End to End Business Process Management System using ebXML and Web service

S.W. Choi

Electronics Telecommunications Research Institute
305-350 Gajeong-dong, Yuseong-gu, Daejeon, 305-350, Korea
conch@etri.re.kr

J. G. Hwang

Electronics Telecommunications Research Institute
305-350 Gajeong-dong, Yuseong-gu, Daejeon, 305-350, Korea
jghwang@etri.re.kr

Abstract: With the introduction to ebXML and web service related standards, enterprises struggle to adapt to the rapidly evolving technology to meet the complex needs of the enterprise customer. The ability to integrate and interoperate individual services within enterprise and with other enterprise's information technology infrastructure using standard-based business processes is an important element of business process management system. For over 25 years EDI has established VAN based solution of exchanging business information in electronic form. However EDI solutions are only accessible to large organizations due to the cost factor. Moreover lack of well accepted B2B business process standards is hindering the success of promoting interoperability between organizations of any size. ebXML work is focused on defining the standard B2B business process context and its runtime semantics in order to remove these hindrances. However ebXML framework does not recommend any particular implementation model to interact with enterprise internal system. This paper propose a end to end business process management architecture by applying ebXML in the front end of the enterprise system and using BPEL to integrate front end services into related services within enterprise.

Keywords: BPM, ebXML, BPEL, Web service.

1. Introduction

The most important issues that hinder adoption of BPM related solution is that proprietary EAI and BPM solutions are just too expensive. They are too expensive to develop, maintain, and extend across a diverse, heterogeneous environment. Proprietary integration links are always brittle, and the cost to maintain them as organizations continually evolve is a significant burden. The specialized skills required to support these proprietary solutions often create their own cost and availability concerns. The frequent result is that constrained IT budgets end up shifting the majority of their funds toward maintenance issues, with precious little left over to satisfy the needs for innovation and improved flexibility. Moreover most enterprises using proprietary BPM related solution finds it very difficult to integrate with other enterprises information technology system. BPEL and Web services are technologies with the potential to finally break through most of aforementioned impasse. Traditional methods for integration and process automa-

tion typically involve embedded logic inside of functionally oriented IT applications, such as ERP, supply chain, or CRM. The development, testing, and deployment efforts required to change these applications make integration and process changes both costly and complex. These limitations still inhibit organizational flexibility today.

To overcome these issues, proprietary EAI and BPM products emerged to abstract integration and process automation into a new layer. [2] This new layer wraps around embedded business logic of IT applications and exposes only the interface required to integrate with other applications. And the exposed interface of the IT application is defined as a service. This is a key notion of service oriented architecture also known as SOA. As a matter of fact, the notion of wrapping business logic into abstract interface is not a new technology. For instance CORBA shows the same approach. However web service made it easier and technically superb.

BPEL and Web services now provide a standardized integration interface and a standardized language for integration and process automation. BPEL, in effect, has the potential to commoditize the capabilities provided by proprietary EAI and BPM solutions. As often occurs in a commodity market, the resulting prices for products and services are certain to fall. However BPEL and Web services related technology is not mature to provide secure and reliable services, when it comes to cross enterprise business. ebXML is a standard framework specially designed to provide secure and reliable IT infrastructure in the area of B2B. [3] In this paper we propose a complete end to end BPMS architecture using ebXML as a front end B2B IT infrastructure and complement with BPEL to integrate with IT applications within enterprise.

2. Introduction to Web service and BPEL

Service Oriented Architecture start with services, which are groups of software components that carry out business processes, for example, verifying a credit card transaction or processing a purchase order. [2] To simplify things SOA is a collection of services and a service is a abstract interface of business logic of IT application which communicate with one another in a loosely coupled way. The term loosely coupled means that each

application that communicate with each other does not know the technical details of another application in order to communicate each other but only knows now to communicate with each other using abstract interface. SOA is a higher level of application development that, by focusing on business processes and using standard interfaces, helps mask the underlying technical complexity of the IT environment. And Web service is a standard framework for exposing abstract interface of a software component in a standard, well defined, cross platform independent way. It is important to note that an SOA does not require Web services; and Web services can be deployed without an SOA. However, building an SOA using Web services is the ideal approach. Web service in a technical term consists of WSDL and SOAP. WSDL is an XML format for describing network services as a set of endpoints operating on messages containing either document-oriented or procedure-oriented information. SOAP provides the definition of the XML-based information which can be used for exchanging structured and typed information between peers in a decentralized, distributed environment.

BPEL provides a language for the formal specification of business processes and business interaction protocols. By doing so, it extends the Web Services interaction model and enables it to support business transactions. BPEL defines an interoperable integration model that should facilitate the expansion of automated process integration in both the intra-corporate and the B2B spaces. However authors of this paper believe that BPEL is not enough to provide secure and reliable B2B infrastructure and B2B transaction requires more complex mechanism such as ebXML BPSS protocol.

3. Introduction to ebXML

Electronic business XML (ebXML) is a global electronic business standard that is sponsored by UN/CEFACT and OASIS.[1] ebXML thus defines a framework for global electronic business that will allow businesses to find each other and conduct business based on well-defined XML messages within the context of standard business processes. If the Internet is the information highway for electronic business, then the ebXML can be thought as providing the on ramps, off ramps and the rules of the road. To simplify things, one can think of the ebXML as XML + internet + set of business rules [1]. The ebXML framework addresses the issue of integration at both business and technical layer: the level of business process interfaces that describes business semantics as well as providing infrastructure to ensure reliable and secure transportation of electronic message. If EDI framework concentrated on defining data format integration and technical connectivity [4], ebXML concentrates on business processes that defines collaborative interface between trading partners as well as actual technical connectivity. One important thing to note is that ebXML is not a software product, but it is set of specifications that describe how to implement actual software.

Research has shown that ebXML specifications and development has reached quite a mature state with respect to the transport and routing which covers technical aspect of integration. In addition there are many off-the-shelf ebXML compliant software at the level of messaging service, but not so much in the business process level [7]. At first glance, it is easy to think that all we need in electronic commerce is data format integration and technical integration. However, EDI framework has shown that we need more that those. Fundamentally for 2 or more companies to understand each other it is essential for each other to have a common shared meaning in what is being actually said. Therefore it is important that to understand each other we need more than a simple vocabulary but really need to share with each other a common set of semantic meaning values. To a large extent that meaning of business is what a lot of real business contracts really address, and what is needed for business interoperability. Therefore what we need is standard e-Business modeling methodology. Business process models in ebXML are more than documentation. If EDI business process models were mainly concerned with documentation, ebXML business process models define descriptions of e-business collaborations specified using the Business Process Specification Schema (BPSS) which is declarative, machine-readable. It is therefore necessary to have a methodology to organize the modeling of e-business processes down to the actual documentation using Business Process Specification. That methodology is provided by UMM and the ebXML BPSS adopts subset of the UMM meta model.

UMM is a standard e-business modeling methodology and it stands for UN/CEFACT Modeling Methodology. UMM consists of 4 different views where each view describes e-business goal, requirement down to the actual technical implementation. Therefore real business meaning of trading partners is actually linked in documentation. One of the weaknesses of EDI was that it concentrated on run time aspect of e-business and it was hard to bind business meaning to actual documentation. What the UMM gives ebXML is a uniform and consistent layered modeling approach of rendering the business meaning from describing the top level business goals down to the actual technical implementation so that technology is always working to support the business goals.

Once we have the common shared meaning of what's being spoken, and have the common set of vocabulary, we can start the conversation using agreed transportation method. That agreed transportation method is described in the ebXML messaging service specification. The ebXML Messaging Service (ebMS) is the component that provides the services needed for business document exchange. The ebMS extends the standard SOAP message structure with its own header and body extensions. The ebXML extensions support the extra levels of security and reliable messaging functionality necessary for a B2B e-business framework like ebXML.

4. Business Process Management System

As described in previous chapters, we believe that ebXML provides secure, reliable and standard framework for conducting B2B business with other business partner. However ebXML does not define standard implementation model to interact B2B related services with IT applications within enterprise. The role of connecting various IT applications within enterprise is done using orchestration manager as shown below the picture 1.0.
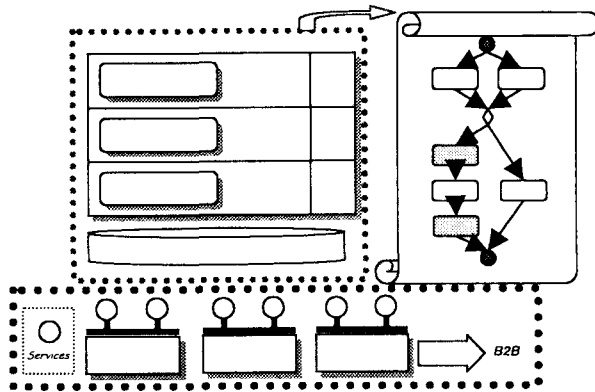

Figure 1. System architecture of BPMS

As explained in chapter 2, various IT applications like ERP, IMS, ebXML Engine provide its services and BPMS can be configured to execute required services in sequences. Below is a sequence diagram of processing purchase order request received by business partner. First ebXML component receives purchase order document from business partner then it is sent to human resource to decide whether to accept purchase order then purchase order processing application process the purchase order and send the purchase order acceptance document back to the business partner.
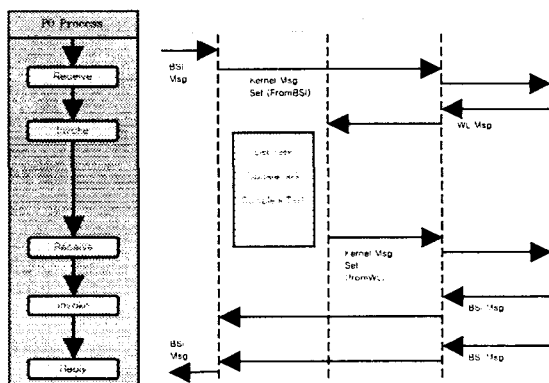

Figure 2. Sequence diagram of processing purchase order

3. Conclusions

In this paper we propose a complete end to end BPM system architecture using ebXML as a front end B2B IT infrastructure and complement with BPEL to integrate with IT applications within enterprise. Both the ebXML and BPEL is open standard framework and hence the developing the BPM solution would be cost effective. However limitation of this model is that both ebXML and BPEL requires separate process description model like BPSS and BPEL model.

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