Chapter 12

Crafting a Personalised Agent–Oriented Mobile E–Learning Platform for Adaptive Third Level Education

Olapeju Latifat Ayoola
University College Dublin, Ireland

Eleni Mangina Phelan
University College Dublin, Ireland

ABSTRACT

This chapter presents the architecture of an agent-based m-Learning platform, "Personalised Ubiquitous Learning Platform" (PULP), which incorporates adaptive personalisation and collaborative learning for the development of enhanced e-learning. The main objective of this platform is to provide University College Dublin with a single supported intelligent mobile learning environment that will promote adaptive and collaborative learning, human computer interaction on mobile clients anywhere, anytime and also to provide useful recommendation about available educational resources. The system aims to enhance the students' learning experience in third level educational environment.

INTRODUCTION

The internet is the medium for distributing content more efficiently anywhere, anytime. Learning in the 21st century is becoming ubiquitous and personalised (Bates 2000). Distance learning systems and e-learning has become a great challenge and focus of many research teams in recent years. Several e-learning tools are now enhancing second and third level learning experience in Asia, Africa and Europe (Keegan 2008). Quality pedagogical techniques enhance students' abilities and save students time when they acquire new skills and knowledge.

There is a huge demand for distant learning; the traditional learning system is too restricting for modern students. These students need to multi-task and manage their time. These students also have short attention span hence they cannot focus on a single task for a long period of time in a single space. Modern students have to work part-time in

order to meet end meet such as upkeeps, school fees, etc. In order to balance work roster and college timetable, students prefer a flexible timetable, they enrol to fewer modules hence the duration they spend to get a degree is extended. Research showed that 70% of the Australian students work an average of 14.5 hours per week and American third level students work between 5-60 hours per week. Thirty-three percent full-time students and forty-seven percent part-time students admitted that they often and sometimes miss lectures and practical sessions (Misfud et al 2005). The same education systems are mainly based on client-server or peer-to-peer architectures, which have shortcomings such as poor scalability and low availability. Another approach such as service-oriented architecture encapsulates e-learning contents (Harrier, 2002, Pankratius, 2004, Vossen, 2003) inside a Web service to improve interoperability and reusability (Pankratius et al, 2003). This approach benefits education systems; contents are made available on the Web in different formats; the Web services can provide functionality that extracts and present these contents (Pankratius, 2003).

Personalisation is another shortcoming of the current e-learning systems (ELS) and one of the strong claims of the work presented in this chapter. In the previous years, some ELS introduced useful suggestions to support students' lesson sessions, monitor student's progression and consider students' learning styles (Ayoola 2008). An extracted suggestion can be content-based, recommending a similar course based on students' browsing history or search query. This collaborative filtering is carried out by searching for similarities between students and recommending similar modules (Garruzzo et al, 2007).

University College of Dublin (UCD) has a modularized, credit-based educational system known as UCD Horizon that provides adaptive learning. UCD's fast and efficient wireless local area network (WLAN) provides access to resources anywhere, anytime for its vast scale of

students. This offers great opportunity for mobile clients' users and e-learning facility. UCD has managed learning environments (MLEs) that act as resource repository and also as an intelligent learning environment that aids students through their learning stages. These MLEs lack personalisation, efficiency, and interoperability. The majority of the services provided from the MLEs, such as collaborative learning, are redundant because tutors and students are not making use of them. The skills learnt in order to use one MLE are not transferable to other mobile learning environments (Ayoola et al, 2008). Furthermore, the existing MLEs are designed for clients such as desktop computers and notebooks hence it's not ubiquitous enough.

The Leonardo da Vinci project[1] led by Ericsson stated that the next generation of learning is based on wireless devices. PULP's development is influenced by the fact that educational tools and resource contents' support are now provided with specific technical requirements and at affordable prices (Adelsberger et al, 2002). Content can also be presented with reduced costs for administrative tasks (Pankratius et al, 2004). Moreover, the recent advanced development of wireless devices and network has enabled learning to step out of the traditional classroom learning system (Amin et al 2006) hence distant learning has become a standard learning environment. E-learning systems are now very popular in Information and Communication Technology (ICT) due to the improved adaptivity and e-courses' personalisation requirements (Garruzzo et al, 2007).

This chapter describes the architecture of a Personalised Ubiquitous Learning Platform (PULP) that is being designed for UCD in order to enhance its managed learning environments, to provide recommendations, to improve scalability, availability and personalise the existing systems. PULP's architecture is agent-oriented and educational learning contents are enfolded by web services; the web services provide consistent services to students. PULP aims to use enhanced

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