Editors' Introduction

Web-based software development is one of the most growing areas in the software industry. Several application domains like e-commerce, community information systems, and multi-agent systems have benefited from the new means of access and visualization of information supported by the Web. However, this is still an emerging technology, and as such, Web-based software design is still in its infancy. On the other hand several software engineering techniques have become popular in the past few years, including design patterns, application frameworks, component standards, and development processes. The papers in this volume address how these techniques may be applied to enhance Web-based software development. The areas covered by the papers in this volume include components and patterns, development processes, software documentation, multi-agent systems, eXtensible Markup Language (XML) technology, and innovative application areas.

The first five papers in this volume describe how components and patterns can be used to support the development of Web applications. The paper by Blake, Hamilton, and Hoyt proposes a component-based architecture for the development of distributed data management Web applications. This architecture is based on the idea of "plugable" Web-based components. As a case study the paper presents the distributed data management system that supports the Center for Advanced Aviation System Development (CAASD). The paper by Atkinson, Bunse, Groß, and Kühne describes a development methodology for Web-based systems in which components, frameworks, and product-line architectures play a central role. The proposed methodology also addresses the issues of composition, separation of concerns, and validation. The paper by Saiedian proposes a framework to evaluate distributed object models (DOMs). The evaluation criteria are based on a number of important managerial items such as cost, personnel, technology resources, training, enterprise changes, and time constraint. The most widely used DOMs (CORBA, DCOM, and RMI) are discussed in the light of the proposed framework. The paper also presents a Web engineering case study to illustrate how the framework can be applied in practice. The paper by Rossi and Schwabe discusses different object-oriented design structures and patterns for building Web applications. It bases its discussion on the separation of the navigational and conceptual models proposed by the Object-Oriented Hypermedia Design Model (OOHDM). Additionally, it introduces Web frameworks as a conceptual approach to maximize design reuse in Web applications. The paper by Markiewicz, Lucena, Alencar, and Cowan describes how the Abstract Design Views (ADV) model can be used to support reuse and separation of concerns in the development of Web applications. The paper also proposes reuse tax-

onomies to analyze and validate the ADV model. Finally, it shows how the proposed approach enhances the design of e-commerce applications.

The following three papers propose processes and standards for Web-based software development. The paper by Reinhartz-Berger, Dori, and Katz introduces OPM/Web, an extension to the Object-Process Methodology (OPM) that satisfies the functional, structural, and behavioral Web-based information system requirements. The paper also presents a case study that evaluates OPM/Web and compares it to the Unified Modeling Language (UML), which is the Object Management Group (OMG) standard for object-oriented development. The paper by Henderson-Sellers, Lowe, and Haire analyses the efficacy of the OPEN development process in the context of Web development. It proposes extensions to OPEN in order to fully support the new demands of Web site construction and the delivery of business value on the Web. The paper by Larsen and Conallen presents standards that enable teams to build, communicate, and apply their experiences in Web application software developments. These standards are based on UML and on the UML representations of Web-based systems.

The next two papers are in the area of software documentation. The paper by Bompani, Ciancarini, and Vitali presents an XML browser that, given its modular architecture and general scope, can be used as the basis for implementing sophisticated hypertext functionalities on the Web. The paper describes how this XML browser can be used for displaying notations relevant to software engineering, such as UML diagrams. The paper by Fuentes, Troya, and Vallecillo proposes the use of UML profiles for documenting Web applications. As an example, it presents a UML profile for MultiTEL, a framework particularly well suited for the development of multimedia and collaborative applications in open distributed environments. The paper also shows how to build UML profiles, and how systems designers can use these profiles and frameworks for multimedia applications.

Multi-agent systems is an important application area for Web engineering. The paper by Calderoni and Soulié introduces a generic multi-agent platform for collective research on self-organized systems. It details the construction of the platform upon generic models of environment and agents and it describes the suitability of the architecture for collective research. The paper by Brugali proposes the use of software agents as a mediation support between the Internet and its users. It presents a classification for mediation. Additionally, it describes an agent-oriented mediation framework and it presents a case study in the domain of product negotiation on the Internet that illustrates how the proposed framework can be applied in practice. The paper by Menkhaus presents a system that addresses the issues of user interface and personalization features in Internet-based services and applications. It proposes a solution based on an event graph that abstracts the user interface and personalization aspects from the implementation of the service on different gadgets.

XML is one of the underpinning technologies for the development of Web-based systems. The following two papers focus on XML and its application in Web-based software development. The paper by Sun, Dong, Liu, and Wang addresses the issues of how XML can benefit from formal modeling techniques and how XML can support

formal software development processes. More specifically, it describes the use of XML for assisting the development of a Web-based environment for the Z family languages. The paper by Löwe, Noga, and Gaul proposes an offline parser generation approach to enhance online parsing performance for XML documents conforming to a given Document Type Definition (DTD). It presents an algorithm that maps DTDs to deterministic context-free grammars defining the same languages. The experiments in the paper show that superior XML parsing performance can be achieved with generated optimized parser.

The last paper in this volume, by Alencar, Cowan, and Luo, presents a framework architecture for Web-based community information systems (CIS). CIS is a new and innovative application area that can benefit from Web engineering technology. The proposed framework is based on COTS (commercial-off-the-shelf) software components and network technologies. The paper discusses how a component-based approach, a layered architecture model, and design patterns can be used to provide a common framework for CIS. Finally, it presents the overall framework architecture, its individual components, and the most important interaction patterns.

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