Introduction to the Special Issue on M-services

THE GROWTH of Internet technologies has enabled a wave of innovations that are having an important impact on the way businesses deal with their partners as well as their customers. To remain competitive, traditional businesses need to take advantage of the information revolution that the Internet and Web have both brought about. Most businesses are moving their operations to the Web for more automation, efficient business processes, personalization, and for more global visibility.

Web services are one of the promising technologies that help businesses become more Web-oriented. In fact, business-to-customer cases identified the first generation of Web services. More recently, businesses started using the Web as a means of connecting their business processes with other partners by creating what is called business-to-business Web services.

Besides the new role of the Internet as a vehicle for delivering Web services, a major growth in the field of wireless and mobile technologies is witnessed. Indeed, new opportunities are offered such as surfing the Web using the wireless application protocol (WAP). Because users are relying more and more on mobile devices to conduct their operations, enacting Web services from mobile devices and possibly downloading these Web services for execution on mobile devices are new avenues that IT businesses are pursuing. At present, the main use of mobile communications is still voice-related, but multiple indicators show that this is changing. Larger displays, third generation networks, e.g., general packet radio service (GPRS) and universal mobile telecommunication system (UMTS), and recent development of communication protocols, are being combined to give a rich user experience of data-centric services.

By organizing this special issue, we present recent and significant developments in the general area of mobile Web services (M-services). The advent of wireless technologies, such as palmtops and cell-phones, creates the possibility of providing facilities on the spot, no matter where users are located. However, businesses that are eager to engage in M-services activities are also facing complicated technical, legal, and organizational challenges. This special issue includes six papers that were selected among the twenty-nine submissions in response to our call for papers. Given the novelty of this research area, in addition to contributions describing proven research efforts, we have also included in this issue concept and visionary papers that outline key challenges and research directions.

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The paper "Location-dependent Services for Mobile Users," by Cabri *et al.*, outlines the value-added of location-based services to mobile users. Provisioning such services requires awareness mechanisms that consider the context in which users request the services. Context is defined as the information that characterizes the interactions between humans, applications, and the surrounding environment. The paper illustrates the use of mobile software agents and mobile agent reactive spaces (MARS) coordination framework for the development of location-dependent services.

The paper "Konark: A System and Protocols for Device Independent, Peer-to-Peer Discovery and Delivery of Mobile Services," by Lee *et al.*, has been motivated by the proliferation of mobile devices and the pervasiveness of wireless technologies. Both arguments highlight the importance of supporting users by offering mobile services on the spot and regardless of where these users are located. Available service discovery and delivery mechanisms are mainly designed for traditional infrastructure-based networks. They are not suitable for ad-hoc wireless environments. To handle the specificities of such environments, Konark provides each device the ability to advertise and discover services in an efficient way.

The paper "Achieving Secure and Flexible M-services through Tickets," by Wang *et al.*, discusses the importance of achieving the security and flexibility of M-services. It is observed that several standard techniques are being developed only for Web services but no major techniques are being dedicated for access control to M-services. The secure and flexible access control for M-services that Wang *et al.* introduce relies on the approach of role-based access control. This control architecture involves a trusted credential center, a trusted authentication and registration centre, and a service ticket based mechanism for service access. Tickets are issued to users and carry authorization information needed for the requested services.

The paper "Automating Negotiation for M-Services" by Paurobally *et al.*, discusses issues related to automated negotiation in m-commerce environments. The authors developed and evaluated time-constrained bilateral negotiation protocols. Among other things, these negotiation protocols allow agents to adapt to the quality of the communication network.

The paper "A Three-Tier View-based Methodology for M-Services Adaptation," by Chiu *et al.*, proposes a view-based methodology for the adaptation of business processes execution to mobile devices. Views are used to customize business processes in order to support service provisioning in mobile environments.

The paper "Organizing and Accessing Web Services on Air" by Yang *et al.*, proposes an infrastructure for organizing and

efficiently accessing M-services in broadcast environments. The paper defines a multichannel model to carry information about M-services available within a given geographic area. In addition, the paper introduces three techniques to enable efficient access to wireless channels.

The guest editors would like to thank all of the authors who submitted papers to this special issue. In addition, the guest editors would like to thank the anonymous referees for their time and efforts to review submissions. Finally, the guest editors would like to thank Prof. Don Brown, Editor-in-Chief of IEEE TRANSACTIONS ON SYSTEM, MAN, AND CYBERNETICS –PART A for his guidance.

BOUALEM BENATALLAH, *Guest Editor*
New South Wales University
School of Computer Science and Engineering
Sydney, NSW Australia
boualem@cse.unsw.edu.au

ZAKARIA MAAMAR, *Guest Editor*
Zayed University
College of Information Systems
Dubai, United Arab Emirates
Zakaria.Maamar@zu.ac.ae

Boualem Benatallah (M'01) received the Ph.D. degree in computer sciences from IMAG Grenoble University, Grenoble, France in 1996.

He is a Senior Lecturer in the School of Computer Science and Engineering, University of New South Wales, Sydney, Australia. His research interests lie in the area of workflows, Web/mobile services, and mobile databases.

Zakaria Maamar received the Ph.D. degree in computer sciences from Laval University, Quebec, QC, Canada, in 1998.

He is an Associate Professor in the College of Information Systems at Zayed University in Dubai, United Arab Emirates. His research interests lie in the area of mobile computing, Web/mobile services, and software agents.