

Chapter 3.3

Semantics for E-Commerce Applications

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INTRODUCTION

A few years ago, e-commerce applications were mainly focused on handling transactions and managing catalogs. Applications automated only a small portion of the electronic transaction process, for example: taking orders, scheduling shipments, and providing customer service. E-commerce was held back by closed markets that could not use distributed services, due to the use of incompatible communication protocols.

Recently, business needs are evolving beyond transaction support to include requirements for the interoperability and integration of heterogeneous, autonomous, and distributed service. Enabling technologies and business-centered design methodologies have addressed the shortcomings of contemporary e-commerce applications. New technological development such as Web services, Web processes, and semantics have allowed the creation of a new breed of e-commerce applications which can orchestrate cross-organizational and distributed services.

Web services and processes refer to a set of technologies that can universally standardize the communication of applications in order to connect systems, services, business partners, and customers cost-effectively through the World Wide Web. Semantics provide an agreed understanding of information between and among Web services encouraging the development of interoperable systems that can help create and support new collections of services to better meet the demands and expectations of customers.

In this article, we present seven reasons why semantics should be an integral part of Web services and Web processes technology managing e-commerce applications.

BACKGROUND

As organizations are increasingly faced with the challenge of managing e-commerce applications, important technological development such as Web services, Web processes, and semantics are emerging.

The main idea of Web services is to encapsulate an organization's functionality or service within an appropriate interface and advertise it in the Web using the Web service definition language (WSDL) (Christensen, Curbera, Meredith, & Weerawarana, 2001). Web services are a very general model for building distributed applications which can be used to link together computer programs from different suppliers and technologies. The principles behind Web services are very simple:

- A provider defines a standardized format for requests and responses for its Web services.
- A computer makes a request for the Web services across the network.
- The Web services perform some action and send the response back.

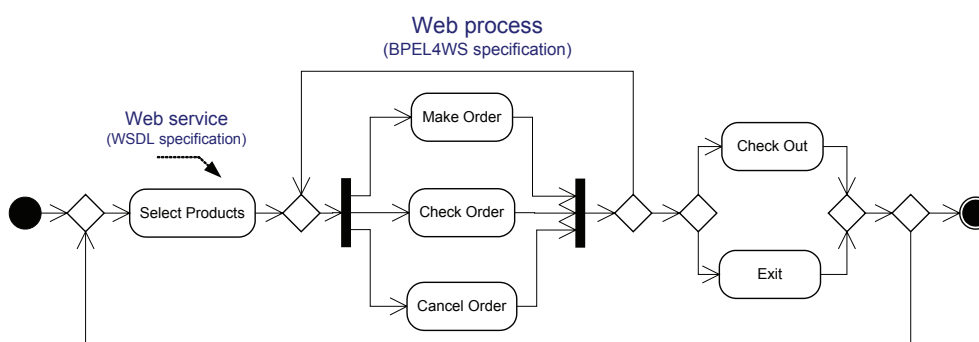
While in some cases Web services may be utilized in an isolated form, it is natural to expect that Web services will be integrated as part of Web processes. A Web process is an abstraction of a business process. It comprises a number of logic steps (i.e., Web services), dependencies among services, process flow, routing rules, and logic to control and coordinate services and partners. The most prominent solution to describe

Web processes is BPEL4WS (BPEL4WS, 2003). BPEL4WS (Process Execution Language for Web Services) is a specification that enables a business process to be performed using a number of Web services, possibly provided by several companies. Figure 1 illustrates how a Web process can model an e-commerce application.

WSDL and BPEL4WS specifications are shallow and focus only on syntactical descriptions of Web services and Web processes. As a consequence, these descriptions are inadequate for an automated discovery or composition of Web services. Much richer and deeper machine-processable descriptions are required.

Several researchers have pointed out that Web services should be semantically enabled (Cardoso & Sheth, 2003; Fensel, Bussler, & Maedche, 2002; Martin et al., 2004). Semantics are indispensable to develop distributed e-commerce applications over the Web due to its heterogeneity, autonomy, and distribution. Semantics articulate a well-defined set of common data elements or vocabulary allowing a rich description of Web services and Web processes which can be used by computers for an automatic or semi-automatic processing and management of e-commerce applications.

Figure 1. Example of a Web process modeling an e-commerce application



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