# Analysis and Realization of Eliminate the "Information Isolated Island" in Enterprise E-commerce

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**Abstract.** With the global e-commerce enterprises towards change in the mode of operation, the interior and exterior information of a enterprise linking gradually close, and even together. This kind of change is profoundly affecting the traditional enterprise information system. Base on the analysis of the status quo of the enterprise information system, this paper propose a solution for the effective elimination the "information isolated island". This paper also reviews the Enterprise Apply Integrates (EAI) nowadays situation in the China's petrochemical industry, elaborates an idea of based on the structure of Service Oriented Architecture (SOA) to realized the system platform for EAI, and gives some technical principles and matters needing attention to when using the SOA technology to conformity the enterprise information system.

## Introduction

E-commerce is a new trade way that backing modern information and networking technology. It collected the finance computerization, the management information, the business information network into a body, and aimed at achieving logistics, capital and information flows in harmony. Using the E-commerce can enhance the enterprise economic efficiency greatly. The research indicated that, the enterprise realizes the information to be possible to increase 10%-20% incomes, reduce 20%-45% cost, and reduce 20%-60% capital investment. And at the same time, the enterprise can also obtain an equality competition opportunity with the domestic or foreign big enterprise.

In China, along with the enterprise information thorough popularization, more and more enterprises have established their own E-commerce. But because of these information systems are designed and developed independent by the different enterprise or by the different unit of an big enterprise, so they have formed the "information isolated island". It means these information systems sometimes cannot share business process and information between the enterprise application systems, also can't effective coordination and be not able to make the fast response effectively to the outside world quickly change. Moreover, there are lots of overlapping functions in these "the information isolated island" inevitably, it not only created the massive nonessential repetition work, but also create very big waste to the enterprise by used in the scarce resources solving many identical questions. Therefore, it's necessary to make the enterprise application system integration. That is making business processes, application software, hardware and standards together, achieving to a seamless connection between two or more enterprises applications, and enable them to conduct business as a whole as handling and information sharing, thereby eliminating the 'information isolated island'.

## Analysis of Elimination the 'Information Isolated Island'

Make the enterprise information integration is a complex and comprehensive process. It needs to integrate the enterprise existing construction achievement, like existing information system, website, application management system and so on. More importantly, the enterprise information integration needs to establish a framework to make a uniform norms and standards, and to guide the planning and

building of enterprise information. Now, there are several method to solve this kind of question, the usual practice includes:

In the web of system performance (Fig.1) the:

**Point-to-point links integration method**

This method only focuses on intercommunication between the passing system and the other system. It does not have the system rationality and the extendibility, and so this kind of integration does not use any special EAI technology, only using the hard code to realize the point-to-point connection between two systems. In this way, in some specific cases (such as some small-scale integration systems) may be received relatively high performance, because all are custom-made for the specific cases. But for slightly larger-scale integration, the shortcomings of this way will be revealed beyond doubt, such as the code quantity will be big, unreliable, unable to maintain and so on. Because of this kind of development work has the high linearization characteristic, and each of these steps is dependent on the completion of the last step, and can not be interrupted relaxed or be divided into a number of independent tasks performed by the distributed resources scattered.

**Hub- spoke integration method**

This way provides an application integration center (hub), and this center has own connection protocol, all of system needing to integrate (spoke) connect with this center. Users need only consider the system and the integrated center achieving point-to-point link and transform, and among n system need n*(n-1)/2 point-to-point links originally reduce to n links now.

The integrated center can complete the link with each other system and the corresponding transformation in the use of adapter. This way makes it possible to focus on management and process integration. In addition, the architecture of this way appears to central resources center (Repository). The resources center provides some convenience for users to design, development, deployment and maintenance management EAI system.

However, this way also has its limitation. Although this kind of platform has avoided the massive procedure code work, it essentially still will be scattered and has custom-made the development. The structure integrated easy to create the efficiency bottleneck, etc.

**Enterprise service bus (ESB) integration method**

This kind of architecture inherited the idea of hub--spoke architecture to changes various systems linked as point-to-point into various systems linked to a central system. But in this architecture, the integrated center is expanded into a bus that can distribute in many physical nodes, and effective solution to the question of efficiency and a single point of failure that in hub--spoke architecture.

ESB is similar with the PC bus that can realize computer hardware communications between the various functional components. It can help the enterprise to realize EAI and enormously reduces the cost of enterprise interior information sharing by moving the service, the information and the alternation based on event which in heterogeneous environment to the bus and link points.

There are business process manages (BPM) and trade activity monitors (BAM) module realized in the ESB. ESB is just a communication module to transfer enterprise service based on the information. Its function is provides a framework and a simple method for enterprise's SOA service transfer.

**Service oriented architecture type integration method**

Service Oriented Architecture (SOA) is the most advanced architecture in EAI application now. In the system based on SOA framework, application programming has been divided into a number of loosely coupled and coarse-grained distributed application components (also known as the service). And these services link each other through the definition of a good, unified interface and contractual ties, so that components can use a unified and a common method to interactive among the various systems.

Using SOA can cause the enterprise network turn to a big software development environment. This not only greatly enhances the code reuse rate, but also can integrate with business as a link service or repeatable tasks, and to realize the enterprise information system management, the application rapid reaction and the integrated operation. The application integrative system based on SOA will be better expansibility and flexibility. Users can develop and use of a new business modules (service) or revisions

of the existing modules under minimizing the impact on old systems, in order to meet business demands rapidly. So we can say it will be a tendency that accomplish an enterprise application integration information system based on the SOA technology and eliminates the "information isolated island" in the enterprise E-commerce.

**Analysis of the SOA Model**

SOA (Service Oriented Architecture) is a kind of system framework facing to the enterprise service. It is a component module of designs, development, application and management disperser logic (service) unit under the network environment. It is also a "methodology" that organization, construction IT foundation structure and service function. SOA is not one kind of brand-new technology; CORBA and DCOM module is its predecessor.

After using SOA, superintendents can facilitate management these enterprise application that builds in service platform, but not management signals application module anymore. Its principle is, SOA can make the manager of the company to get the data of when, what and which business logic carried out easily through analysis the service between mutual transfers, this will help the enterprise managerial personnel or application architect iterative optimization of business processes and application systems.

Fig. 1 is a layered model of SOA has been widely recognized. In left side of the layered model, each level represents the function structure of SOA. And in right side of the layered model is some auxiliary functions that provides for the all SOA system.
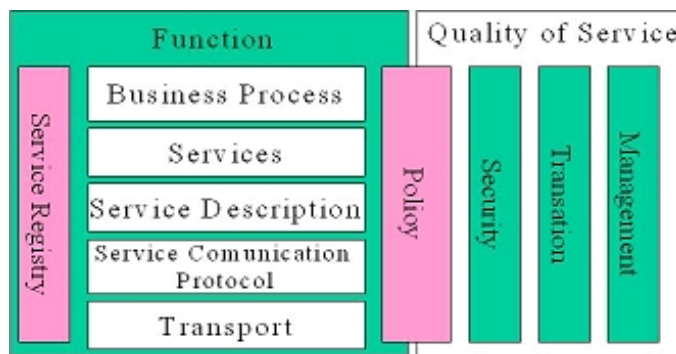


Fig. 1    Layered Model of SOA

Transport layer's task is transmitting the request that comes from the service users to service provider, and transmit the service provider response to the service user. Implementing Transport Protocol can shield the lack of communication sub-network that differences in technology and design and quality of service inadequate, providing standards and improve communications services with higher layer of the SOA.

Service Communication Protocol is one kind of consultative system that services mutual comply. Through this system, the service providers and service users can take communicate for the content, which will be requested or returned to.

Service Description is the service description layer of SOA. It is a standard mode, using in describing what is the service, how to transfer the service and what kind data needed for transfer the service successfully.

In SOA, the layer of Service is some of the application programming function that packaged business processes into reusable components. It is software entity that realizing service interface and can use any language for its development.

Business Process is the business process layer of SOA. The Business Process is a set of services, in accordance with the specific sequence and the use of a particular procedure call for meet business requirements. Business process itself can be seen as services so that it can be composed of different granularity of services.

Service Registry is a registered service layer of SOA. This service registration system is a repository of the services and data description, its purpose is to enable service providers to publish their services through the service registry center and service users can find or identify the services available through the service registry center. And it achieved a number of standards to enable enterprises to be able to register their Web services and to allow the other enterprises users to access and visits to it. It make a lot of server that provide the registration service to compose a physical distribution logic centralism colony, the users can publish their web service to all over the world as soon as they register one time, and these information will become the object be discovered later.

## REALIZATION OF ELIMINATION "INFORMATION ISOLATED ISLAND" BASED ON SOA

Let's take the large state enterprises - Henan Oilfield Branch of the China Petrochemical Co. Ltd. as the example, explains the process of elimination the "information isolated island" based on the SOA.

For a long time, Henan Oilfield attaches great importance to the construction and application of information systems. Especially in recent years, network infrastructure and information systems building is beginning to take shape, it coverage of the production, operation, management and other business links, and it already becomes an information platform serving for the all China's petrochemical enterprises. Information technology has been melting into exploration and development, research and production, operation and management and various departments of Henan Oilfield. Use of information technology to upgrade traditional industries, and enhance overall strength of Henan Oilfield has played an increasingly prominent role.

However, as a result of the Henan Oilfield information system disperser and isomerism characteristic, the massive business data widely distributed in the various business agency mutually independent information systems, thus result the data type and structure complex. There are not only management data by database structured, but also massively by the non-structurized document way management data, documents reported, graph form, digital photography, multimedia documents, GIS digital map, remote sensing phantom, CAD design paper, as well as each kind of database. Moreover, the different operational channel uses the different database management system frequently (for example Oracle, SQL Server so on), and works in the different computer system (Windows, Unix, Linux and so on).

With the information construction work more expansive, how to plan, organized, systematic approach to increasing the level of information construction has become a key problem of the enterprises e-commerce. In order to enhance the overall management level and the profitability of the business and market competitiveness by using information technology, improving the utilization of existing information systems, full release the potential of all internal information systems have been build, eliminating the " information isolated islands", in recent years, we help Henan Oilfield to achieve enterprise application integration (EAI).

The EAI of Henan Oilfield deploy from three levels: the Data integration, the business process integration and the user Portal integration. Based on SOA technology ideas, according to the management construction, the entire enterprise information system integration divides into two levels: information system integration of facing to the enterprise management layer and business application system integration of facing to the business. In the information system integration, the mainly functions include following aspects: user interface integration, business process integration, business data integration and user Identity integration. In which:

The enterprise information portal realized by using Microsoft SharePoint Server, it achieved two main functions, one is the information portal construction and the documents management, another is providing a platform with data show of the application system.

The data report form realized by using Microsoft SQL Server, the data report form has achieved the function of source data pick-up, report form data storage, report form server and report form show.

The data exchange realized by using Microsoft BizTalk Server, the data exchange platform can support current application system Interface of China petroleum and chemical industry, and provides data mapping, transformation and transmission service, enables all of the data exchange between systems to complete in one platform.

The application process realized by using Microsoft SharePoint Server, the application process provides the item definition tool, the process definition tool, the process execution and dispatch environment, enables the enterprise conveniently realization the information system that support to internal control and other business processes.

The entire EAI system platform adopts the B/S system structure. The bottom technology is based on XML technology, directory services technology, Web Services technology, application server technology, database technology and indexing services technology and so on of SOA. The service uses the SharePoint portal system architecture. By fully uses the function of information publish, full text retrieval, data integration, application integration, visit statistics, jurisdiction management and individual desktop which the SharePoint portal system has, client can use various service which the portal provides as soon as make use of the browser that supports xml.

The specific functions of this EAI system are as follows:

l  Provides a set of technical realization and the safe operation management framework for enterprise information sharing and the knowledge management, provides a set of complete company portal system construction, integration enterprise service and application.

l  Integrated order and disorder information, provides a unified information sharing entrance, gives the necessary steps and tools to the staff of enterprise so that they can get the information quickly.

l  Provides a application platform for the enterprise interior staff support various visit include using mobile equipment, so that the staff can visit the enterprise interior business data and business processes on demand at any time and any where.

l  Provides unification channel for information public and integrate, in order to Henan Oilfield and its subordinate's enterprise will be able to unify organically and integrate in future.

l  Achieved enterprise internal business application system integration organically.

Unified the user management, and enhanced the information and the system security including user's confirmation, authorization and management. Provides the formidable safety control system and the service of simple point register;

Achieved personalized service for users and give them the suitable information according to their demand and jurisdiction.


**Summary**

Through the above analysis, research and practice of EAI technology based on SOA, we can compare the SOA with the traditional method and discover that SOA has more superiority: based on the standards, loose coupling, sharing service, coarse-grained and joint control, etc. And the SOA technology in practical applications should pay special attention to the following aspects:

**Control of the service granularity**

Service granularity control is an extremely important work in SOA technology. Serves granularity in SOA have two meanings: one is how does the service realize and the other is how many data or message is used or returned in the service. The fine grain service has carried out the smallest function, transmission and receives few data. The coarse grain service has carried out the big service function, and has exchanged more data. We proposed that the exposed to the external services of entire system would be to use coarse-grained interface and relatively fine-grained service interface is normally used in internal of enterprise systems architecture.

**Stateless Service design**

As we know, the service in SOA should be stateless service. That is to say services should not depend on the context and state of other services. When some service needs to rely on, we would best

define it as a specific business processes and use the stateless Session Bean to realize the specific service.

**Existing system and resources reuse**

The Enterprise System structure based on SOA is usually developed on the basis of the existing system structure. Therefore, we do not need to completely re-development of all the subsystems. SOA can use the resources (development personnel, software language, hardware platform, databases and applications) of current system to reuse so that reduce the enterprise system development cost and the developing time.

It is expected that the use of SOA technology will ultimately realize efficient and real-time link among various business enterprises or all interrelated economic entities, and make the whole industrial chain to achieve automation collaborative business. And it can be predicted that the use of the SOA technology will effectively enhance the ability of commercial enterprises and change the existing business model and the way of economic growth. We believe that SOA technology will facilitate information systems infiltration and development in the commercial enterprises trade activities.

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