

Chapter 17

An Adaptive E-Commerce Architecture for Enterprise Information Exchange

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ABSTRACT

This article contributes to the design of a generic framework for providing a new way to exchange information between enterprises. This concept is well addressed in the context of B2B standards. Many organizations are increasingly searching for adopting these standards to automate data exchange. But the limit of such models resides in the fact that the content of exchange is defined in several formats which make their use difficult. To overcome this difficulty, we have explored the possibility to integrate new models for describing content involved in B2B transaction which represent a key issue. Our finding establishes the feasibility of integrating product models described by ontology with e-commerce standards especially at the business process level. This article presents a descriptive model allowing partners to exchange information with other organisations without modifying their Information System. The case study also indicates that our system is developed as a Service Oriented Architecture.

INTRODUCTION

Over the last 20 years, e-commerce (EC) has been recognized as an efficient tool to handle complex exchange and transactions between companies. EC is becoming ever more important in developing new activities and new models especially for business-to-business (B2B) interactions.

B2B is concerned with all activities involved in obtaining information about products and services and managing these information flows between organisations (Peat & Webber, 1997). The B2B architectures are difficult to conceptualize because they handle several scenarios as a Business Process (BP) and several contents with different formats as product catalogs defined separately by different organisations.

EC systems are well-conceived to address these different issues, even when the multiples sources of information will cause heterogeneity of exchange (Tellmann & Meadche, 2003). To ensure and exchange competitively between partners it will be necessary to have a new view about how we describe all concepts involved in such interactions.

The main concepts related to EC models are a BP concept and a content (payload or useful data) concept. These two pieces of information are defined separately by each standard in a specific format. This article proposes an adaptive architecture that gathers product catalogues standards with EC standards in order to automate exchange and purchasing operation.

A number of standards try to define a global and a generic architecture to consider large industry sectors and areas. The old one is the UN initiative: Electronic Data Interchange for Administration, Commerce, and Transport (EDIFACT) (United Nations, 1999). The shortcoming of this generation of approaches like EDIFACT is in the fact that they require a significant programming effort from organizations to be able to use these standards. Thus, the cost will be higher for this reason. EDIFACT has just been used by small number of companies and was not allowed for small organizations. To overcome this limitation and to close this gap in order to reduce cost and to improve quality of interaction and communication between partners, new standards have appeared in the same time with the development of the Internet infrastructure. For example, there are some e-commerce portals for online purchasing and ordering product from online catalogues—harbinger.net, mysap.com, vertical-Net.com—in which transaction content specifications can be rendered easily by standard browsers. In addition to XML and EDI initiatives (Westarp, Weitzel, Buxmann, & König, 1999), a proprietary standard (de facto) exists like RosettaNet which is a B2B architecture used for IT and semi-conductors content. The BP model of RosettaNet named PIP (Partner Interface Process, RosettaNet, 2001c) can

be used with other catalogues. ebXML (ebXML, 2001a) is a horizontal model defined without any relation to any product catalogues, it just describes some specifications for BP, core component, registry, and all pieces required to implement a global B2B system.

As a result, a B2B system is built using the existing standards cited above by overcoming their limits and sharing their different advantages. Also, the system will ensure interoperability, which is a key issue in order to share several product catalogs with the same architecture. This is the main reason why we propose in this article to use product ontology¹ for characterizing product catalogs and trying to define BP ontology for managing any kind of transactions. Shared ontologies play a crucial role for supporting an adaptive architecture to save time and money and to increase its efficiency through B2B transactions.

This work aims to define an adaptive infrastructure using ontologies for the electronic commerce, especially in the B2B framework. The exchange of data, information, and knowledge are the key issues. Two kinds of ontologies can be used to improve exchange in such architecture. One addresses products and services characterization, whereas the other addresses business processes. We demonstrate the capability of integration of these two kinds of ontologies in a unique and global B2B-layered architecture. The idea is to use several business process ontologies conjointly with several products ontology in order to ensure reliability and feasibility of such exchange in different ways.

In the first part of this article, we argue that ontology for both BP and product is needed to automate B2B exchange. In the second part, the proposed architecture and its three parts are presented. The third part describes the different components of the system with an overview of objectives and functionalities for each part. Finally, the last part shows a case study of the developed platform using PLIB ontology and the Web services paradigm.

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