Chapter IV
High-Value B2B Interactions, Nonrepudiation, and Web Services

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ABSTRACT

This chapter provides an overview of the problem of making high-value business-to-business (B2B) interactions nonrepudiable, where nonrepudiation is the property that no party to an interaction can subsequently deny their involvement in the interaction. Existing approaches are discussed in the context of fundamental work on fairness and nonrepudiation. The existing work suffers from a lack of flexibility both in terms of the mechanisms that can be deployed to achieve nonrepudiation and of the interactions to which nonrepudiation can be applied. The authors contend that it is necessary to be able to render arbitrary Web service interactions nonrepudiable and to optionally invoke application-level validation of business messages at run-time. The chapter presents the design and implementation of a novel Web services-based middleware that addresses these requirements. The middleware leverages existing Web service standards. It is sufficiently flexible to adapt to different regulatory regimes and to provide security guarantees that are appropriate to different business contexts.

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INTRODUCTION

It is increasingly common to structure business-to-business (B2B) functions in terms of well-defined business message exchanges between loosely coupled services. This has led to the development of open standards for business conversations. For example, the RosettaNet Partner Interface Process standards (RosettaNet, 2005) define observable B2B interactions in terms of the XML messages that business partners should exchange in order to perform functions such as product line querying and order processing. Business partners use such standards as the basis for agreement on the syntax, semantics and sequencing of messages; and on the B2B processes that they should execute. A problem that then arises is how to ensure that an executing interaction complies with these business agreements. Monitoring for, and enforcement of, compliance implies that interacting parties must be held to account for their actions. That is, it should not be possible to deny participation in a B2B interaction. In this context, nonrepudiation services provide protection against false denial of involvement in communication. A related concern is that honest parties should not suffer disadvantage due to the misbehaviour, or noncooperation, of others.

A typical business message exchange between organisations A and B is shown in Figure 1a. There are two types of message flow: solid lines show the flow of business logic messages and dashed lines the flow of signal messages for acknowledgement of receipt. Party A sends a business message to party B and B provides an acknowledgement of receipt (ack) in return. Figure 1b shows an extended interaction where B both acknowledges A’s business message and, in step 3, asserts its validity, or otherwise, with respect to agreements governing the interaction. Message validity may relate to some business specific constraints on the content of messages or may be with respect to some contract that governs a cross-organisational business process composed of a number of message exchanges. Essentially, if B signals the validity of a message, they confirm that the message is acceptable for continued processing in the business context. As shown, A is expected to provide an

Figure 1. Typical B2B interactions

(a)  

1. business message
2. ack

(b)  

1. business message
2. ack
3. valid/invalid
4. ack
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