

Research on Collaborative Commerce Model Based on Web Services

Liwen Wu, Yingqiang Duan

School of management, Dalian University of Technology, Dalian, Liaoning 116024, China
feagleme@sina.com

ABSTRACT

The concept of collaborative commerce was put forward by Gartner Group in 1999, and Web Services becomes one of the best implementation technologies of collaborative commerce for that it is loose-coupled, based on open standards and etc. In this paper, based on service oriented architecture of Web Services, we construct collaborative commerce model, analyze business process integration of collaborative commerce and design the implementation way of conversation mechanism in transaction process.

Keywords: Web Services, Collaborative Commerce, Transaction Process

1. INTRODUCTION

Collaborative Commerce is a new business mode on the background of global economics becoming one whole body. It can make enterprises easily collaborate with each other in the supply chain or cross supply chain. As result, the management mode is changed and resource is used economically^[1]. Collaborative Commerce is an evolution of the rudimentary point-to-point B2B transaction and it is a multi-point interaction among multiple parties for a single transaction.

Since the concept of collaborative commerce was put forward by Gartner Group, its implementation was researched from different aspects^[1]. Now, there are two partly implementation ways of collaborative commerce. One is web enabled c-commerce, which is a one dimensional, single e-enabled business process that allows certain internal data to be visible to external trading partners, and vice versa. Typically, this meant implementing a web presentation of the data, and allowing partners access to it. This is a limited form of c-commerce, with very limited value, saving only labor cost. Typical applications would be displaying demand for production materials, showing sales forecasts to suppliers, or presenting bills electronically. The other is B2B exchanges in markets such as steel, auto parts, chemicals or airline equipment. Buyers, sellers and suppliers are integrated through a web portal. In this stage, each enterprise can reconfigure its supply chain through the marketplace to leverage aggregated buying power and eliminate brokerage fees and middlemen^[2].

Those two ways of C-Commerce have never reached the critical mass required for mass adoption by all industries, because of the cost of integration. Information systems of two sides in the transaction are cannot communicate directly and isolated information islands are formed between them. And also, one complete transaction not only includes the two transaction sides, but also needs the third parties such as logistics, bank and etc. How to incorporate the third parties value-added service providers into business process and communicate each other between different systems freely is critical to

completely implement collaborative commerce, and one effective way is needed in order to implement transaction process integration.

Now, there are mainly two ways on implementing collaborative commerce. One is expanding the existed information systems such as SAP, the other is by adopting distributed component technology^[3]. But these methods have different defects. By expanding the system function, it can partly improve business process, but it cannot satisfy the need of easily process integration and reengineer, especially between heterogeneous systems. Distributed component technologies, such as DCOM, CORBA and RMI, are complex, their message format are not open, and are difficult through firewall. So, they cannot satisfy the demand of transaction process integration of collaborative commerce.

Web Services, which are loosely coupled, cross-internet, based on open standards, can be one effective technology of integrating transaction process of collaborative commerce. Charles Abrams, Gartner Group expert thinks that "Web Services have made a good development on those facets, including tools, infrastructure architecture, technique, standard. But, research on business model is short^[4]." So, based on Web Services, collaborative commerce model will be constructed and transaction process integration of collaborative commerce will be researched.

2. WEB SERVICES ARCHITECTURE

A Web service is an interface that describes a collection of operations that are network accessible through standardized XML messaging. A Web service is described using a standard, formal XML notion, called its service description. It covers all the details necessary to interact with the service, including message formats (that detail the operations), transport protocols and location^[5].

The Web Services architecture is based upon the interactions between three roles: service provider, service

registry and service requestor. The interactions involve the publish, find and bind operations. Together, these roles and operations act upon the Web Services artifacts: the Web service software module and its description. Figure1 illustrates these operations, the components providing them and their interactions^[5]

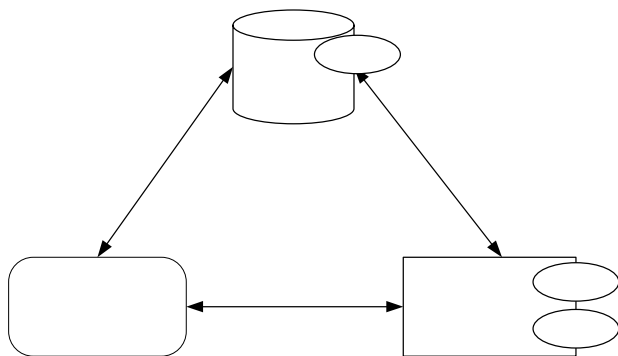


Figure1 Web Service architecture

In a typical scenario, a service provider hosts a network-accessible software module (an implementation of a Web service). The service provider defines a service description for the Web service and publishes it to a service requestor or service registry. The service requestor uses a find operation to retrieve the service description locally or from the service registry and uses the service description to bind with the service provider and invoke or interact with the web service implementation. Service provider and service requestor roles are logical constructs and a service can exhibit characteristics of both.

3. COLLABORATIVE COMMERCE MODEL BASED ON WEB SERVICES

3.1 Building Collaborative Commerce Model Based on Web Services

In web-enabled collaborative commerce and e-market mentioned above, only the buyer and seller interact with each other. However, it doesn't include the seller's interaction with the transportation company that will pick up and deliver the goods. This transaction also relies on the buyer and seller having an agreement to do business before the electronic transaction occurs^[6]. Obviously, the transaction process is not complete, and doesn't include value-added service.

Based on Web Services Service Oriented Architecture, collaborative commerce model was constructed as figure 2. This model expands the transaction boundary and incorporates all parties at the time of the transaction including third party logistics, third party storage, bank and etc. Thus, it can integrate all transaction process and all transaction data can flow freely between different systems. As a result, isolated information islands between different entities are eliminated. And also, it

provides accurate fulfillment information, dynamic trade agreement, and increased revenue recognition. Accurate fulfillment is a critical requirement for direct materials procurement. There's no tolerance in this market for out-of-stock conditions or backorders. The ability to dynamically trade with sellers will open up opportunities for e-hubs to emerge. These hubs can manage complex interactions for many businesses. Finally, directly incorporating creditors into the process will ensure faster revenue recognition for the seller and create a new financial market for underwriting and insuring these transactions^[6].

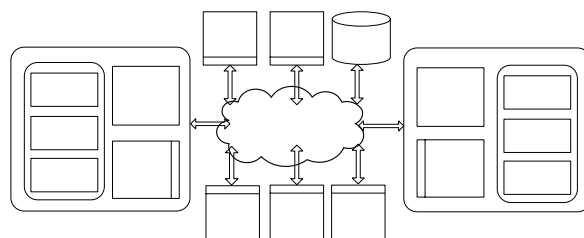


Figure2 Collaborative commerce model

Collaborative commerce model includes three kinds of entities:

- Direct transaction entities, including buyer and seller. Anyone can be the service provider, also can be the service requestor. For example, manufacturer can publish order service to UDDI registry. At the same times, it also can request the third party logistics service.
- Third party entities: including storage, logistics, bank and etc. The third party entities mainly are the role of services provider and provide services for business transaction.
- UDDI Registry. It provides functions of publishing and finding of service.

3.2 Transaction Process of Collaborative Commerce Based on Web Services

Here on background of TV industry, we analyze how to integrate transaction process of collaborative commerce by Web Services. Supposed that there are five business entities included in the whole transaction process, TV distributor (buyer), TV manufacturer(seller), third party storage, third party logistics and bank. TV manufacturer published order service (OrderTV) to UDDI registry. Third party storage provides product query service (ProductQuery) to check product amount. Third party logistics provides service of transporting product (ProductTransport). Bank provides service of payment (AccountTransfer).

According to market forecasting, TV distributor plans to order one thousand of TVs. The whole transaction process of collaborative commerce is described as following:

- TV distributor looks up order service(OrderTV) that TV manufacturer published in UDDI registry. There

Service
Requestor

Service
Description

Registry

Find

WSDL

UDDI

Bind

SOAP

are some open source software of UDDI registry, such SOAPUDDI and JUDDI. We can use find_business(), find_service(), find_tModel() and etc functions to get concrete information such as TV manufacturer, service list, bindingTemplate of every service, accessPoint of services and WSDL OverviewURL.

- According to returned WSDL document URL, TV distributor can use client tools to produce client proxy class, and use this proxy class invoke order service(OrderTV) of TV manufacturer. Here, we can use the tool of Axis, org.apache.axis.wsdl.Wsd2java, to produce client proxy class.

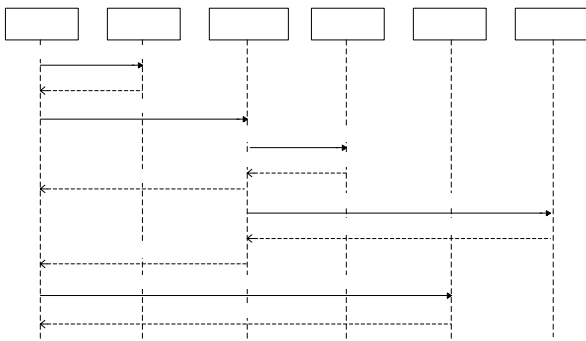


Figure3 Transaction process of collaborative commerce

- TV manufacturer invoke the product query service(ProductQuery) of third party storage to check the amount of TV in storage.
- According to the returned amount, TV manufacturer decided to accept order or reject.
- If accept order of distributor, TV manufacturer invokes transportation service(ProductTransport) of the third party logistics.
- After receive confirmation information of the third party logistics, TV manufacturer returns the state of order to TV distributor.
- The third party logistics delivers to TV distributor, order is fulfilled.
- TV distributor invoke service of payment (AccountTransfer) to give payment for TV, and the whole transaction is complete.

From above transaction process, we can see that every entity doesn't log on web site to fill in web form. Through direct interaction between systems, we integrate transaction processes of collaborative commerce and data of transaction seamlessly flow in and out of different system of business entities.

3.3 Implementation Way of Conversation Mechanism for Collaborative Commerce

In the ordering TV transaction process above, Web services of different business entities are included, and maybe the whole transaction last several days, even several weeks. So we should make mechanism of

conversation to keep track of execution process of whole transaction.

We can implement it by adding conversation state information to SOAP Header of buyer and seller. Conversation state information was inserted into SOAP Header by Service requestor's conversation state process module, and service responsor's conversation state process module use the information of services requestor. Concretely, we can use TPP/TPA of ebXML or cnXML.

The following is a simple demo of requestor's message, ConversationState SOAP Header item defines message exchange protocol of two sides of transaction, AgreementID element is ID number of protocol. ConversationID element is used to identify concurrent conversations under the same conversation agreement.

Conversation message demo of service requestor in SOAP message as following:

```

<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">
  <env:Header>
    <n:ConversationState xmlns:n="http://www.dlut.org/conversation">
      <n:AgreementId>
        uuid:0236223-8688-266b-f891-9dfdfj3j6jf
      </n:AgreementId>
      <n:conversationID>
        uuid:1323212-46bf-36fh-2323-dy1q2w5l24
      </n:conversationID>
    </n:ConversationState>
  </env:Header>
  <env:Body>
    .....
  </env:Body>
</env:Envelope>
  
```

Message response uses ConversationState SOAP Header item which is produced by message requestor, so they are identical. During the life cycle of the whole transaction conversation, values of AgreementId and ConversationID don't be changed, and they are included in SOAP request message and response message.

4. CONCLUSION

Web Services are loosely coupled, based on open standard, and provide dynamically discovery transaction object. It becomes an effective technology in transaction process integration of collaborative. Deeply research on Web Service will promote rapid development of collaborative commerce.

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Service Registry Manufacturer Third party storage

find manufacturer and services

overview URL and etc.

invoke service of ordering TV

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