The Web-based B2B Environment with Web Services

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Abstract

The objective of this work is to develop business-to-business processes of electronic markets using Web services in order to facilitate the execution of these processes in different electronic markets. The main contribution of this approach is the promotion of interoperability, just-in-time integration, and reduction of complexity. In specific, the Cooperation, Orchestration and Semantic Mapping of Web Services (COSMOS) tool, which is an integrated development environment that enables the creation, design and modification of executable business processes based on the Business Process Execution Language, is used for the integration of business-to-business processes of a Virtual Industrial Market into a fully functional Web-based environment.

Key Words: e-markets, XML, BPEL, Industrial e-markets.

1. Introduction¹

The evolution of Information and Communication Technologies (ICT) brought new opportunities to enterprises and organizations, and changed the way of doing effectively and efficiently business. As a result, numerous electronic markets (e-markets) are continuously being deployed. An e-market can be considered as an information system intended to provide market participants with online services that facilitate information exchange and support activities related to business processes. It can support the phases of information search, negotiation, settlement, as well as, after-sales support [1].

2. An Overview of BPEL

The concept of Web services is to use XML defined protocols, namely the SOAP for communication, the WSDL for description and the Universal Description, Discovery and Integration (UDDI) of software services over the Internet for discovery.

Web services provide a basic one-way or request-response mechanism that can be used by two systems to communicate. Its standards are open, cross platform, and fully aligned with Internet standards and technologies. However, it is widely recognized that the interaction of several or many Web services is often required to create business value. This has led to several initiatives to create languages to express and define business processes that coordinate Web services.

BPEL is an XML based language that models the behavior of Web services in a business process interaction. It is a language that models both the orchestration and choreography aspects of a business process. Orchestration refers to the actual execution of a business process. It controls the flow of the various activities internal to a business process, like invocation of Web services, messages handling, business logic and rules. On the other hand, choreography describes the interfaces and the communication protocol between two or more independent business processes. It tracks the message sequence between Web services in an abstract manner [2].

3. The COSMOS Environment

COSMOS is an integrated development environment for the design and creation of business processes based on the BPEL language. The goal of COSMOS is to provide a complete environment that would allow the user to design, create, code, verify and deploy a business process based on BPEL. The concept for the COSMOS deployment stems from the evaluation findings of BPEL and existing design tools.

The existing BPEL design tools are either very developer-oriented and tied to the BPEL tags instead of process concepts, or very manager-oriented and general, without basic features of BPEL, like fault handling or a real execution notion. The evaluated tools have not business process and workflow tasks orientation and do not provide an unambiguous, simple, and easy way to a user without knowledge of the BPEL language, to design

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and execute a business process. They are something more than just simple BPEL editors with a graphical environment, and they are not business process design tools which will help the user to think, design and implement a business process using Web services. It is worth noticing that none of these tools refer to basic business processes concepts.

The principal idea behind COSMOS software development process is that end-user applications, need and use some fundamental services hidden to the user which are responsible for communicating with the lower services provided by a platform, environment, network or operating system.

COSMOS addresses the needs of two broad categories of users, namely managers and developers. In COSMOS, a business process can be described considering two different views: the manager view and the developer view. The manager view provides a visual design environment with drop capability for the specification of the activities of a business process. It is represented by using a diagram containing information about the business process in a graphical way. The developer view follows the manager view. It provides automatically generated BPEL code for the business process as well as an XML editor for further BPEL coding. The spirit of simplicity and formality influenced the requirements of the application.

4. Web Services for B2B Industrial E-markets

In this section, the COSMOS environment is used for describing online industrial B2B processes in BPEL in order (a) to promote interoperability by minimizing the requirements for shared understanding among different industrial e-markets, (b) to enable just-in-time integration, and (c) to reduce complexity by encapsulation. More specifically, the case of modeling industrial B2B processes in VAM is discussed so as to facilitate the execution of these processes in different industrial e-markets. The VAM system is an industrial B2B e-market that supports triangular business processes namely, demand, supply and transport of industrial products, using digital intermediation services.

For the description of the industrial B2B process in VAM, the Unified Modeling Language (UML) is used. The UML business modeling concentrates on the business processes that will be generally supported by the VAM system. It describes the structure and dynamics of the business processes around the system. In specific, it concerns the identification of actors (anyone or anything that is external to the business but interacts with it), and use cases (a group of related workflows within the business that provide value to the actors). UML business modeling results in the use case and the activity diagrams. A use case diagram illustrates use cases and actors for business processes, as well as the interactions between them. Actors are represented as stick figures and use cases are shown as ovals. An activity diagram is used to describe the workflow through a particular use case. It consists of action states, activity states and transitions between them.

In the following, the COSMOS environment is used for modeling the Supply Customer Info and Product Order business processes. These processes are expressed as BPEL processes. First, the manager view of COSMOS is used for designing these processes. For brevity reasons, the manager view of the product order business process is presented. Second, the COSMOS developer view is used in order to express the business processes as BPEL processes. In this phase, BPEL code is automatically generated for each business process.

5. Conclusion

Information systems researchers develop Web services hoping that these services will be widely offered in e-markets [3]. In this direction, this paper presents the development of two business processes of an industrial B2B e-market (termed as VAM), as Web services. Similarly, Web services have been developed for the rest of the VAM business processes such as supply provider info, get marketing info, information brokering and matching and negotiation. In the future work, Semantic Web service technologies such as the Ontology Web Language for Services (OWL-S, formerly DAML-S) will be used to develop such business processes in order to describe them in a semantic way.

6. References