry, according to the principle of indexing the various categories to provide a unified database to retrieve the user entry, or platform integration[1]; data Integration is the D2D integration, that is distributed heterogeneous data sources to achieve a unified multi-access, form a complete, unified view of data, with real-time and intelligence to pass the valuable data to the analysis system or other applications for further processing of information.

Data modeling is the basis for data integration, data identified according to the requirements of business processes, to establish a complete information model, the original application in the progressive use of standardized data platform, based on the application of the new system providing a unified data
exchange platform (DEP). The logical data model must be unified, can be physically distributed memory. Data exchange platform is an integrated service platform, the system can meet all kinds of data exchange and sharing of needs, and can solve the data sharing between applications and integration issues to address many applications in the federal model (an application between the loosely coupled model) of information islands, provide global data for the application view, global view of data rights and improve the data exchange services. Most of the current domestic and international data exchange systems are generally designed in accordance with its own standard, did not adopt a common technology and architecture standards and poor interoperability. The development of these data exchange systems are commonly used as components, modular software development methods, system, the coupling between modules is very high, the data exchange system more difficult to maintain and modify, higher maintenance costs [2]. To solve these problems, through studying the data exchange system architecture design and system implementation, proposed SOA-based communications solutions for heterogeneous systems to solve the DEP construction and implementation process of the general is poor, the relatively higher implementation complexity problem.

2. Soa model based on web services

In 2001, IBM corporation proposed a SOA model, clearly describes the Web Service architecture, the interaction between the various roles, shown in Figure 1. SOA architecture has three kinds of components of the role totally: Service provider, publish their own services and to use their services to respond to the request; Service broker (intermediary services), registration has been issued by Service provider, its classification and to provide search services; Service requestor (service requester), through Service broker to find the services they need, then use the service.

![Fig.1 SOA system architecture](image)

Between the Web Service's role using three kinds of operations: publish (release), so that for Service broker Service provider can register their capabilities and access interface; find, so Service requestor through Service broker to find specific types of services; bind, so that Service requestor can really use the Service provider to provide services.

3. DEP architecture based on SOA

SOA is used for information integration, is because it has a standardized, operational, can be assembled features. SOA provides a common, interoperable and flexible industry-standard architecture, the software infrastructure can support the business model to establish a series of reusable services, these services are provided by different application systems components, can business processes to adapt to changing needs. To improve the DEP's versatility, satisfy the system pairs of loosely coupled and based on uniform technical standards requirements, the level design, using the SOA level dividing thought, the whole system is divided into 6 levels (service level, Zujian layer, business services bus layer, business process layer, service quality level and safety management) and 8 core modules (news module, data
transfer module, the service control module, data storage modules, data storage and verification module permissions, service registration and query modules, as authentication and session management module, error handling and logging modules).

In the specific implementation process, DEP uses loosely coupled "server + agent" architecture, using SOA's core technologies (such as JMS, Web Services, ESB, etc.) were realized DEP news services, data transmission services, the main functions of the core components. Unified message service control data exchange process in complex control information exchange; unified data transmission services to address the data exchange process in a variety of data efficiently and accurately transfer[3]; message protocol and data exchange protocol standards do not address the issue of reunification and achieve the data exchange system versatility.

DEP as a distributed open network system was composed of a DEP service and several applications of DEP agent, applications of the various data exchange with DEP acting as interface, with the DEP message and data exchange services to achieve information exchange. DEP service is the core management center of DEP in the middle of all the information channels. DEP service main function is to all applications for data exchange system to provide data exchange services, including information services, exchange of data upload / download service, the exchange of data authority services, the exchange of data subscription services. DEP agents achieve the interaction between DEP and the application system, the main function is to capture application data exchange event, according to DEP's data transmission standard for the exchange of data, news and DEP through interactive services, control the right to exchange data transmission, to ensure the correct complete the data exchange process. DEP agents can be used as a component integrated in the application logic within the system can also be articulated as an independent entity outside the system in the application.

4. Heterogeneous communication platform design

One travelling site in order to in a different area, using different hardware and software platform for travel agencies, hotels and transportation departments to establish between the unified data platform, to achieve its book hotel, pre-sale tickets, tour smart business strategy, need to build a cross-boundary, cross-platform, extensible e-commerce system. During system design and architecture, select the Web Service for SOA-based model to address the heterogeneous system interconnect, low-cost, highly scalable demand business problems.

4.1. System architecture

System platform running on multiple distributed servers around the country, from the structure and function can be divided into: travel portal, Web Service application services, systems data services, UDDI, data services, travel agency, hotel data services, data services shipping station, internet banking settlement services, in different parts of each type of service by type of servers on different platforms[4].

The main part of the system and the focus in the tourism portal and Web Service application services, tourism portal for the user's request accordingly, and data services are all from the Web Service applications. Cooperation with travel travel agencies, hotels and transportation units to use Web Service published interfaces to communicate, according to the principles of the business data nearest to the travel network data server in the cluster, the data involved clearing settlement by the Tourism Network Gateway uniform settlement, temporary data is stored locally. This system architecture is a distributed computing architecture, is a typical multi-layer structure: the user interface layer is a travel portal, mainly to draw the interface and the end-user interaction, in the application are some of the pages and aspx page related code; business logic encapsulated business logic and rules and call the Web Service provides all the server services, responsible for providing a response to user requests and communication with
partners for co-operation with a unified data access mode, the heterogeneous systems provide services support, which is encapsulated in the application process for the. NET components; Web services proxy call every web service to produce agent class and object; data access layer mainly achieved bottom interaction with the database, in projects all Web applications are the underlying data manipulation operations using the same set of code to achieve the purpose of reuse[5]; physical data layer consists of clusters and distributed database services, cooperation in various units of the database component, using abstract data access interface, good use of the class data resources. UDDI service for the system to all Web services publishing and discovery for all partners in the system to achieve better co-operation between.

4.2. System portal

System Portal is the core of the entire system, the system releases the department Web Service interface has been integrated here, and then displayed in the user's eyes. Travel portal design pattern with a typical 3-tier model design, that the presentation layer, business logic, data access layer (local data access layer for the data interface, remote data calls for the SOAP interface layer).

- **Presentation Layer**: Presentation layer is the user interface directly to see the Web page, the user is dealing directly with the system places. System, all pages are basically a new generation of Web Forms using Microsoft technology to build this technology with traditional ASP, JSP technologies, its benefits can easily see the front page the user code and the background to achieve phase separation, which very easy to be separated from the presentation layer and business logic.

- **Business Logic Layer**: Middle business logic tier package is the business logic and rules. System functionality and access the logical order in this way had a very detailed definition. By calling the data access layer logic, or SOAP interface level production function object types defined functional entity reference.

- **Data Access Layer**: To avoid cumbersome to establish a database connection, close the database connection and other operations, and to maximize code reuse, in MS. NET environment, the preparation of this layer logic code, the system in other business sectors are local low-level data manipulation code to use this data layer.

- **SOAP Interface Layer**: On the Web Service server and opening up access to Web services, XML-based objects through a simple protocol SOAP (simple object access protocol), in the Web to exchange structured information and type information. In addition, client-server on the local Web Service proxy class generated by defining the object use Web server functionality[6].

4.3. Support information services and client

Including travel agents, hotels, shipping Web Service service stations, mainly exists as a provider of information, these parts Web Service's basically was the same design. To the station as an example, Web Service server provide query interface for train time service, while providing reservation services interface to accept orders from the portal, while booking the results back to the Web Service caller, which in effect form a portal kind of dynamic B2B e-commerce model.

Collaboration portal provides the travel agency to join the Web Service interfaces, joined after the travel agency can submit their companies tourist routes and other information, and in order to facilitate travel companies develop their own itineraries, client calls the information service center for Web Service query interface can be directly check the weather, accommodation, transportation and other information.
4.4. System features

This system reflects the large-scale, large commercial Web Service application in many new features:

- **Simplicity.** It is simple in concept, the process of deployment and operation of it is simple. The surface, the system looks to complete the deployment process is quite complicated, mainly because the system more and more involved in the business sector, the practical application of a single server deployment or enterprise sector's relatively simple. Because the system is connected with the HTTP protocol, XML messages are free to pass through the firewall, do not need to re-configure the firewall.

- **Integrity of Encapsulation.** From the perspective of external users, Web services are a component deployed on the Web, with the object of a good encapsulation of users, and only can see the system in the enterprise sector Web Service object list of features available.

- **Loosely Coupled.** As long as this system in the Web services exposed to all the call interface of the same, but when a change in its implementation when the caller is not find its changes, Web services, to achieve the Renhe change for both pairs of Ta Men transparent.

- **Cross-platform, Cross-language Integration.** As the Web Service is based on a number of agreements and open (HTTP, SOAP, WSDL, UDDI, WSFL) based on, can do cross-system, cross-platform integration between applications.

- **Easy Scalability.** This model is dynamic, the integration between applications, it has a real-time assembly capacity, so has good scalability. The system UDDI registry for the system provides a good scalability[7].

5. Conclusion

Practice shows that the use of JMS, Web Services, ESB, XML and other SOA core technology of DEP is simple, flexible, open and extensible, etc, can effectively realize heterogeneous data exchange and data sharing. The DEP now realize the main background Relational databases are used for applications to non-relational database systems such as Lotus Development based office automation system, the system can not directly exchange data needs to go through a Web Services architecture to achieve.

References


