Development of Web-based Multimedia News Management System for News On Demand Kiosk Network

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Abstract: - The existence of fast networks in Malaysia has enabled the delivery of TV and newspaper content over an Internet connection. This has led to new types of integrated publications that include features from both media through interactive TV. To manage this publication effectively, a software tool known as web-based multimedia news management system (MNMS) was designed for organizing, integrating and composing multimedia interactive digital news. MNMS consists of a collection system, website management system, workflow system and publishing system that publish chunks of information onto the web represented by multimedia content. A 5-layered architecture was proposed for this system and was implemented using the Java 2 Enterprise Edition (J2EE). The prototype of the system has been implemented on the News On Demand KIOSK network. MNMS aims to allow effective collaboration among journalists, reporters, managers and designers in a multinational publication company despite the challenges posed by time and location. It was codified in XML and XSLT to provide a universal content and flexible styling. An easy to use web-enabled authoring tool has been integrated into the system to ease non-technical journalists in composing multimedia interactive news by filling up step by step guided web forms.

Key-Words: - SMIL, XML, XSLT, News Multimedia Management System, Multimedia Interactive News

1 Introduction

More and more households in Malaysia are connecting to the Internet through fast connections like xDSL provided by Streamyx, TimeNet Broadband and MaxisNet [1,2,3]. The capability of these networks to transmit data is marvelous with more than 1 Mbit/s downstream towards the user. Besides this, the 3G cellular phones will also attain this transmission speed. Thus, it is evident that new types of integrated multimedia news publications will be delivered through these connections in addition to traditional single media products like radio, TV and newspaper news. The availability of the fast Internet network in Malaysia has prompted us to develop and investigate the potential of integrating multimedia news publishing combining TV and newspaper content on personal channels with interactive TV (ITV) via Internet connection. Having digital news published via Internet, users can enjoy some of the benefits that traditional media cannot offer. These includes:

- Flexibility in news programs – For a well managed web server, it is able to service clients 24 hours a day and stream any news-show when requested at any point of time. Thus, viewers can watch news programs at any time without depending on the predefined schedule.
- Interactivity – A well composed website can offer the user with a variety of interaction levels such as the ability to search for particular news, selection of broadcast languages, features to select, which item to skip and which item to pursue in more detail (hyperlinks) and so on.
- Personalization – The WWW offers users the ability to define their own profiles for personalization such that different users may experience a different look and feel on the same news content.

In order to publish news articles on a large-scale effectively on websites, it requires a unique news content management system, either it be a normal process enacted by a single person – usually known as a webmaster, or, a decentralized system through a process of authoring and publishing web content supported by sophisticated technology. A few years back during the boom of “.com” era, many companies tried to make use of the Internet as a business strategy to increase their business. It was during then as well, that news publication companies started to extend their services by
publishing their latest news on websites. However, as information is growing in an exponential manner, many are now experiencing problems associated with creating and maintaining news articles effectively on their website. The problems surrounding the news websites arise from the manner in which they were developed, deployed and managed.

Initially, news content on websites are mainly represented by textual and graphical information and the targeted reader could be anyone. This makes the content authoring process simple. One can easily use web publishing tools like Microsoft Frontpage to do the job. However, in order to attract the attention of more users, news content types have proliferated and now consist of myriad applications, information sources, media types, as well as static pages. Besides, the trend of one-size-fits-all news articles is no longer competitive. Users now demand that news content be dedicated and personalized to different users according to their own interests. For instance, multi-racial countries like Malaysia consisting of 3 major races, namely Malays, Chinese and Indians, clients from different races will surely prefer to read or watch the interactive multimedia news in their own language. Most people would agree that such multi-style personalization of digital news programs for different users, is desirable. Using current techniques, each layout of the same news program needs to be designed separately. For online digital news involving a combination of multimedia elements such as video, audio, image, text and animation, the realization process usually requires a tedious multimedia composing, and is therefore, very time consuming. Furthermore, with emerging devices like 3G cellular phones and Pocket PCs being available to the public, it is vital to the news publication company to make their online news available on these gadgets. To realize this, news content would have to be formatted properly to suit these devices. In short, since news content types have become more complex, we need to diversify the publication platforms and the requirements of personalization. Hence, the content authoring process becomes much more difficult, time consuming and requires a workforce that has special skills to create the news content.

To ensure the lively growth of a news company, more and more news articles have to be composed, updated daily and put online while out-dated news has to be removed consistently. As such, the news content authoring and publishing team is getting bigger than before, involving, in some cases, hundreds of journalists, reporters, web designers and managers working in different countries. They all have to work together to publish interesting news articles on the web rapidly. With such a big publishing team, the original standalone system that was not originally designed to cater to large-scale publication on the web, as well as to support collaborative authoring among employees, will certainly fail to meet the requirements for the smooth operation of a multinational news publication company. The increased activities in news content generation may create many problems to the news publication company if there is a lack of control over the news content management process.

As such, a sound infrastructure must be in place to support the growth of news websites in a controlled, but flexible and consistent manner. This paper will describe the design of a model for a web-based Multimedia News Management System (MNMS) that is developed based on the RedHat CCM tool [4]. It adopts a 5-tier architecture using Java 2 Enterprise Edition (J2EE) [5], XML [6], XSLT [7] and SMIL technology [8] to support a collaborative authoring and publishing team within a geographically distributed region and from a diverse functional area, for broadcasting interactive news that combines TV and newspaper content on personal channels on ITV, through Internet connection.

2 Design Issues of Multimedia News Management System

The most essential part of the project titled News On Demand KIOSK Network (NODKN) that aims to combine Malaysia TV and news content on personal channels via ITV, would be the multimedia news management system. The aim of MNMS is to provide an easy-to-operate environment to employees of news publication companies from the process of authoring to the publication of multimedia interactive news shown on the web. Some of the features of the MNMS, which aim to solve the problems faced by current news publication companies, mentioned earlier, are listed below.

- Remotely accessible and collaborative environment – The MNMS is web-enabled with a centralized relational database to provide an environment that allows effective collaboration among contributors in the content production process despite the challenges of time and location.
- Flexible content and styling – The system is designed such that the deployment process for news content is separated into
two different groups, the content provider and the template designer from the unified web editing team. News articles created by the content provider group will be codified in XML format by the MNMS while the template designer concentrates on the presentation templates in XSLT format that provide a consistent look and feel across the news website. News articles in XHTML are formed and published on the web by combining the XML content with XSLT stylesheet. With this technique, similar news articles can be published on different platforms with ease by changing the XSLT stylesheet to generate the content like WML [9] for WAP-enabled cellular phones.

Web publishing and control – News websites are surfed by hundreds of thousands of readers around the world everyday. So, all the news published on a news websites ought to be reliable and correct. Misuse of news websites by unauthorized personnel will result in incorrect news on the website. Therefore the MNMS has an integrated workflow system to ease reporters, journalists, editors and managers in the process of authoring, reviewing, publishing, versioning, archiving and deletion of news items.

Easy to use authoring tool – To benefit a layman with easy but yet attractive and feature-rich multimedia news show, MNMS has integrated an authoring tool to help the content provider to compose multi-style news content in SMIL format to achieve the personalization of content such as a language.

2.1 News Content Life Cycle
The “multimedia interactive news life cycle” is referred to as a process to organize content from inception through to deployment and eventually to archiving and deletion (Refer to Fig. 1). A successful management of the “news content life cycle” requires input from various individuals such as managers, journalists, reporters, publishers and several from each category. However, with the advent of global corporations, there is a high potential that these members will not be in the same building or even the same continent. During the authoring process, the news item is composed using some, if not all, of the following: text, images, animation, video, sound or data from external sources, generated dynamically together with a pre-defined layout template. These news items will be associated with a specific date for publication; a date for removal and often a temporary archive may be destroyed.

The “multimedia interactive news life cycle” suggests that there will be a number of roles to be considered: content author, content editor, publisher, template developer/designer, business manager, system administrator and so on. Although separate individuals may fill these roles, in a cost saving production environment, the associated tasks can be shared.

3 A Framework for News Content Management System

Fig. 1: Multimedia interactive news life cycle

The framework for Multimedia News Content Management System presented in this paper is built on top of the J2EE platform that provides a robust scalable system to employees, managers and
partners. In our terminology, we regard multimedia news content management system as a big system that binds together a collection system, website management system, workflow system and publishing system that publishes chunks of information onto the web represented by multimedia content. Schematically, one can envision the process of a multimedia news content management system as shown in Fig. 2.

The purpose of a collection system is to ease the content author in creating a news article from scratch or in acquiring information from existing data sources. It consists of a set of collection services that produce web forms for the author to create news articles via an Internet browser. The collection services then store the news components collected from the web forms into a database. It also includes a multimedia news authoring tool for easy generation of multimedia news articles in SMIL format.

Website management system deals with the management of the news website that presents digital news to users. It is responsible for the long-term storage of content components that form a news article, as well as the way it is grouped and published. The website management system uses a 'category tree' that allows users to search for content according to a subject category; they can also browse through the news categories, viewing both news articles and subcategories within that category. A news article is generated on the fly, on the request of users, by retrieving the article components stored in the database through the website management system.

Workflow Management System (WMS) is concerned with the organization process that includes the coordination of the tasks, the exchanges of the data file, media information and task information among the members according to the predefined rules. The WMS ensures that the process of content production moves seamlessly by formalizing the "news content life cycle" into a checklist of a set of tasks. It allows the system administrator to define different roles to ease the management of the website with different permissions. For instance, news authors are given the permission rights to create news articles for the content section, while a publisher is given authority to push edited news articles onto the live site and also to determine how long the news article will remain live before expiring.

The function of the publishing system is to draw out news article components from the repository and format it into web format. To achieve higher flexibility in news content, the publishing system separates the news content from the presentation styles. This allows a journalist to focus only on the news article without worrying about the layout design, while designers will concentrate on the publication templates. By having device independent content (XML), it is possible to extend news publishing services to other devices like the mobile phone (WML), by changing the publication templates (XSLT), without affecting the news content.

This framework is built using a 5-layered, web-based architecture shown in Fig. 3. This architecture consists of a presentation layer, an application logic layer, a persistence layer, a database layer and a streaming platform. The presentation layer consists of dynamic HTML that is formed from XML and XSL stylesheets and java servlets for content management tools. The Application logic layer contains domain-objects and process-objects that together perform operations on data-objects and provide data for presentation to management and authoring tools on the presentation layer. Digital news is constructed in our system based on XML, XSL and XSLT techniques, which are more suitable for description and presentation of hierarchical media structures. The persistence layer possesses the characteristics needed to read, write and delete objects to or from the database. The Database layer provides the mechanism for storing news content and user profiles persistently, by using a relational database model. Finally, a streaming server is used to deliver the personalized video content to the user. Helix Universal Server from Real Networks is used as the streaming server in our system, because it supports SMIL streaming [10].

Fig. 3: System Architecture for the Multimedia News Content Management System
4 Intranet Deployment: News On Demand Kiosk Network

The model for MNMS has been implemented as part of the data broadcasting head-end system in the project entitled News On Demand Kiosk Network (NODKN). NODKN is a collaborative project between Multimedia University in Malaysia and Matsushita in Japan to create a digital broadcasting system that is able to provide personalized multimedia interactive news shows to users through a digital television with an Internet connection (See Fig. 4).

Fig. 4: Architecture for News On Demand Kiosk Network

4.1 Operation of News Content Management System

Business managers within a news publication company will interact with the MNMS to define any news event and then use the integrated Workflow Management system (WMS) (Refer to Fig. 5) to distribute specific tasks to employees to complete the “multimedia interactive news life cycle”. For example, a content author, upon receiving tasks from the business manager, will use the MNMS to interact with a centralized database and retrieve any desired information like news reports, photographs, video clips and other relevant materials, sent by reporters around the world, to compose digital news by filling up pre-defined templates. To meet the needs of different races in Malaysia, video and audio are encoded separately and stored in the streaming server [See Fig. 6]. Based on the user’s profile, an appropriate audio with video streams will be sent to the user. The content authoring process for multimedia interactive news is made very simple to the journalist, i.e. by filling up some web forms describing the characteristics of the news show like duration, video source, audio source, length, template to use and so on (See Fig. 7). During the authoring process, news content will be segmented according to some categories to provide a mechanism for searching and personalization for different users. As for the template designers, once notified by MNMS, they will create a custom template to be supplied to the content author. Thus, there are some dependencies between content authors and template designers. Once news authoring and templating processes have been completed, content editors will be notified by the MNMS to review, revise and approve pre-published news events to ensure the quality of news is acceptable, from a marketing and legal point of view. Any changes made by the content editor will be saved as per the requirement for versioning and tracking discussed earlier. This will allow the business manager to perform any rollback operations whenever necessary. Finally, the web publisher will schedule the deployment of the news content when requested by the business manager and ensure that the news content on the site is current, appropriate and correct.
5 Conclusion
In this paper, we have presented the design of a 5-layered, web-based multimedia news content management system that forms the backbone of the head-end system of the News On Demand KIOSK Network. The aim of this kiosk is to form new types of integrated publication combining TV and newspaper. One of the unique features of MNMS is a collaborative environment codified in Java that enables publishing teams, distributed around the world, to collaborate effectively to complete a “multimedia interactive news life cycle”. MNMS emphasizes the concept of separation of content and layout to achieve flexible content and styling by using XML and XSLT techniques. An easy to use authoring tool is integrated in the MNMS to allow a journalist to create multimedia interactive news shows in SMIL format by filling up guided web forms.

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References:

Fig. 6: Audio and video streams are separated during the content encoding process
Fig. 7: The authoring process of a multimedia interactive news show