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GUEST EDITORIAL

Mobile Web and service applications: guest editors' introduction

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1 Introduction

The Web of today is a mature application consumption and development platform. Web browsers are stable, JavaScript code is almost fully portable among browsers, Web services provide access to an unprecedented amount of reusable functionality on the Web, and Web applications are as interactive and engaging as their desktop counterparts—if not even more. All this is true especially for conventional desktop and notebook computers, while things slightly change if we move our focus from conventional clients to mobile clients, such as mobile phones, smart phones, tablets, embedded devices, and the like, a reality that has been growing considerably over the last years. For instance, already two years ago, there were more mobile users than desktop users accessing social networking applications [1], and the number of mobile phone users is much higher than the number of desktop/notebook users. However, despite extraordinary and fast progress, mobile services and applications are still in their infancy and only seldom at the level of quality of their desktop counterparts.

The increasing adoption of standard Web technologies, originally developed for conventional Web clients, significantly eases also the development of services and applications in modern mobile environments[1], yet mobile application and service development also comes with its very own peculiarities and engineering challenges that ask for specific solutions and development methodologies that extend state-of-the-art Web development practices. The huge adoption, fast spreading, and novel capabilities of mobile devices pose new requirements to Web service and application engineering, such as:

– *Multi-channel deployment*: The availability of mobile devices first of all asks for the capability to deploy applications in both conventional desktop and mobile computing environments. The use of standard Web technologies and infrastructure certainly eases this task, but still the different device capabilities (e.g., with smaller screen sizes and lower computing power on the mobile client) typically ask for adaptations of Web applications that go far beyond the simple adaptation of style sheets and images and instead embrace the whole structure of Web applications and their interaction paradigms (e.g, to support touch screens). This also comprises the choice of whether to develop a Web application to be consumed via the device's mobile browser or a native application tailored to a specific mobile operation system.
– *Cross-device integration*: Next to deploying applications on multiple devices, users increasingly expect their applications not only to run on all their devices, but also to be integrated with each other, possibly in real time. In this respect, the integration of Web applications and services with cloud computing infrastructures as mediators between all interacting applications (especially for the

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[1] Interestingly, standards like WAP [2], which have been specifically developed for mobile clients, were not able to attract the necessary critical mass to survive, neither in Europe nor in the US.

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centralized management of the users' data or the de-localization of computing-intensive tasks) becomes crucial and a strategic value to both application/service providers and consumers.
- *Device APIs*: Mobile devices, especially smart phones and tablets, are advanced computing devices with capabilities that to some extent go even beyond those of desktop or notebook computers. For instance, today almost all smart phones come with their own, built-in GPS receiver, an accelerometer, a variety of other sensors, a built-in camera, a calender, and so on, which can be leveraged on in the development of mobile Web applications. These capabilities have not been there only few years ago.
- *Personalization and context-awareness*: Being the mobile device intrinsically a personal device, the personalization and customization of mobile Web applications and services is even more important than that of conventional Web applications. The availability of location and other sensor data opens up the way for unprecedented context-awareness capabilities in mobile Web applications, which, however, need to be well-engineered and thought through.
- *Security and privacy*: Given their personal nature (users typically carry them in their pocket or purse), mobile devices oftentimes carry more sensible data, such as photos or short text messages, about their owners than their desktop computers. It is therefore important that applications and the mobile operating systems guarantee the necessary protection to their users in terms of security and privacy of their data, which are continuously threatened by online attacks and carefree users.

The aim of this special issue is to shed light on these challenges and on the specific problems and solutions the research community is working on. Mobile computing and especially the support in terms of models, languages, infrastructures, and methodologies that can be provided to developers implementing mobile applications are certainly one of the topics that will occupy the research agenda of the years to come, hopefully to the satisfaction of the mobile users.

Of course, the modern mobile computing landscape comes with many other research and engineering challenges, such as lowering the energy consumption of mobile devices or catering for the necessary bandwidth to support the ever growing ecosystem of mobile applications, but in this special issue, we want to specifically focus on the challenges regarding the engineering of Web application and services.

2 In this issue

This special issue collects extended versions of a selection of the best papers presented at the 8th International Conference on Mobile Web Information Systems (MobiWIS 2011[2]), which focuses on the convergence of service-oriented computing, Web-based information systems, and mobile devices. Out of all the submissions, in this issue, we collect a set of papers that represent well the current problems approached by research and industry, focusing for instance on the problem of Web vs. native applications, cloud computing, location awareness, and usage control. Specifically:

- In *Towards a cloud-based mobile device: scriptable Web applications as first-class citizens* Mikkonen et al. propose an own mobile runtime environment for Web-based, scriptable applications that is able to provide a user experience that is similar to that of native applications. The goal of the authors is to break with the document-centric interpretation of Web applications, which confines them inside a relatively closed Web browser, and to enable them, for instance, to run as a background process or to leverage on the device's high-performance graphics capabilities.
- In *Social group formation with mobile cloud services* S. Srirama at al. investigate how to reconstruct small social networks from a set of photos taken with the mobile phone. The proposed CroudSTag system heavily leverages on cloud resources and computing power and is able to recognize faces, name them, and connect the user with the identified users.
- In *TransportML platform for collaborative location-based services* W. Ait-Cheik-Bihi at al. propose a service-based platform that is specifically tailored to the needs of interoperability and safety in the context of transportation and that leverages on the collaborative power of multiple distributed devices. The core of the approach is TML, a Transportation Markup Language for transmission of language-independent traffic and travel information.
- In *A synergy between context-aware policies and AOP to achieve highly adaptable Web services* H. Yahyaoui at al. propose an approach to the development of adaptable Web services based on a synergy of context-aware Web service policies, expressed via an extension of the Web Service Policy Language (WSPL), and Aspect Oriented Programming (AOP), which is able to automatically weave policies into composite Web services.
- In *Distributed and minimal usage control* Biswas et al. show how the usage of personal data by service providers can be monitored in a distributed fashion for an expressive set of policies, in order to assess compliance with privacy regulations and user preferences, a complex but important aspect especially in cloud computing environments.

[2] http://cs-conferences.acadiau.ca/mobiwis-11/.

The articles in this special issue demonstrate a set of conceptual and technical issues that give the reader a first impression of what novel problems mobile Web application and service development is facing today, while they also provide a set of hints and ideas on open issues and future research challenges.

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