

Chapter 6

A Method for Generating Multiplatform User Interfaces for E-Learning Environments

Juan Manuel González Calleros
Université catholique de Louvain, Belgium

Josefina Guerrero García
Université catholique de Louvain, Belgium

Jaime Muñoz Arteaga
Universidad Autónoma de Aguascalientes, México

Jean Vanderdonckt
Université catholique de Louvain, Belgium

Francisco Javier Martínez Ruiz
Université catholique de Louvain, Belgium

ABSTRACT

In this paper the authors present a structured method for automatically generating User Interfaces for e-learning environments. The method starts with a definition of the learning scenario where the different goals, jobs (professor-student/trainer-learner), and tasks are described and stored in a template. After, the description is mapped to FlowiXML, a learning process authoring tool, where graphically trainers or content designers draw the overall process. A learning process is viewed as a workflow and modeled using Petri net notation. From each step in the process model more details are added using user task models; user's activity interacting with a user interface is stored in such diagrams. Then, a transformational method for developing user interfaces of interactive information systems is used that starts from a task model and a domain model to progressively derive a final user interface. This method consists of three steps: deriving one or many abstract user interfaces from the task model, deriving one or many concrete user interfaces from each abstract interface, and producing the code of the final

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user interfaces corresponding to each concrete interface. The models and the transformations of these models are all expressed in UsiXML (User Interface eXtensible Markup Language) and maintained in a model repository that can be accessed by the suite of tools. Developing user interfaces in this way facilitates its automated generation over multiple computing platforms while maintaining portability and consistency between the multiple versions. Our approach is illustrated on an open Learning environment using a case study.

INTRODUCTION

Knowledge acquisition in e-learning environments requires both, individualization of content and social interaction based on learning objects. The learning process links users to domain-specific information sources in collaboration spaces designed for knowledge transfer and knowledge generation. E-learning Communities describe social settings where knowledge can be exchanged effectively. Communities are composed of people who share common interests or needs following a set of rules or policies using computer technologies (Preece, 2000). In recent years, there has been a vast interest in how groups of people work together, and in how collaboration and cooperation might be supported. E-learning communities are formed and exploited by a variety of social and professional groups interacting via the Internet. An E-learning Community is a network of individuals who share a domain of interest about which they communicate online. The participants share the environment, resources, experiences, problems and solutions, tools, and methodologies.

Becoming efficient and stimulating for better and effective learning process using available technology requires a strategy to follow. The strategy must consider at least: design of learning content, design of different ways to present content (textual, graphical or mixed) considering different devices (PDA, mobile, laptop), and defining collaboration during learning process. In this chapter our objective is to describe a method to generate collaborative scenarios with learning objects that

can be manipulated in different platforms. We refer to collaborative scenarios as a description of the foreseen interaction between instructors, learners and the system; this information is gathered in a template using MACOBA (Margain, Muñoz, & Álvarez, 2008). Each scenario is viewed as a workflow (depiction of tasks during which documents or information is passed for one participant to another according to a set of rules) that is recursively decomposed into tasks, that could be associated to a learning object (LO); then each task gives rise to a task model whose connection with others models allows the design of user interfaces (UIs) using a transformational approach (Vanderdonckt, 2005). Normally, interaction and communication among e-learning community members take place through a technological interface.

In the reminder of the chapter, we provided a brief background about e-learning environments and the generation of user interfaces, next we present the models involved and the method to generate collaborative multiplatform scenarios exemplifying with a case study. The chapter is wrapped up by summarizing our work, addressing future trends, and deriving conclusions.

BACKGROUND

E-Learning Environments

There is a plethora of computer-assisted e-learning environments/tools (Wainwright, Osterman, Finnerman, & Hill, 2007). The platform of choice

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