

Chapter 5

A Context-Aware MDA Approach for Content Personalization in User Interface Development

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ABSTRACT

User Interface (UI) personalization aims at providing the right information, at the right time, and on the right support (tablets, smart-phone, etc.). Personalization can be performed on the interface elements' presentation (e.g. layout, screen size, and resolution) and on the content provided (e.g., data, information, document). While many existing approaches deal with the first type of personalization, this chapter explores content personalization. To that end, the authors define a context-aware Model Driven Architecture (MDA) approach where the UI model is enriched by data from a domain model and its mapping to a context model. They conclude that this approach is better used only for domains where one envisions several developments of software applications and/or user interfaces.

INTRODUCTION

Recent years, the proliferation and the continuing growth of different computer devices with several interaction modes, allow users to access informa-

tion anywhere and at anytime. This flexibility makes the user even more exigent and brings new challenges to those systems. Since the relevance of the delivered information and its adaptation to the users' preferences are key factors for success or rejection of systems, the solution is to conquer

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users by developing personalized systems adapted to them.

Personalization is the capability to customize communication based on knowledge preferences and behaviors (Dyche, 2002) being able to provide content and services tailored to individuals (Hagen, Manning & Souza, 1999). Moreover, Garía-Barrios, Mödritscher, and Gütl (2005) say that to perform personalization, an internal and individual model about the user is needed. Personalization can take into account several aspects (e.g., navigation, structure, functionalities) and it can be performed on the interface elements' presentation (i.e., layout, colors, sizes, and other design elements), and on the content (data, information, document) provided in the UI (Anli, 2006; Brossard, Abed, & Kolski, 2011). Unlike content personalization, many works explore the adaptation of UI element presentation (called containers adaptation).

This chapter presents an MDA-compliant approach that takes into account the content personalization when designing UIs. Our goal is to generate context-aware UIs that provide users with personalized content, according to their context.

In the following sections we first present briefly definitions of context-awareness and its application for UI development (section 2). Then, in section 3, we describe in detail our MDA context-aware approach for content personalization. At the meantime, we showed an example of its application in the development of software system for medicine recommendation. Sections 4 and 5 present, respectively, some related works and our conclusions.

BACKGROUND

Context-aware software application was first defined by (Schilit, Adams, & Want, 1994) in 1994 as the software that “adapts according to its location of use, the collection of nearby people

and objects, as well as changes to those objects over time” (p. 1). They defend that a context-aware software application can examine the computing environment and react to environment changes. In 2001, Dey (2001) defined that “a system is context-aware if it uses context to provide relevant information and/or services to the user” (p. 1), where relevancy depends on the user's task. Schilit, Adams, and Want (1994) say that three important aspects of context are: where you are? Who you are with? and what resources are nearby? Dey (2001) generalizes those aspects by defining context as “any information that can be used to characterize the situation of an entity” (p. 3) where entity is a person, place, or object relevant to the interaction between a user and an application.

In the Human-Computer Interaction (HCI) domain, our particular interest in this chapter, Calvary et al. (2003) propose the CAMELEON framework. In this framework, the UI generation is performed through a set of models transformations, considering the context of use. According to the authors, the context of use is composed of three classes of entities: the user of the system, who is intended to use the system; the platform (hardware and software) that is used for interacting with the system, and, the physical environment where the interaction takes place. In CAMELEON, four models are proposed: task and concepts models, that describes the user's tasks to be carried out and the domain-oriented concepts required by these tasks; abstract UI, that describes a UI independently of any modality of interaction; concrete UI, that concretizes an abstract UI for a given context of use; and, the final UI, that is the operational UI running in a specific platform.

Several context-aware approaches and tools were defined based on CAMELEON, such as: UsiXML environment (Limbou et al., 2005), that supports UI generation using Model Driven Architecture (MDA) (OMG, 2003); TERESA tool (Berti et al., 2004), that supports the semi-automatic generation of multimodal UI; Sottet's

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