Chapter XIV

Interoperability of B2B Applications: Methods and Tools

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ABSTRACT

This paper presents a Web-based data integration methodology and tool framework, called X-TIME, for the development of Business-to-Business (B2B) design environments and applications. X-TIME provides a data model translator toolkit based on an extensible meta model and XML. It allows the creation of adaptable semantic-oriented meta models to support the design of wrappers or reconciliators (mediators), taking into account characteristics of interoperable information systems, such as extensibility and composability. X-TIME defines a set of meta types which correspond to meta level semantic descriptors of data models found in the Web. The meta types are organized in a generalization hierarchy to capture semantic similarities among modeling concepts of interoperable systems. We show how to use the X-TIME methodology to build cooperative environments for B2B platforms involving the integration of Web data and services.

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INTRODUCTION

The WWW provides access to large collections of data or documents represented in a variety of data formats (text, HTML, multimedia, etc.). The data are often in human readable formats not suitable for (automatic or semi-automatic) semantic based processing or integration. Semantic-related issues play a crucial role in the development of Web-based applications in which multiple interoperable systems exchange and share data. Information system interoperability aims to support the amalgamation of autonomous heterogeneous systems. Interoperable systems allow the creation of integrated virtual environments or architectures in which information from multiple disparate sources can be accessed in a transparent and efficient manner.

In order to achieve a high level of interoperability and interactions among enterprises, B2B methodologies have recently emerged as appropriate solutions for exchanging business-oriented data, processes, and services. These emerging methodologies aim to provide tools for (1) processing and sharing data in various business formats and (2) integrating distributed business functionalities to create Web services. Data and system integration can be hampered by many issues, including platform, syntactic, and semantic heterogeneity problems. Platform (hardware, software, communication) heterogeneity is resolved by communication standards and protocols, such as CORBA, IP, and HTTP. Syntactic heterogeneity requires common or pivot meta models to represent the data of the participating systems. Finally, semantic heterogeneity uses semantic models and languages that can capture the meaning of the representation concepts of different information systems.

To allow the exchange of business services and processes among various sources, there is a need (1) to standardize low level communication systems and protocols (SOAP, Simple Object Access Protocol); (2) to define common data presentation format and service definition languages (WSDL, Web Services Description Language, for the resolution of structural heterogeneity); and (3) to provide repositories (UDDI, Universal Discovery, Description, and Integration) for the description and classification of Web services. XML (eXtensible Markup Language) plays an important role in the development of Web services and B2B applications. It has emerged as a de facto standard for data exchange in networked environments (Abiteboul, Buneman & Suciu, 2000; XML, 2004). XML is a textual language that provides a structural description (and related semantic) of information (Pardi, 1999). It is more than a tool or language that allows the separation of content description from content presentation. It is a meta language from which more than 260 languages (XML Acronym Search Results, 2004) have been developed in the last few years. Examples of languages derived from XML include Business Rules Markup Language (BRML, 2004), Advertising XML (adXML, 2004), XML Common Biometric Format (XCBF, 2004), Global Positioning System Markup Language (GPSML, 2004). The
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