UNIVERSITI PUTRA MALAYSIA

RSS-BASED INFORMATION DELIVERY MODEL FOR LEARNING MANAGEMENT SYSTEM

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RSS-BASED INFORMATION DELIVERY MODEL FOR LEARNING MANAGEMENT SYSTEM

By

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UPM

DEDICATION

To my dear parents that I owe them each moment of my life.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

RSS-Based Information Delivery Model for Learning Management System

By

SOLMAZ BAGHERPOUR

June 2008

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In modern education, e-learning or Internet enabled learning has been extensively used by teaching and learning institutions, especially by higher education for improving their educational services. Learning Management Systems (LMS) are one of the important parts of e-learning solutions for providing learning contents and learning information during the educational process. Information delivery as main functionality of these systems has a vital role in the success of these systems in achieving their goals. An LMS with growing number of users, courses, and frequently updated learning information resources needs a systematic, fast and easy to use information delivery service which can support personalization also.

As a response to this need and with considering technical and pedagogical benefits of RSS (Really Simple Syndication), this research applied a combination of RSS 2.0 and RSS 1.0 to design a new RSS-based information delivery framework for LMSs. The proposed RSS based information delivery framework is implemented on e-SPRINT, an existing LMS at Universiti Putra Malaysia as object of experiment, and

evaluated regarding to the impact of RSS-based information delivery framework in users satisfaction and usability of the LMS in information delivery.

Based on the analysis of the results of experimental design there is positive changes in users satisfaction with information delivery after using the framework compared to before using the framework. According to usability evaluation of the RSS information delivery framework also, positive changes of user perception from the aspect of usability in information delivery has been gained. It is mentionable that the scope of the study was limited to the case study system. The contribution of this study was the design and development of an RSS-based information delivery model for LMSs to support systematic fast and easy to use information delivery.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

RSS Bersaskan Model Peniampayan Maklumat untuk Sistem Pengurusan Pembelajaran

Oleh

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Pengerusi : Professor Madya Mohd. Hasan Selamat, PhD.

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Dalam pendidikan moden, e-pembelajaran atau pembelajaran berasaskan internet telah digunakan secara intensif dalam institusi pengajaran dan pembelajaran, terutamanya pada peringkat pengajian tinggi untuk mempertingkatkan perkhidmatan pendidikan. Sistem Pengurusan Pembelajaran (SPP) merupakan salah satu daripada bahagian penting dalam penyelesaian e-pembelajaran dalam menyediakan kandungan dan maklumat pembelajaran semasa proses pendidikan. Penghantaran maklumat merupakan satu fungsi utama yang memainkan peranan penting untuk mencapai matlamat tersebut. Perkembangan yang pesat pada jumlah penguna, kursus, dan sumber maklumat yang kerap dikemaskini, menyebabkan SPP memerlukan servis penghantaran maklumat yang sistematik, cepat dan mudah digunakan serta mampu menyokong personalisasi.

Sebagai tindak balas untuk memenuhi keperluan ini, dengan mengambil kira pertimbangan teknikal dan faedah pedagogical menggunakan RSS (*Really simple syndication*), penyelidikan ini mengaplikasikan kombinasi RSS 2.0 (*Really simple syndication*) dan RSS 1.0 (*RDF Site Summary*) untuk mereka bentuk satu rangka kerja penghantaran maklumat berasaskan RSS yang baru untuk SPP. RSS berasaskan rangkakerja penghantaran maklumat yang dicadangkan dibangunkan pada e-SPRINT (System Pengurusan Rangkaian Integrasi Notakuliha dalam Talian –mod Elektronik), salah satu SPP yang telah sedia ada di Universiti Putra Malaysia sebagai satu kajian kes, dan dinilai berdasarkan kepada impak rangka kerja penghantaran maklumat berasaskan RSS menggunakan kepuasan pengguna dan kebolehgunaan SPP dalam penghantaran maklumat.

Berdasarkan kepada analisis keputusan eksperimen, terdapat perubahan positif di dalam kepuasan pengguna bagi penyampaian maklumat selepas menggunakan rangka kerja yang dicadangkan berbanding sebelum menggunakan rangka kerja tersebut. Berdasarkan kepada penilaian, kebolehgunaan rangka kerja penghantaran maklumat berasaskan RSS ini juga telah didapati terdapat perubahan posistif dari segi tanggapan pengguna dari aspek kebolehgunaan di dalam penghantaran maklumat. Sumbangan utama kajian ini adalah pada reka bentuk dan pembangunan model penyampaian maklumat berasaskan RSS untuk SPP bagi menyokong penyampaian maklumat yang sistematik, cepat dan senang digunakan.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citation which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

SOLMAZ BAGHERPOUR
Date:

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LIST OF ABBREVIATIONS / GLOSSARY OF TERMS

ACS	ArsDigita Community System
ANOVA	Analysis Of Variance
BBS	Bulletin Board System
CMC	Computer Mediated Communication
CMS	Course Managemenet System
GUI	Graphical User Interface
ICE	Information and Content Exchange Protocol
IEEE-LOM	Learning Object metadata for IEEE
IMP	Institute of Multimedia and Software
LMS	Learning Management System
LOM	Learning Object Metadata
MIS	Management Information System
MLE	Managed Learning environment
MVC	Model-View-Controller
OCS	Open Content Syndication
OLAT	Online Learning And Training
RSS	Really Simple Syndication
SQL	Standard Query Language
UNED	Universidad Nacional de Educación a Distancia
UPM	University Putra Malaysia
VLE	Virtual Learning Environment

CHAPTER 1

INTRODUCTION

1.1 Background

In recent times e-learning or Internet enabled learning is being extensively used by teaching and learning institutions, especially by higher education providers, in order to develop and improve their educational services.

According to the results of nonprofit and association e-learning survey from 2004 through 2006 a general upward trend in e-learning adoption has been indicated among educational institutions (Nten, 2007). From the view point of higher education institutions and universities one of the important parts of e-learning solutions is Learning Management Systems (Itmazi and Megias, 2003).

Learning Management System (LMS) focuses on management of learning services for end users. These systems are one of the important e-learning platforms for online creation, management and distribution of learning materials. They also facilitate smooth communication between different stakeholders including lecturers, administrators, and students (Georgiakakis *et al.*, 2005).

A large number of LMSs, commercial or open source, are readily available for the users (e.g. Moodle, ATutor, ILIAS, LON_CAPA, WebCT, and Blackboard). These systems are now widely used by tertiary education providers, even though they were a novelty only 3-4 years ago. In NewZeland, for example, every university has at least one LMS, with around 40% of all taught courses having a LMS web site. In the

UK, according to the 2003 JISC and UCISA report, 86% of the surveyed Higher Education Institution used a LMS. A recent EDUCAUSE report (2004), which collected data from 908 Higher Education Institutions (primarily US, but some Canadian, Australian, South African and New Zealand institutions were also included), shows that 90% of these institutions had a LMS, while for research universities this figure was 100%. These results indicate that the LMS technology has reached advanced stages of adoption in tertiary education (EDUCAUSE Report, 2004).

LMSs are widely adapted among educational institutions and universities for four main benefits they provide for learning services. They alleviate the constraints of time and place of learning, they provide flexibility in the way of learning, they support interactivity between tutors and learners, and they support reusability of resources.

A typical user of web based LMSs as a learner for example has a collection of frequently updated learning information including learning material web pages(Learning resources), notifications, assignments, results of those assignments and calendar contents, but keeping track of “what’s new” on these web pages is a non-trivial task. They need to receive a systematic notification service about those updated contents. This automatic notification service can support them personalize the resources of learning information and materials and also to receive those updated contents in easier and faster way.

For providing personalization and updated content notification service LMSs have been applied Email notification, personalized web pages and RSS notification or combination of them. This service in many LMSs is provided through RSS feeds, which are descriptions of the new data in XML format (Chmielewski and Hu, 2005). RSS feeds are implemented in different formats including RSS 2.0 and RSS 1.0. Really Simple Syndication or RSS 2.0 is one of the most popular and easy to use syndication methods for expressing content changes and it has been extensively used in News websites, Weblogs (Davison-Turely, 2005), Content Management Systems (Nanno and Okumura, 2006) and Library Management Systems (Wusteman, 2004). RDF Site Summary or RSS 1.0 is also applied in different domains including e-learning domain and by the module proposed by Downes (2003) it can be compatible with IEEE e-learning standard IEEE-LOM. In this study RSS feeds are identified for designing an efficient information delivery framework for LMSs in order to provide fast and easy to use information delivery.

1.2 Research Problem

Learning information in LMSs is frequently updated by different users including administrators, educators and even students themselves. RSS technology has been applied in e-learning subsystems including LMSs due to its benefits as notification channel. RSS has two main versions applicable for different types of learning resources based on their nature.

Existing RSS information delivery services in LMSs are applied for merely specific subset of learning resources excluding learning contents. LMSs and their services vary according to their focus; Those LMSs which focus on distribution of learning

contents are in need to have a notification system about updated learning contents as well as other learning resources. Checking all of the updates page by page is a cumbersome and time consuming task for learners in these systems.

The major problem for this study is to design a new information delivery model for LMSs with supporting different versions of RSS for different types of learning resources including both learning contents and other learning information provided by these systems.

1.3 Research Question

The considerations in problem statement lead to the following research question:

"How to develop and evaluate an RSS-based information delivery model for LMSs to deliver a wide range of learning information including both learning contents and other learning resources".

Based on this research question, the sub-problems are as follow:

1. What are the requirements of learning information delivery for LMSs?
2. How existing LMSs and recent studies provide fast and easy to use updated information delivery by RSS?
3. How to evaluate the effect of RSS-based information delivery framework on user's satisfaction and usability from the aspect of information delivery?

1.4 Goal and Research Objective

The aim of this study is to develop an RSS-based information delivery framework for LMSs that supports fast and easy to use information delivery.

- To develop an RSS-based information delivery framework for LMSs and implement it on an existing LMS in Universiti Putra Malaysia (UPM)
- To evaluate the impact of RSS-based information delivery framework on user's satisfaction with information delivery and usability of the object LMS from the aspect of information delivery.

1.5 Scope of the study

This framework is developed based on e-SPRINT recently named as PLMS, an existing LMS implemented at Universiti Putra Malaysia (UPM). The information content focuses on learning contents and notifications for evaluating the model.

1.6 Contribution

The main contribution of this research is proposing an RSS-based information delivery framework for fast and easy to use information delivery in LMSs. Other significant outcomes of the research are:

1. Design and development of an RSS-based information delivery framework to be implemented on the object LMS which supports mixed metadata for diverse learning information.

2. Conducting an experimental design to evaluate the impact of RSS-based information delivery framework after adding the RSS information delivery feature on the case study system.

1.7 Organization of the thesis

This thesis is classified based on the standard structure of thesis and dissertations at University Putra Malaysia. The thesis consists of five chapters including current

introduction chapter which gives a background view about the development of this research based on the idea of the use of RSS in architectural design of LMSs.

Chapter 2 contains the literature review of related studies on existing LMS's architectural design and their information delivery and communication facility techniques. The chapter introduces LMSs in general by the review of three existing LMS and their functionalities and technologies for information distribution. This chapter also focuses on information delivery methods and techniques in web applications by emphasizing on benefits that RSS technology can bring to the problem by a fast and easy personalized notification and information deliver functionality in LMS design.

Chapter 3 reviews applied methods and techniques for development and evaluation of the model for case study. The overall methodology of conducting this study with pre test and post test experimental design is explained in this chapter. Chapter 4 describes in detail model justification and steps and stages of model development. This chapter also covers the details of implementation of the proposed framework on the case study LMS. Chapter 5 gives the results of the study according to the objectives and analysis of those results and finally Chapter 6 concludes this research and suggests future work for this research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Modern education is changed by ubiquitous information and merged technologies and the need for the design of online systems that aim to provide virtual access to course materials, administrative processes and information support of Virtual Learning Environments is raised by the growth of related technologies.

In higher education especially, the increasing tendency is to create a Virtual Learning Environment (VLE) in which all aspects of a course are handled through a consistent user interface standard throughout the institution. With the advent of these systems the opportunity to package content and resources for fully online delivery turned to a real possibility (Wikipedia, 2007).

VLE is also interchangeably named as Learning Managemenet System (LMS) or Course Managemenet System (CMS). These systems are sometimes combined with a Management Information System (MIS) to provide a managed learning environment and also these systems have been widely adopted by institutions and instructional designers in order to fulfill certain needs and requirements for effective, fast and pedagogically correct education and training.

This review will cover first a general overview on e-learning and LMSs as a subsystem of e-learning and standard architectures for them. It is followed by a review on definitions and categorizations of LMSs which results in selection and

comparison of three well-known and famous Open source LMSs from the aspect of content delivery, content packaging and information distribution. Next would be a review on RSS technology and its definitions and characteristics. This chapter concludes on approaches towards the design of an efficient information distribution in LMSs.

2.2 Virtual Learning Environments as a Solution for e-Learning

e-Learning or internet enabled learning supports modern education with providing managed learning environments. A Managed Learning environment (MLE) uses technology to enhance and make more effective the network of relationships between learners, teachers and organizers of learning through integrated support for richer communication and activities. Such a learning environment can bridge the gap between academic, administrative and students through LMSs.

Advances in information technology and new developments in learning science provide opportunities to create well-designed, learner-centered, engaging, interactive, affordable, efficient, easily accessible, flexible, and meaningful, distributed, and facilitated e-learning environments (Khan, 2003).

LMSs are not learning intranet portal; Figure 2.1 demonstrates different parts of a university portal and relations between its subsystems. LMS is a central subsystem in the learning portal and its main functionalities are focused on Content, Collaboration, Assessment, Communication, Calendar, Grades, and Repository.