Developing a Synchronous Activity Module for the Moodle CMS

Pei-Chen Sun 1 Te-Hsiung Tseng 2
Information and computer Education Graduate Institute
National Kaohsiung Normal University
No.116, Heping 1 st Rd., Lingya District, Kaohsiung City 802, TAIWAN(R.0.C.)
sun@nkucc.nknu.edu.tw, cedriccefc2002@gmail.com

Abstract: - Moodle is a famous open source Course Management System, but this system could only provide limit synchronous communication service through keyboard chatting. So the purpose of this study was to development a Moodle synchronous learning activity module to establish adobe video conference meeting. Based upon the Moodle developer guide and Adobe Acrobat Connect Pro server guide, this study designed a Moodle & Adobe Acrobat Connect Pro bridge unit and defined the correspondence between Moodle roles to Adobe Acrobat Connect Pro principals. Based on the proposed Module, Moodle really will use for full online classes as well as supplementing “face-to-face” learning and help students to improve their learning progress.

Key-Words: Moodle, Course Management System, Rich Internet applications, XML

1 Introduction
Technological developments in the design of Learning Management System are opening the way for exploitation in a wide range of applications. Many educational projects have promoted and introduced e-learning as an alternative to traditional education.[1] Information and Communication Technologies (ICT) with their continuous development provide new possibilities for the creation of innovative and effective environments of teaching and learning, thus redefining the educational processes.[2] With accelerated growth of computer and communication technologies, researchers have attempted to adopt computer network technology for research on education. Notable examples include the development of Course Management System. The website «www.cmsreview.com» provides directories with descriptions of over 350 Proprietary CMS, Open-Source CMS, and Hosted CMS services at application service providers.[3]

The Course Management System (CMS) alternatively known as a Learning Management System (LMS) or a Virtual Learning Environment (VLE). Moodle is a famous open source Course Management System. It is a free web application that educators can use to establish effective online learning sites [4] Moodle system was designed with following characteristics.

1. It was designed to be used for full online classes as well as supplementing face-to-face learning
2. It was designed to be simple, lightweight, efficient, compatible, low-tech browser interface
3. It was designed to be easy to install on almost any platform that supports PHP. It requires only one database (and can share it).
4. It was designed to be full database abstraction supporting all major brands of database (except for initial table definition)
5. It was designed to show descriptions for every course on the server, including accessibility to guests with course lists.
6. It was designed to provide courses categories and courses searching functions. - one Moodle site can support thousands of courses
7. It was designed to emphasis on strong security throughout. Forms are all checked, data validated, cookies encrypted etc
8. It was designed to have most text entry areas (resources, forum postings etc) using an embedded WYSIWYG HTML editor [5]

This popular CMS system could only provide limit synchronous communication service through keyboard chatting. There is a need to implement more fruitful functions for synchronous communication, such as audio and video communication.

On the other hand, the web is evolving into machine-centric and user-centric perspectives. We are seeing tools and platforms to facilitate user collaboration and sharing collected under the term “web 2.0” and influencing all types of communities.[6] Rich Internet applications (RIAs) are used into in a variety of web applications. The envisioned growing autonomy of such vehicles and the complexity of the environments in which they are expected to operate brings a new vision of the future role of internet applications. The Adobe flash
application is a mature technology in all kinds of Rich Internet applications technologies. Acrobat Connect Pro is an online synchronous learning solutions base on flash for virtual classroom environments.

Most eLearning solutions require specialized software or plug-in downloads, but Acrobat Connect Pro delivers learners to the classroom with just a simple click—from anywhere, at anytime, on almost any device. Things user required is what they already have: a web browser and the ubiquitous Adobe Flash® Player software, already installed on 98% of Internet-connected computers.[7]

Acrobat Connect Pro is based upon an open documented and flexible architecture that provides money-spinning integration with existing infrastructure and future possible investments. Acrobat Connect Pro uses standards such as XML and Java™ to exchange data, and it offers a full developed APIs and SDKs.[7]

Adobe Connect Pro meetings are live online conferences for compound users. A meeting room is an online application could be used to conduct a meeting. The meeting room consists of various display panels (pods) and components. Choosing from prebuilt meeting room layouts or customize a layout to suit your needs is possible. Users could apply meeting rooms to teach online classes and to collaborate with colleagues or students.[8]

Adobe Acrobat Connect Pro is a possible solution to be applied on Moodle for establishing synchronous learning activity, but there still is no Moodle module which could be used to establish video conference meeting based upon connect pro. So the purpose of this study was to development a Moodle synchronous learning activity module to establish adobe video conference meeting. Based upon the Moodle developer guide and adobe connect server guide, this study designed on-line learning activity to make the synchronous communication service possible for Moodle users. A prototyping method was applied to conduct this research.

2 Problem Formulation
The problem of this study was that there existed no audio and video synchronous communication service for the Moodle course management system. In order to study how to integrate Moodle with Adobe Acrobat Connect Pro, we have studied the development of their manual to find out the functions they provide. Moodle R & D manuals can be obtained on the website (http://docs.Moodle.org/en/Development). Adobe Acrobat Connect Pro's R & D manuals can also be obtained on the official website. Therefore, the prototype module could be created accordingly.

2.1 Moodle module directory structure and uses
The version of Moodle system in this study is 1.9x. Moodle system did provide well defined specifications. The lib.php program file defines a number of critical functions.

All function names are with a prior naming part. For example, If the module name is called widget, to create a new instance of the function was called widget_add_instance (), to delete a exists instance of the function was called widget_delete_instance ()

There are also other important considerations in creating Moodle module:
1. When creating a new module, the new name of the module must not contain numbers or other special characters.
2. There need a data base table with the same name as the module. This table must have at least three fields : id , course , name
3. It is also required to make sure that the activity module provides appropriate support for groups and meta-courses[9]

2.2 Roles operation of Moodle
In a Moodle system, the role attribute is processed by two primary functions:
1. define a list of permissions - role definition is global for all contexts, but can be changed by local context overrides
2. replace old course enrolments - role assignment in course context is similar to the old enrolment process

The new system will allow authorized users to define an arbitrary number of roles (e.g. a teacher) A role consists of a list of permissions for different possible actions within Moodle (e.g. delete discussions, add activities etc).

Roles can be applied to users in a context. [10] There are some default roles in a Moodle system. Those roles have some basic rights:
1. Admins: Admin users will be assigned the default legacy admin role in the system (site) context
2. Teachers: Users who were teachers will be assigned the default legacy teacher role (or non-editing teacher role) in all courses they were teacher
3. Students: Users who were students will be assigned the default student role in all courses they were student.
4. Guests: There will still be a single guest user with no default role at site level.[10]

2.3 Adobe Acrobat Connect Pro key concepts
Adobe Acrobat Connect Pro has three key concepts:
1. Principals: include users and groups
2. SCOs: Shareable Content Objects represent meetings, courses, and just about any content that can be created on Connect Enterprise.
3. Permissions: which define how principals can act on objects[11]

2.4 Adobe Acrobat Connect Pro Meeting Permissions
There are four kinds of permissions in an Adobe Acrobat Connect Pro Meeting system: view, host, mini-host, remove. [11]

2.4 Adobe Acrobat Connect Pro Principals and Meetings Processes
There are many processes used to manage Principals and meetings in a synchronous communication activity, such as an Adobe Acrobat Connect Pro server. R & D in the adobe connect development manual describes a variety ways to manage accounts. It can be viewed as four parts comprising “User manager”, ‘Shareable Content Objects (SCO) manager”, “User Authentication” and “Meeting manager”. (See Fig. 1)

3 Problem Solution

3.1 Base Connect Unit
Adobe Connect Enterprise Web Services were designed to be used with multiple languages on multiple platforms which ever could send and receive XML over HTTP to develop custom applications.[8] We need to have there three tools:
1. XML parser code library
2. A cookie management code library
3. viewing HTTP request and response headers

There are three XML parser code libraries for php. Those are Document Object Model (DOM), XML Parser, XMLReader and SimpleXML. This study uses SimpleXML to parser XML because the extension of SimpleXML provides a very simple and easily usable tooset to convert XML to an object which could be processed with normal property selectors and array iterations. This study use fsockopen function to develop a HTTP Client class to send HTTP request and get its response for creating code library of cookies managing and HTTP request and response headers viewing. This class could be also used to send cookies in each http request.

For A cookie management code library and viewing HTTP request and response headers tools this study use fsockopen function to develop a HTTP client class to send http request and get HTTP response, this class is also can send cookie in every http request.

On the other hand, this study design a Moodle & Adobe Acrobat Connect Pro bridge unit illustrated in Fig.3:
In the bridge unit, the messaging process works according to the following steps:

1. Requests of every Moodle module were set into an array. This array can be encoded to an http request by using “rawurlencode” function and then using “fsockopen” to create http request for the Adobe Acrobat Connect Pro to play send and request functions.

2. Whenever getting the response from Adobe Acrobat Connect Pro, SimpleXML would be used to parse this response. A return SimpleXMLElement class would be send to Moodle by SimpleXML module. Moodle module can use this class to get useful data.

### 3.2 User correspondence

There are many roles in Moodle, and every role has different permission and rules. In Adobe Acrobat Connect Pro, there are also serial principals and every principal has different permissions on different scope. It is needed to define the correspondence between Moodle roles to Adobe Acrobat Connect Pro principals. (See Table 1)

#### Table 2 Moodle roles & Adobe Acrobat Connect Pro Permission

<table>
<thead>
<tr>
<th>Permission</th>
<th>Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>manager</td>
<td>Admins</td>
</tr>
<tr>
<td>publish_host</td>
<td>Teachers</td>
</tr>
<tr>
<td>view</td>
<td>Students</td>
</tr>
</tbody>
</table>

When user try to create a new meeting activity on a Moodle platform, Moodle will find out who are teachers and students of this course for checking the status of the principal:

1. If there is no existed user belong to this course, module will create a new one
2. If his Principal is incorrect, this module will fix it.

### 3.3 Synchronous learning activity module

Basic process for establishing synchronous communication was defined according to each role of Moodle course users. Synchronous learning activity module could be design based upon the following sequence defined for each role.

1. **Teacher:**
   1. add new instance of modules in course
   2. set up or update an instance
   3. list all instances in a course
   4. view a particular instance

2. **Student:**
   1. list all instances in a course
   2. view a particular instance

3. **Administrator of Moodle:**
   1. install module
   2. defines the structure of db tables for all database types
   3. backup & restore data
   4. setup global value for all instance of module

When teacher want to assign an on-line learning activity, the class of “widget_add_instance()” would be applied. The “Create the URL to a meeting room for which the user is host” process could be used to create a meeting on Adobe Acrobat Connect Pro server, and then its sco-id would be send to Moodle. Finally, this sco-id will store in Moodle database.

When teacher want to launch a synchronous learning activity module:

1. Once the user is authenticated on Moodle, log the user in to Connect Enterprise
2. Get the value of the BREEZESESSION cookie for the user’s session.
3. In the Moodle module, a meeting room URL is create
4. Open the meeting room URL with the guest name parameter.

3.4 Coding Structure between Platforms
Coding structures of both platforms of Moodle and Adobe Acrobat Connect Pro were identified the relationship for the purpose of implementing synchronous learning activity. Files and functions of Moodle platform were identified to the corresponding Adobe Acrobat Connect Pro Principal and Meetings Process

All those necessary corresponding pairs build a module were pointed out. In Table 2, for example, when Moodle call index.php script, the index.php maybe use “Log in using the session parameter” or “List all meetings on the server” in Adobe Acrobat Connect Pro

<table>
<thead>
<tr>
<th>Moodle file</th>
<th>Moodle function</th>
<th>Adobe Acrobat Connect Pro function</th>
</tr>
</thead>
<tbody>
<tr>
<td>index.php</td>
<td>Log in using the session parameter</td>
<td>List all meetings on the server</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Find the info of a meeting</td>
</tr>
<tr>
<td>view.php</td>
<td>Create the URL to a meeting room for which the user is host</td>
<td>Create the URL to a meeting room for which the user is not host</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Launch a meeting and let the user enter as guest</td>
</tr>
<tr>
<td>lib.php</td>
<td></td>
<td>Add a user to a meeting and display meetings</td>
</tr>
<tr>
<td>_add_instance()</td>
<td></td>
<td>Create a private meeting and add host, presenter, and participants</td>
</tr>
<tr>
<td>_update_instance()</td>
<td></td>
<td>Add a user to a meeting and display meetings</td>
</tr>
<tr>
<td>_delete_instance()</td>
<td></td>
<td>Remove a user’s permission to access a meeting</td>
</tr>
</tbody>
</table>

4 Conclusion
A graphical user interface is provided for Creating a Synchronous Activity, as shown in Fig. 4. Teacher can select which Adobe Acrobat Connect Pro server would be used for this activity.

When teacher created a Synchronous Activity in a course, teacher and students can view at index page, Fig. 5, and then they can check this link to show Synchronous Activity view page, Fig. 6. Teacher and students can see not only a link for accessing Adobe Acrobat Connect Pro meeting, Fig. 7, but also records of Adobe Acrobat Connect Pro meeting.
This study proposes a Synchronous Activity Module for the Moodle CMS. Based on the proposed Module, Moodle really will use for full online classes as well as supplementing “face-to-face” learning and help students to improve their learning progress.

References:


