Chapter 7
Specifying Business-Level Protocols for Web Services Based Collaborative Processes

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ABSTRACT

Business collaboration is increasingly conducted over the Internet. Trading parties require business-level protocols for enabling their collaborative processes and a number of standardised languages, and approaches have been proposed for specifying business-level protocols. To illustrate the specification of web services based collaborative processes, three inter-related specification languages, namely, the ebXML Business Process Specification Schema (BPSS), the Web Service Business Process Execution Language (WSBPEL), and the Web Services Conversations Language (WSCL) are discussed in this chapter. A contract negotiation protocol is used as an example to illustrate the concepts involved in the specification. The chapter also discusses different strategies for deploying these specification languages.

1 INTRODUCTION

Business-to-business (B2B) electronic commerce has grown tremendously over the past decade. Alibaba, the biggest Chinese B2B e-commerce company achieved a total revenue of nearly US$1 billion in 2011. The company was valued at nearly US$26 billion when it went public in 2007. Recently, it was valued at US$35-40 billion in a recent deal between the company and its shareholder Yahoo (The Wall Street Journal, May 22, 2012).

On the technology front, web services are seen as playing a significant role in enabling B2B collaboration (Baek Kim & Segev, 2005; Chen, Zhang, & Zhou, 2007). Web services technology supports business process management (BPM) and enterprise application integration (EAI) within an organization (Lim & Wen, 2003; Zhao & Cheng, 2005; Albrecht, Dean, & Hansen, 2005). Ente-
prise applications running at different geographic and functional units of the same company can be implemented as web services and orchestrated to run according to graphically defined workflow models. Enterprise applications implemented as web services are loosely coupled and can be dynamically bound together during the execution of a business process. This enables B2B collaborative processes in which partnerships are set up dynamically.

In order to set up partnerships on the Internet, the interacting parties need agreements on the following (Hewlett-Packard Company, 2002):

- **Business payload**: Both parties need to know which information to exchange.
- **Protocol**: Both parties need to know how to exchange business payload.
- **Service location**: To interact with a specific service, both parties need to know which protocols the service supports, which payload it exchanges, and its location, e.g. its HTTP URL.

There are various ways to define the protocol for exchanging business payload among trading parties. While a comprehensive survey of the various languages and approaches for specifying business-level protocols is beyond the scope of this chapter, such a survey can be found in (Ko, Lee, & Lee, 2009; Dorn, Grün, Werthner, & Zapletal, 2009; Mili et al., 2010) which also discuss the strengths and weaknesses of different languages and approaches.

Instead, this chapter focuses on three interrelated approaches to specifying business-level protocols and illustrates them using a concrete example. First, the ebXML business process specification schema (BPSS) (OASIS, 2006) supports a choreographic approach to representing business-level protocols. Choreography is an explicit built-in concept in ebXML BPSS for B2B protocols. Based on this concept, an independent business-level protocol can be specified based on the interactions among business partners, rather than the operating procedures of any individual partners.

ebXML is a widely adopted standard for e-commerce with an established record (Kotok, 2007). In U.S., the Centers for Disease Control and Prevention (CDC) has built the Public Health Information Network (PHIN) based on ebXML for exchanging clinical and business messages. In Hong Kong, ebXML messaging is used in the Digital Trade and Transportation Network which connects trading partners in trade, logistics and financial industries.

Given a well defined protocol, business partners need to prepare business payloads and initiate interactions with each other in accordance with the protocol. The web services technology supports the automation of the collaborative process through integration of enterprise applications across the Internet. The Web Services Business Process Execution Language (WS-BPEL) (OASIS, 2007) is a standard means of orchestrating an enterprise’s applications. While WS-BPEL is often deployed in the context of business process management within an organisation, it also plays an essential role at the interface with other organisations. Currently, WS-BPEL is the de facto standard supported by major vendors for implementing web services systems.

The Web Services Conversation Language (WSCL) (Hewlett-Packard Company, 2002) provides a useful link between ebXML BPSS and WS-BPEL. Since WS-BPEL is executable, it contains all the necessary details for the orchestration of web services in the particular execution environment of a host enterprise. Many of these details are specific to the implementation at the host and are irrelevant from the point of the view of the protocol, i.e. the ebXML BPSS specification. A WSCL specification provides an abstract specification of the behaviour of a partner in terms of its business payloads and how it is prepared to interact with its other partners.