Improving Device-Aware Web Services and their Mobile Clients

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Abstract: Mobile devices have become an essential element in our daily lives and Web services have grown extremely important when offering services through the Internet. However, current Web services are very inflexible as regards their invocation from different types of device, especially when being invoked from mobile devices. In this paper, we summarize an approach for the creation of flexible Web services which can be invoked transparently from different types of device and which return subsequent responses, as well as providing the client’s adaptation as a result of the particular device model characteristics and end user preferences in a completely decoupled way.

Keywords: Aspect-Oriented Software Development, Mobile Devices, Web Service, Model-Driven Development.

1 Introduction

Mobile devices have acquired great prominence over the last years; the great amount of devices and their continuous use clearly illustrate the importance of access to mobile services [1]. From the service-side point of view, Web service developers have mainly focused on developing services which are designed to be accessible from desktop or laptop computers, creating a void in the sphere of their access from mobile clients. In order to meet this requirement we have to bear in mind the type of device from which the service is going to be invoked. In this regard, developed clients will vary widely depending on the target device. Furthermore, not only screen size, but also runtime capacity needs to be considered [2]. On the other hand, from the client-side point of view, once we develop a client for a specific type of mobile device, we also have to account for the large existing differences across the whole assortment of mobile devices in the market. Besides, clients should also consider final user preferences: most mobile device screen settings can be personalized based on end-user preferences.

1 Currently affiliated to University of Cádiz.

2 This extended abstract summarizes the paper entitled Improving Device-Aware Web Services and their Mobile Clients through an Aspect-Oriented, Model-Driven Approach published at the Information and Software Technology Journal, Vol. 52, Issue 10, in 2010, p.1080-1093, which can be found at http://www.sciencedirect.com/science/article/pii/S0950584910000807
In this paper we summarize the solution presented in [3] for the creation of services which can be invoked from different types of device, particularly to adapt them to mobile clients, providing each one with the appropriate response. The solution is based on the transparent provision of information from the invoking device through the header of the sent SOAP message. The service will deliver one piece of information or another depending on the information it receives. In this approach Aspect-Oriented Programming has been used to avoid scattered and tangled code [4, 5] across the system due to the device adaptation. Furthermore, to save developers the need of learning an aspect-oriented language and to increase the implemented code’s quality and reliability, device-related code has been automatically generated thanks to the use of a model-driven approach. Even more so, in regards with client-side applications, aspects allow us a modularized non-intrusive adaptation of the latter to the specific device characteristics in which it is going to be deployed as well as a dynamic adaptation to final user preferences. Aspects’ performance evaluation has shown that their inclusion does not impact negatively on system performance.

Thus, the approach provides us with the possibility of following a model-driven development of mobile-aware Web services in an integrated platform: everything has been integrated in Eclipse, so that the full development process can be easily followed from initial platform-independent model to final implementation code.

Besides, the approach is perfectly extensible to different types of result the service has to return (not only mobile phone versus computer). Both platform-independent and platform-specific models are easily extensible for this purpose with the only addition of a stereotype for each new type of result to be returned. The new aspect required for the modularized and non-intrusive addition of code will be automatically generated by model-to-model and model-to-text transformations.

Furthermore, the use of aspects provides additional benefits: a last minute change of requirements would only imply the addition or deletion of an aspect, without the need to regenerate the full system.

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References