Chapter II

A Semantic Service-Oriented Architecture for Business Process Fusion

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Abstract

Most enterprises contain several heterogeneous systems, creating a fuzzy network of interconnected applications, services, and data sources. In this emerging business context, a clear need appears to link these former incompatible systems by using enterprise application integration (EAI) solutions. We propose a semantically enriched service-oriented business applications (SE-SOBA) framework that will provide a dynamically reconfigurable architecture enabling enterprises to respond quickly and flexibly to market changes. We also propose the development of a pure semantic-based implementation of the universal description, discovery, and integration (UDDI) specification, called pure semantic registry (PSR), which provides
a flexible, extendable core architectural component allowing the deployment and business exploitation of Semantic Web services. The implementation of PSR involves the development of a semantic-based repository and an embedded resource definition framework (RDF)-based reasoning engine, providing strong query and inference capabilities to support effective service discovery and composition. We claim that when SE-SOBAs are combined with PSR and rule-based formalizations of business scenarios and processes, they constitute a holistic business-driven semantic integration framework, called FUSION, applied to intra- and inter-organizational EAI scenarios.

Introduction

In today’s fiercely competitive global economy, companies are realizing that new initiatives such as e-business, customer relationship management, and business intelligence go hand-in-hand with the proven organization-wide EAI strategy. The goal of EAI is to integrate and streamline heterogeneous business processes across different applications and business units while allowing employees, decision makers, and business partners to readily access corporate and customer data no matter where it resides. More and more, EAI involves integrating information and processes not only across the enterprise but also beyond organizational walls to encompass business-to-business (B2B) integration supporting large scale value-added supply chains across the enlarged worldwide economy.

Business process fusion is the transformation of business activities that is achieved by integrating the interfaces of previously autonomous business processes by pipelining different middleware technologies and enabling the effective (semi-) automated exchange of information between various systems within a company or between enterprises. The development of SOBAs (which constitutes a set of independently running services communicating with each other in a loosely coupled message-based manner) and the publishing of Web services may implement the vision of business process fusion, by providing an abstraction layer for the involved interfaces through the Web service description language (WSDL). While SOBA and Web services have already made headway within large organizations, the technology will start filtering down to small- and medium-sized enterprises (SMEs) and will expand into supply chains. This architecture will also play a significant role in streamlining mergers and acquisitions, by linking previously incompatible systems.

Despite the aforementioned trends, users and professionals have high expectations towards software applications and enterprise application integration. They want to access the content they need, while this content must be accurate and free of redundancy. So, the enterprise applications must be intuitive and easy to use; reus-