

Chapter X

Building Dynamic Business Process in P2P Semantic Web

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ABSTRACT

Business process management systems such as the workflow management system and the enterprise application integration system manage process flow on a minute-by-minute basis in various application domains. In the conventional approach, the business process must be predefined before it is implemented. However, involving business users in the early stage of the design phase is neither efficient nor realistic in the dynamic business world. This study proposes a framework to implement a dynamic business process in the P2P Semantic Web, which provides the flexibility to dynamically alter business process and to take semantic data into consideration. The system is demonstrated by a case of a manufacturer that is processing an order.

INTRODUCTION

In the past decade, the Internet technology boom has encouraged the development and sharing among people, organizations, and enterprises of vast ranges of information. However, most of that information is written in hypertext markup language (HTML), which mainly follows a predefined format to express the content, where well-formatted information is normally written for human comprehension rather than machine automation. This means that when the information volume grows, the time to locate and digest the information increases even more rapidly. In this way, users need to make a tremendous effort to locate information that fits their needs. There are many possible solutions to resolve the information overloaded problem, such as paying money

to the search engine to improve visibility, which is called “paid placement” or “paid inclusion.” Sophisticated solutions such as allowing users to write a query paragraph rather than simply inputting keywords are also possible. In the years to come, we will see many more innovative solutions to the problem.

The Web has also evolved to become a service-providing medium. Web services use software applications to provide interoperability, whereby they discover, describe, and access other services from the Internet, Intranets, and Extranets. This leads to the adoption of XML (extensible markup language) technology in which information is shared in text format. Note that XML provides independence of applications and data, which allows data to be shared among applications. However, the problem lies in determining what kinds of information can be shared and how it can be shared. As the Web is no longer a media for human-to-human communication because the information available is overwhelming, there is a need to seek help from machines in organizing and locating specific information. The evolution will take place in two dimensions: from syntactic to semantic and from static to dynamic. This will move the Web toward being a Semantic Web and Web service, and then advance the Web service into an intelligent Web service and the Semantic Web into Semantic Web services.

The Semantic Web structures Web content into semantic data for both humans and machines. The semantic data are the information and the meaning of the information. These are presented as structured collections of information and sets of rules. Although both the knowledge representation and rules have been studied for years in the area of artificial intelligence, the traditional approaches have rigid structures to ensure that new knowledge can be inferred from existing data and rules. In contrast, the decentralized nature of the Semantic Web allows individual Web sites to represent knowledge in their own ways. This provides an opportunity for Web sites to grow independently and diversely.

This study will use the properties provided in the Semantic Web to build dynamic business processes, where “a business process is a collection of related structure activities that produce a specific outcome for a particular customer” (<http://en.wikipedia.org>). The process can be defined by attributes such as name, description, date, version, component, operation, and so forth. It is worth noting here the difference between workflow and business process. A workflow is a complex business process that normally involves many *tasks*; it is static and has to be well defined before applying. This also means that the *roles* assigned to specific tasks are predefined even though the *users* that are assigned to roles can be dynamically identified. A workflow can be activated many times, and each implementation is called a *case*, which has a unique identity and a limited lifetime. In this case, the business process is a concept mingling the workflow and the case because it indicates which task must be carried out for a specific customer. As workflow schemas are static and predefined, they are difficult to adopt in the rapidly changing environment, particularly for collaboration among partners (Zeng et al., 2003). Moreover, problems of consistency after changing the workflow, resource optimization in the dynamic environment, the reuse of workflow, the workflow engine that is used to manage the changing workflow, and the flexibility to adapt workflow to new environments are all our concerns (Cichocki & Rusinkiewicz, 2004).

In this study, the business process is developed in the peer to peer (P2P) architecture of the Semantic Web. The P2P architecture is used as a communication platform in which each party (node) has a similar role and a similar ability to handle business processes with other parties directly or through a community service (<http://searchnetworking.techtarget.com>). Moreover, each node is built with Semantic Web technology that allows the semantics of Web content to be included in the handling of business processes. The advantages of this approach are: (1) Web

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