Chapter XIV
Modeling and Specification of Collaborative Business Processes with an MDA Approach and a UML Profile

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ABSTRACT

This chapter describes the application of MDA (model driven architecture) and UML for the modeling and specification of collaborative business processes, with the purpose of enabling enterprises to establish business-to-business collaborations. The proposed MDA approach provides the components and techniques required for the development of collaborative processes from their conceptual modeling to the specifications of these processes and the partners’ interfaces in a B2B standard. As part of this MDA approach, a UML profile is provided that extends the semantics of UML2 to support the analysis and design of collaborative processes. This UML profile is based on the use of interaction protocols to model collaborative processes. The application of this UML profile in a case study is presented. Also, an overview is provided about the automatic generation of B2B specifications from conceptual models of collaborative processes. In particular, the generation of B2B specifications based on ebXML is described.
INTRODUCTION

To compete in the current global markets, enterprises are focusing on setting up business-to-business (B2B) collaborative relationships with their partners in order to improve their performance, as well as the global performance of the supply chain (Liu & Kumar, 2003). A B2B collaboration implies the integration of enterprises in two levels: a business level and a technological level. In order to accomplish inter-enterprise integration at both levels, one of the main challenges is the modeling and specification of collaborative business processes. Through these processes, enterprises undertake to jointly carry out decisions to achieve common goals, coordinate their actions, and exchange information.

On the one hand, the definition of inter-enterprise integration at business level requires the conceptual modeling of collaborative processes. Business engineers and system designers have to rely on a language that allows them to model these processes without considering the technology used to implement them. Moreover, such modeling language has to support the particular requirements of the B2B collaborations: enterprise autonomy, decentralization, global view of the collaboration, peer-to-peer interactions, and the use of suitable abstractions to model communicative actions and negotiations among partners.

On the other hand, collaborative process models defined at business level have to be translated into specifications of collaborative processes and systems’ interfaces based on a B2B standard so that partners can execute these processes. Currently, however, the development of collaborative processes, from the conceptual modeling up to the specifications in a B2B standard, is costly, time consuming, and complex. In addition, collaborative process models must be consistent with the specifications generated at the technological level. Hence, an approach is required to allow business engineers to focus on the business level, and automatically generate the technological solutions required to carry out a B2B collaboration from the conceptual models of collaborative processes, in order to maintain the consistency between both levels.

The objective of this chapter is to show how the MDA (model driven architecture) initiative (OMG, 2003) can be applied to the development of collaborative processes in order to address the aforementioned issues. Through an MDA approach, collaborative process models play an important role. Hence, business engineers can focus mainly on the design of collaborative process models to define partners’ business integration and the behavior of the B2B collaborations. Then, they can transform these models to automatically generate the XML code of the specifications of the collaborative processes and the partners’ interfaces in a B2B standard. In this way, an MDA approach intends to reduce the inherent complexity and costs which partners have to incur during the development of collaborative processes and B2B systems, and to ensure that a business solution is consistent with their respective technological solutions.

In addition, this chapter describes how to extend the semantics of UML2 for supporting the conceptual modeling of collaborative processes. A UML profile for collaborative processes is presented that has the aim of supporting the particular requirements of B2B collaborations. These requirements are met through the use of interaction protocols to model collaborative processes. Interactions protocols are based on speech act theory (Searle, 1975) and hence, by means of this UML profile, business engineers can define, in a richer way, communicative actions and negotiations between partners in collaborative processes.

This chapter is organized in the following way. The first section introduces the main concepts of B2B collaborations, then it describes the requirements for both the conceptual modeling of collaborative processes and the automatic generation of B2B specifications, and finally it
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