Development of a multi-media web board for user friendly e-learning system

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Abstract
With the spread of broadband Internet and the growth of information technology, web-based learning environments are becoming very popular. As a result many e-learning solutions have been developed. However, existing e-learning solutions focused more on the convenience of construction and management of solution provider but less on the convenience of usability of learner and instructor. In this paper, an e-learning system which gives priority to provide facility for usage to users and ease for management to providers is presented. The development of a multi-media web board using ActiveX technology provides the convenience for both user and manager. Using the proposed authoring tool can be possible to provide dynamic multi-media learning contents without any programming skill and to upload or register the prepared contents to the server without any knowledge of file transferring through network. The use of HTTP protocol and standard CGI interface to transmit learning contents from the ActiveX control to a web server gets high compatibilities with existing systems. The propose method enables to construct high quality online education system with low cost and is applicable to various form from small private learning server to large cyber university.

Keywords:
E-learning, Web-based Training (WBT), Learning Management System (LMS), Multi-media web board

INTRODUCTION

The popularization of the Internet and the rapid growth of web-based service technologies have influenced to education. Online education environments overcome geographical and temporal constraints as learning process in online can occur at the independently determined convenience of instructor and learner (Harris D., DiPaolo A., Goodman J. 1994). Start as assistant, online education through Internet formed a new paradigm of education (e.g. Carswell (1997); Rogenberg (2001); Forman (2002)). The online education service market such as Cyber University is rapidly expanded. According to Urdan and Weggen (2000), the market of corporate e-Learning grew constantly and tremendously over the last years. And, in spite of the general stock market crisis in Winter 2000/01, analysts await a continuing growth of 30 or 40% annually over the next 3 years. Universities try to claim their piece of the pie in this market. IDC (2000) expects that the number of universities and colleges offering e-Learning will more than double, from 1,500 in 1999 to more than 3,300 in 2004. Student enrollment in these courses will increase by 33% annually during this time. Therefore many solutions of online education have been developed (e.g. Ahmad et al. (2001); Gerhard and Mayr (2002)).

The e-learning solution is to be classified into three parts: contents viewer, authoring tool and LMS (learning management system). Existing e-learning solutions focused more on the convenience of construction and management for solution provider but less on the convenience of usability for learner and instructor. The separated solution of authoring tool, content viewer and LMS causes difficulties of users who do not familiar to use of computer and program. It also cases trouble for development and maintenance of system. To resolve those problems, e-learning system which focused on usability of users is proposed in this paper.

DEVELOPMENT OF CONTENTS AUTHORING TOOL

It is an important that the contents authoring tool must be easy to create own contents for teaching and to register the contents to LMS on the server. Complication and difficulty of the authoring tool caused problems of using to instructors who were not used to using computer. So the instructional designer should create the learning contents based on the teaching plan in behalf of the instructor. Such method is used to create more professional learning plan, however it is difficult for instructional designer to understand the expert knowledge of various fields which is required to create good learning plan. If the instructor can easily create the learning contents by providing the authoring tool which is easy to use, the cost for creating contents becomes lower and the quality of contents becomes higher. In this paper I would like to develop the authoring tool and process which are easy to create and register contents by instructor itself, so it can be enable

to cut down the cost and to provide high quality contents.

The development of content creation tool focused on making an interactive content using various rich media. And web-board model was introduced to the interface of creation and registration process. The usage of the web-board is familiar to many users because of a popularization of the Internet. The process of contents creation and registration follows a model of writing and registering on the web-board to access easily by instructor. The authoring tool designed a form of ActiveX control to run embedded in the web browser. The instructor can create the contents and register them as writing on the web-board by connecting his own lecture board.

The authoring tool is developed based on the voice recording and annotation on white board for beginner and additional functionality of managing various media files and interactive action script for expert user as shown in figure 1.

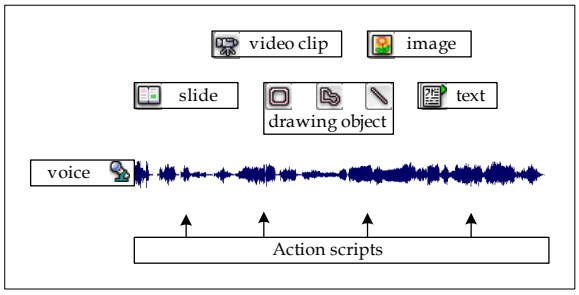

Figure 1: Composition of the authoring tool and data flow

It is difficult to create interactive contents using conventional web-based authoring tools because Hypertext Markup Language (HTML) is best for static content. However, the instructor can easily provide dynamic multi-media contents using proposed authoring tool without any skills in programming languages such as Java, Visual Basic, Flash and etc. In the beginning, the instructor can create the base of online contents from paper-based contents such as Microsoft Word or PowerPoint files simply importing them into authoring tool. And the instructor can start the lecture as if he is in an offline lecture room. The voice is captured in digital form and compressed for storing into online contents. The annotations on the slide are also stored in the contents synchronized with the voice. Figure 2 shows the preparation of the contents with importing a PowerPoint file to begin the recording of the lecture.

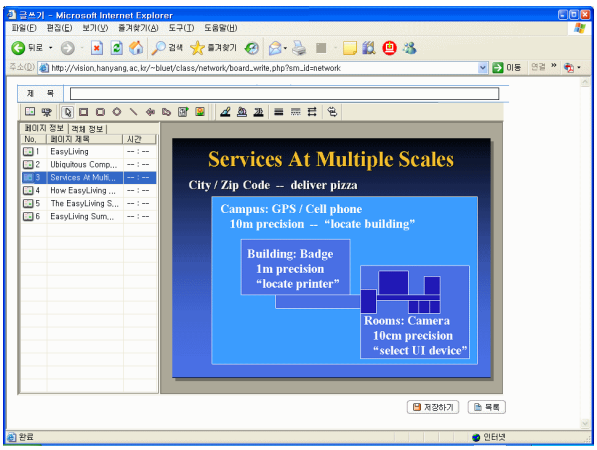

Figure 2: Preparation of the contents for recording lecture in the authoring tool

The prepared content was transmitted to CGI (common gate interface) program on the server using the HTTP protocol. This process also directly implemented ActiveX control so instructor could complete the registration of the content by pushing the submit button on the web page when he finished the creation of content. The outline of the proposed authoring tool is shown in figure 3 below.

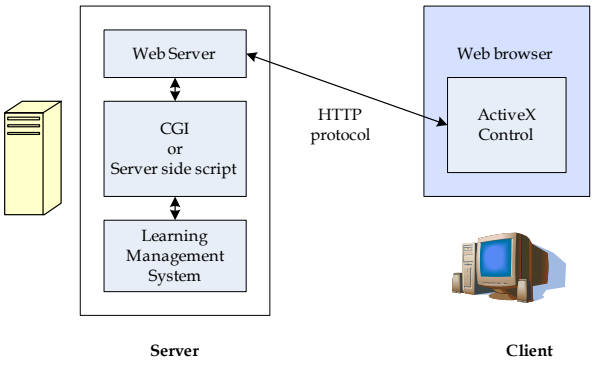

Figure 3: Composition of the authoring tool and data flow

DEVELOPMENT OF CONTENT VIEWER

There needs a content viewer to study the content that was created and registered by instructor. Previously, two types of content viewer were used. The one is simply using web browser to show the content made by using HTML and the other is using exclusive viewer program to see the content which include voice and other recording object. The first has lack of reality of study because of using simple HTML content and the

second has complicated process of installing the viewer program and downloading the content.

In this article I would like to develop the content viewer using ActiveX control or Java applet which can be executed in the web browser, so the learners do not feel the difficulties of installing and running the viewer. Learners could start the study with connecting the lecture board and selecting the view of desired content. The development of web-embedded viewer could take away complicate process of installing the viewer and restriction of place of study. There need only a PC with internet connectivity to study.

In the case of rich media content including voice and other multimedia object, the size of content file becomes very large. As the size of content is larger, the waiting time of receiving whole content is longer. To resolve this problem, the lecture content was constructed logical pages and transmitted by page unit. When the first page was received, viewer started to play the received page and the remaining pages would be received using background transmitting process. This page streaming technique could reduce the waiting time of learners and prevent the illegal copy or usage of content. If there needs offline study, learners could be allowed downloading the content and play it using offline viewer. The outline of the proposed content viewer is shown in figure 4 below.

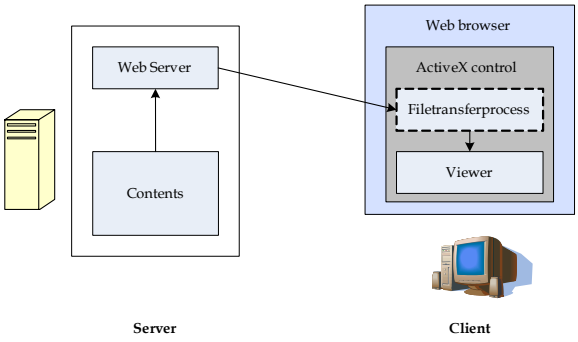

Figure 4: Composition of the content viewer and data flow

BUILD THE E-LEANING SYSTEM

This chapter presents the sample e-learning system using previously mentioned authoring tool and viewer.

Structure of system

A sample system was built based on “EduTack” web platform developed by Mediopia technology. The basic structure of sample system is shown in figure 5.

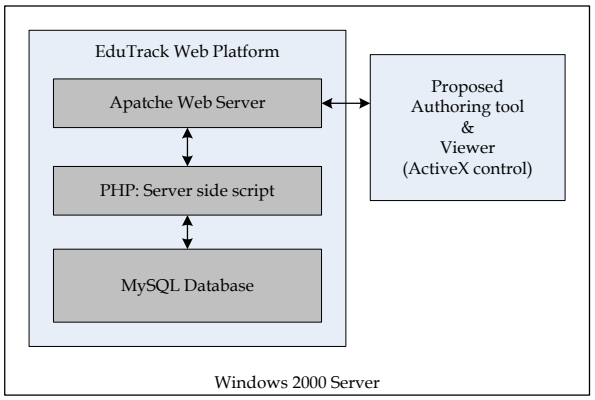

Figure 5: Structure of sample system

The reasons of using existing LMS platform are to reduce the development time of other LMS functionalities such as certification, schedule management and etc. and to show that proposed method could be applied to other existing system easily.

Because the proposed system is composed authoring tool and viewer which use standard HTTP protocol and CGI interface, it was comparable with most systems which was enabled to use web and CGI.

Construct the lecture board with authoring tool

The lecture board is a form of a web board which is enables to attach files. It is possible to reuse existing web board by adding the authoring ActiveX control. Some parameters need to register content on the board were transmitted to ActiveX control and the content was directly transferred from control to web server using HTTP protocol. An example of parameter setting of ActiveX control is as follows.

```
<object
classid="clsid:9B161B48-3A5B-417D-B823-
D8F17E37EBFE"
codebase="AxEdutrackWriter.ocx#version=1,0,0,5"
width='645' height='580'>
<param name="ActionSrc" value="board_post.php">
<param name="TitleVarName" value="sb_subject">
<param name="FileVarName" value="sb_file[]">
<param name="ListSrc"
 value="board_list.php?sm_id=network">
<param name="TargetFrame" value="">
</object>
```

Figure 6 shows the appearance of authoring tool embedded into web board.

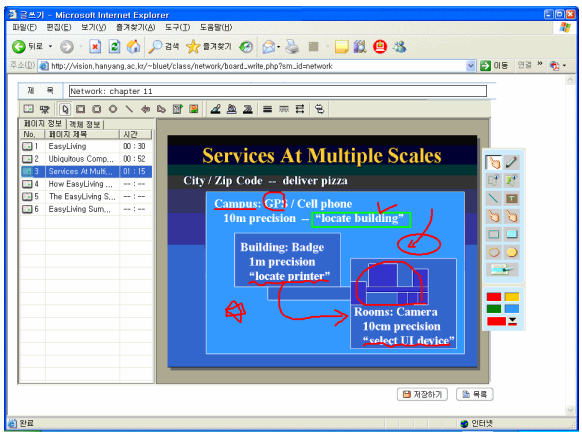

Figure 6: Authoring tool embedded into web board

Construct the content viewer

The contents of the lecture assumed a form of web board, as stated before. Learners connect the lecture board and select a content to start learning. When learner selects the content, viewer control starts running and downloads the content stream from the server. Figure 7 shows an example of learning progress of a lecture.

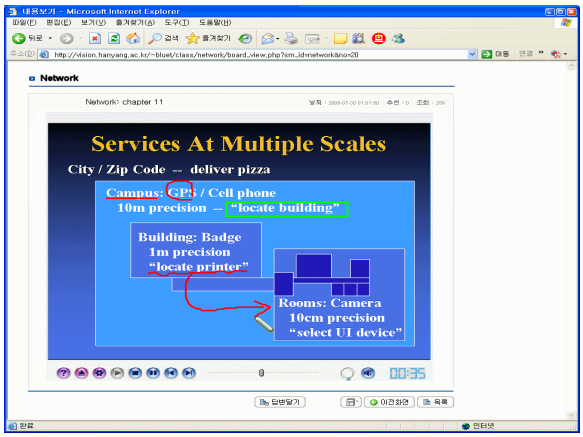

Figure 7: Learning progress of a lecture using the viewer

5. CONCLUSION

In this paper, e-learning solution focused to the convenience of users (instructor and leaner) is presented. The web board interface which is similar to common users is proposed to remove complex and difficult process for creating and registering contents. The same interface is introduced to learning process of students. The authoring tool and the viewer are implemented as an ActiveX control so there is no complicated process of installing and running. In addition, it can be enable to create dynamic learning contents using voice, rich media objects, and synchronized action scripts. It also removes restriction of time and space for learning therefore it is more suitable for the online education strategy. The proposed solution used standard HTTP protocol and CGI interface to get high compatibilities with existing systems and provided flexibilities for applying to new or existing systems easily.

REFERENCES

[1] Ahmad, H., Udin, Z.M., Yusoff, R.Z. (2001), Integrated process design for e-learning: a case study, The Sixth International Conference on Computer Supported Cooperative Work in Design 2001, 488-491.
[2] Carswell, L. (1997) Teaching via the internet: The impact of the internet as a communication medium on distance learning introductory computing students, Conf. Integrating Technology into Computer Science Education, Uppsala, Sweden, 1–5.
[3] Forman, D. (2002), Cultural change for the e-world, Conference on Computers in Education 2002, vol.2, 412-1413.
[4] Gerhard, J., Mayr, P. (2002), Competing in the e-learning environment-strategies for universities, Proceedings of the 35th Annual Hawaii International Conference on System Sciences 2002, 3270-3279.
[5] Harris D., DiPaolo A., Goodman J. (1994), ADEPT proposal, [on line], http://stanford-online.stanford.edu/history/fulldesc.html
[6] IDC (12-18-2000), eLearning Spending and Enrollment Are on Course to Grow Steadily, IDC, http://www.idc.com:8080/Hardware/press/PR/DMT/DMT121800pr.stm, [6-10-2001].
[7] Mediopia technology, EduTrack: http://www.mediopia.com
[8] Rogenberg, M.J. (2001). E-learning – strategies for delivering knowledge in the digital age, McGraw-Hill
[9] Urdan, T.A. and Weggen, C.C. (2000), Corporate ELearning: Exploring a New Frontier, WR Hambrecht & Co Research Study.

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