Lecture Notes in Computer Science 1402

Edited by G. Goos, J. Hartmanis and J. van Leeuwen

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Trends in Distributed Systems for Electronic Commerce

International IFIP/GI Working Conference
TREC'98
Hamburg, Germany, June 3-5, 1998
Proceedings

Springer

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Cataloging-in-Publication data applied for

Die Deutsche Bibliothek - CIP-Einheitsaufnahme

Trends in distributed systems for electronic commerce : international IFIP-GI working conference ; proceedings / TREC '98, Hamburg, Germany, June 3 - 5, 1998. Winfried Lamersdorf ; Michael Merz (ed.). - Berlin ; Heidelberg ; New York ; Barcelona ; Budapest ; Hong Kong ; London ; Milan ; Paris ; Santa Clara ; Singapore ; Tokyo : Springer, 1998
(Lecture notes in computer science ; Vol. 1402)
ISBN 3-540-64564-0

CR Subject Classification (1991): C.2, E.3, D.4.6, H.4, H.5, I.211, K.4.1, K.5.1-2, K.6.5

ISSN 0302-9743
ISBN 3-540-64564-0 Springer-Verlag Berlin Heidelberg New York

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Printed in Germany

Typesetting: Camera-ready by author
SPIN 10637100 06/3142 – 5 4 3 2 1 0 Printed on acid-free paper

Preface

Electronic Commerce is potentially the most important application area of the Internet. It demands a variety of information, negotiation, trading, and payment facilities (to name just a few) and is hard to capture by a concise definition. Our conference on *Trends in Electronic Commerce* is concerned with the development of and support for commercial transactions across computer networks, without seeking to overly define what we mean by a commercial transaction, what we mean by support, who we intend to support, or how it is provided.

Support for electronic commerce includes electronic payment mechanisms and security, inter-organisational workflow management, electronic data interchange (EDI), on-line catalogues, electronic signatures and contracts, negotiation support, communication and collaboration infrastructures, the management of intellectual property rights, Smartcards, banner advertising, trust centres, business objects, virtual enterprises, mobile and intelligent agents, brokers, banks, electronic notaries, virtual shopping malls, Internet technologies, and internationally harmonised legal frameworks.

With this variety in its facets, electronic commerce provides many challenges and opportunities. It forces us to bring together experts from various disciplines – practitioners as well as researchers, technology developers as well as users. Providing support for electronic commerce requires the effort of computer scientists but also collaboration with business professionals, economists, lawyers, and politicians. This provides a microcosm of other recent trends in software and IT development, where easy Internet access is becoming a commodity for mass users, where legacy systems need to be integrated with latest technologies, and new business opportunities emerge from a new marketplace.

A conference on electronic commerce cannot cover all relevant areas in a small number of papers or presentations, so TREC'98 tries to approach this complex area from a predominantly technological perspective. In doing so, it continues a recent tradition of international workshops and conferences in Germany on up-to-date 'Trends in Distributed Systems'. In this tradition, TREC'98 is the first to concentrate specifically on electronic commerce infrastructures and applications.

While mainly technological, the organisers have considered it important to include social, political, and legal views, so that TREC'98 can help broaden the perspective of each participant, regardless of provenance, by providing a forum where individual research results can be validated not only by peers, but also against requirements, ideas, and objections of neighbouring and unfamiliar disciplines which all aim at supporting world-wide trade applications by computer-supported means.

Accordingly, TREC'98 has been structured to facilitate exchange, not only between persons working within a specific area, but also between those working in research, industry, and commerce itself. There is a *research track* in TREC'98. Its proceedings cover the 19 best papers out of 75 submitted from 29 countries and 5 continents world-wide. In addition, TREC'98 contains two further elements: an *industrial track*

and an *exhibition*. Together, these elements aim to provide a fruitful setting for the exchange of experience and ideas between practitioners and researchers from various countries. As TREC'98 takes place in the old financial district of the city of Hamburg, it continues a long tradition of supporting people engaging in trade and commerce activities with the most up-to-date facilities.

Contributions to this book cover the following areas:

- Business over the Internet

Without realistic requirements and constraints, the design of electronic commerce systems will never match user needs. Here we include models and mechanisms from research fields such as microeconomics and marketing theory, in order to analyse customer behaviour and to clarify design goals for others.

- Security and Payment

A secure communication infrastructure is a vital pre-condition for commercial transactions across world-wide communication networks. In electronic commerce the concept of security goes beyond questions of authorisation, authentication, and encryption. The certification of public keys, quality-of-service attributes, the credit card number, etc. are all issues for electronic commerce infrastructures.

Except for barter, commercial transactions are composed of flows of goods or services in exchange for money. While relying on sound security mechanisms, payment protocols and services need to be integrated easily into electronic commerce infrastructure frameworks. Contributions to this part present approaches to integrate payment mechanisms with mobile agents, and to support anonymity for market participants.

- Inter-organisational Workflow Management

The integration of business processes across organisational boundaries presents a challenge for management as well as for technology. In the field of inter-organisational workflow management, the problems of process integration need to address heterogeneous security, administration, legal, and software technology domains. Contributions to this part focus on enhancing the flexibility and dynamic integration of underlying software systems.

- Middleware and Brokerage

The middleware of distributed systems provides a bridge from basic communication to the application-specific software of business entities. Specific middleware architectures are emerging in the domain of electronic commerce. These utilise interoperability standards, such as those defined by the Object Management Group, to provide flexible software distribution mechanisms and to build application-oriented support services such as traders and brokers which – in contrast to mere directory services – provide matchmaking support for suppliers and users of services and products.

- Agent Technology

This final topic addresses the application of both mobile and intelligent agent technology to the field of electronic commerce. Mobile agents may help market participants with their information and product retrieval tasks as well as in performing complete commercial transactions. Open issues and obstacles are discussed in the research contributions. Intelligent agents, on the other hand, help to assist and represent human users by sophisticated interactions at a higher level of interaction semantics. Background from the artificial intelligence domain is applied here to utilise knowledge representations and to implement a responsive, strategic, and purposeful behaviour of software components for commercial transactions.

Last but not least, we wish to acknowledge the hard work of all those who contributed to TREC'98 in various ways. Authors, speakers, programme and organisation committee members, reviewers, and exhibitors all deserve to be mentioned. We thank the programme committee for selecting a well-balanced technical programme and the local organisation committee for the many activities needed to make such an event happen. Special thanks go to Marko Boger and the co-operating colleagues and students who developed the completely Web-based review management and organisational tools. These have facilitated efficiency in the conference organisation in ways most appropriate for the conference theme.

March 1998 Winfried Lamersdorf and Michael Merz

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