

Data Management Issues in Electronic Commerce

Guest Editor's Introduction

Asuman Dogac

Software Research and Development Center
Dept. of Computer Engineering
Middle East Technical University
06531, Ankara, Turkey
email: asuman@srcd.metu.edu.tr

E-commerce is not a static field, but is constantly evolving to discover new and more effective ways of supporting businesses. Data management is an integral part of this effort. This special issue aims to report on some of the recent developments and identify some research directions in this area.

Initially, e-commerce involved the use of EDI and intranets. Today we see the dominance of XML. Almost all recent electronic commerce standards are based on XML. As a consequence, the amount of XML data being stored is large, and it is increasing. This naturally leads to the question of how to store and query the XML documents. The paper by Tian, DeWitt, Chen and Zhang describes the design and performance evaluation of alternative XML storage strategies. The results of this performance study provide valuable hints on how to store the XML files depending on the application.

Personalization in e-commerce is about building customer loyalty by understanding and thus addressing the needs of each individual. E-commerce systems need customers' profiles to provide better services. Furthermore, the integration of Internet with telecommunication networks have made it possible for the users to connect to the Web with a variety of mobile devices as well as desk tops. This requires that customer profiles be available to any desktop or mobile device on the Internet that users choose to work with. Such a mechanism must respect users' privacy and security constraints. Cingil proposes a "Trusted Authority" concept for supporting dynamic globally accessible user profiles to fulfill this need.

Sommer, Gullidge and Bailey describe a hub technology for the aerospace industry deployed in Taiwan. The system intends to provide a low cost solution to satisfy the needs of Small and Medium Enterprises (SMEs). Since the supply chain partners use different XML documents in different vertical domains, a critical part of the system is the XML translation engine that provides necessary parsing, querying, and formatting functions to transform one XML standard document into another. The authors then provide their experiences with different tools used for transporting the documents among the SMEs.

The paper by Cilia and Buchmann presents a framework for a service based middleware architecture that contains an ontology-based infrastructure and event notification facilities. The events detected in heterogeneous environments are converted to a common semantic context and notifications are sent to relevant users/programs through a publish/subscribe system.

Hummer, Lehner and Wedekind address another important aspect of e-commerce, that is, negotiation. They describe a formal methodology for discovery and negotiation of configurable goods and services.

ebXML is an initiative from OASIS and United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) which aims to provide the exchange of electronic business data in Business-to-Business (B2B) and Business-to-Customer (B2C) environments. The initiative leverages from the success of EDI in large businesses, and intends reaching SMEs. The vision of ebXML is to create a single set of internationally agreed upon technical specifications that consist of common XML semantics and related document structures to facilitate global trade. The paper by HyoungDo Kim describes a business process definition tool based on UML for modeling of ebXML business processes, which fulfils a need in this respect.

The paper by Cui, Jones and O'Brien discusses semantic interoperability in e-commerce using an ontology-based approach. The authors discuss both the bottom-up and top-down construction of ontologies and provide an ontology management infrastructure.

Quix, Schoop, and Jeusfeld address the integration and classification of product data and data management for negotiations. For the data integration part, the authors propose federated database systems, where all the requests are sent to a repository and then the repository sends the queries to the appropriate sources. Since this can be slow, materialized databases are proposed, but then since some users do not want to share their data with everyone, they propose the concept of business data spaces, where access restriction mechanisms are used. For the classification part, they propose a generic ontology schema.

More recently, agent technology has found numerous application fields in e-commerce, and resulted in very promising products and prototypes. Applications of agent technology range from buying and selling agents in electronic marketplaces to personal agents handling user profiles, and requests. The paper by Erdur and Dikenelli describes a FIPA compliant multi-agent system for software component marketplaces. Two ontologies are defined in UML, one for modeling the component libraries and another one for modeling components in specific domains. The agents in the marketplace have the ability of exchanging ontologies at run time.

Ball, Ma, Raschid and Zhao describe a supply chain infrastructure test bed where mainly an Enterprise Resource Planning (ERP) and a Supply Chain Management System (SCM) are integrated through a middleware collaboration software. The authors then discuss a variety of information sharing methodologies and summarize research on the benefits of intra organizational knowledge sharing.

Finally, the paper by Bussler addresses the role of B2B Engines in B2B Integration Architectures. The main functional requirements and components relevant to a B2B server capable of handling events of various protocols and trading partner specifications are discussed. The author describes the proposed architecture with examples and references to major B2B standards.

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