A Platform for Delivering Multimedia Presentations on Cultural Heritage

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Abstract— **In this paper we present a platform for delivering multimedia presentations on cultural heritage. The platform aims to enhance cultural knowledge discovery by increasing access to museums' digital content. The platform generates rich media presentations considering the personal profile of the audience as well as its interests. The presentations may include text, images, video and sound and can be delivered via network. They can be attended either inside the museum or even outside of it e.g. in schools during a preparation class prior to a museum visit. The platform supports creation and editing of slides and presentations, updating existing presentations and projecting them, considering different roles and access levels for archeologists, tourist guides, educators and individuals.**

Keywords- cultural application; multimedia; streaming media; educational software; web presentations

I. INTRODUCTION

In the resent years museum visitors spend more and more time on museums' web sites in order to prepare their on-site visits. Thus, many research projects aim to develop personalized services both on line and on site [1]. In addition many museums around the world have established educational programs targeted to groups of visitors. We intend for a platform to assist visitor groups for preparing their visit and enhance their experience during their stay in the museum.

Museums' visitors could be categorized by their interests. There are visitors who are interested in the whole exhibition (e.g., group of tourists, guided or not), others that are interested in a particular thematic entity (e.g., school students) and finally archeologists or hobbyists who are seeking for specialized information in depth. Our platform delivers personalized information to all these types of visitors.

Educational programs comprise presentations, video projections, games (e.g., puzzles, quizzes, etc.), lectures, and activities like pottery, handicrafts etc. Special projection rooms are equipped to support partially such programs. Usually instructors prepare their students prior to museum visits by using lendable educational material provided by the museums [2][3]. In Athanassakeio Museum of Volos, this material includes slides and text documents regarding to Mycenaean Civilization and local history, and helps the students to digest easier the archeological material.

We are developing a platform that aims the delivery of personalized content to groups of visitors. The main objective is to emphasize on the educational and informative aspect by dynamically created presentations considering the individuality of the audience. These presentations will be accessible physically in the museum or via web. Our application is going to be deployed in Athanasakeion Archaeological Museum of Volos, Greece.

The platform, exploits modern technology to support and influence the way people collect experience and create knowledge in and out of museums. One aspect of this influence is derived by the use of multimedia in learning environments. According to Multimedia Learning Theory [4], optimal learning occurs when both visual and verbal materials are presented simultaneously. Also, in [5] visitors' feedback had straightened out that multimedia presentations strongly contribute to the digestion of the archeological remains.

This paper is structured as follows: Section 2 summarizes the findings of other researchers in this field, and Section 3 presents the functionality of the application regarding presentation creation and projection. Section 4 introduces to platform's architecture and finally Section 5 concludes the paper.

II. RELATED WORK

Several remote web education systems have been proposed to deliver educational content. These systems support authoring of reusable web-based presentations from live lectures at universities. Actually, they record and encode streams of audio, video and integrate into them additional multimedia material such as Powerpoint slides. In [6] is presented a remote web education system named ESB (Education System Board) that supports video streams, slides and handwriting. Media synchronization was also investigated. A toolkit for producing reusable, web based presentations, named Lectures on Demand (LoD) of live lectures is presented in [7]. It enables lecture recording, editing of the recording, adding of slides, annotations, diagrams, animations and links.

Web conference systems can be used for live presentations via internet. A typical web conference system may support slide presentations, live audio and video streaming, desktop sharing, text chats, etc. Adobe's Connect [8] and Cisco's WebEx [9] are commercial representative
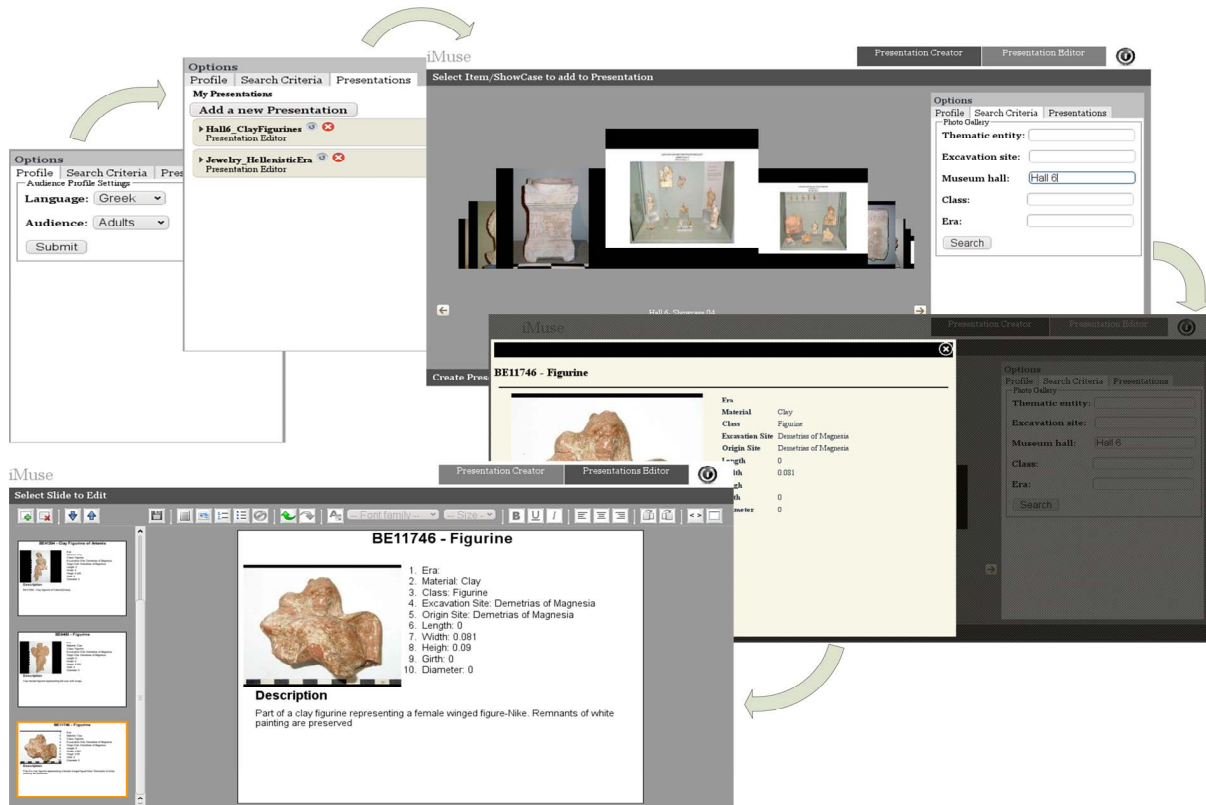
Figure 1.   Authoring a new presentation from left-to-right.

products and Openmeetings [10] is a full-featured open source alternative.

Web presentation systems are on line platforms that enable users to create, manage and share presentations. Several frameworks and tools have been designed and developed in this area. Slidy is an XHTML Framework to create slideshows using HTML, CSS and JavaScript and present them using a web browser. Each presentation is a single XHTML file and each slide is enclosed in a *<div class="slide"> ... </div> element. JavaScript is used to control the presentation by hiding or showing the div elements, while CSS is used to specify the appearance of the presentations. Slidy and an editor* created along were presented in [11]. S5 [12] stands for **S**imple **S**tandards-based **S**lide **S**how **S**ystem and is a Slidy's alternative which also uses XHTML, CSS and Javascript to format slide shows. Both frameworks support light-weight cross platform and cross browser presentations whose appearance can be easily changed by applying a new style sheet.

XSLidy [13] extents Slidy and is an XSLT-based tool, which allows users to create simple XML files for their presentations. Slidy presentations are generated through these XML files, with specific advantages like cross-presentation links and advanced navigation features. Also by adding one more XSLT layer one can add its own customized elements. The resulting Slidy files can be used with or without XSLidy.

Slimey [14] is an open source web slideshow editor, Slimey uses the SLIM format. SLIM stands for Slideshows Microformat and is an extension to the S5. Its functionality includes: insertion and removal of text, images and bulleted lists, addition, removal and reordering of slides, undoing/redoing, changing font face, font color and font size of elements, text formatting (i.e., bold, underline, italics), viewing source code, previewing and saving presentation.

280slides [15] is a free of charge web presentation system built on Cappucino open source framework. Sliderocket [16] and Zoho [17] are representative commercial web presentation systems that offer advanced functionality.

III. THE PLATFORM

Our platform, still under development, automatically organizes exhibit's data connected semantically to each other into the form of presentations, providing access to museum knowledge according to the user's profile and interests. The platform provides three main functionalities: a) Presentation Authoring, where the user may create a new presentation retrieving content form museum's database, b) Presentation Synthesis, where the user may compose a presentation using existing presentations and, c) Presentation Projection, where the user selects a presentation for projection either in the museum's projection room or in a school facility. Specifically, for the installation at the Athanassakeio Museum of Volos, the presentation authoring is allowed only
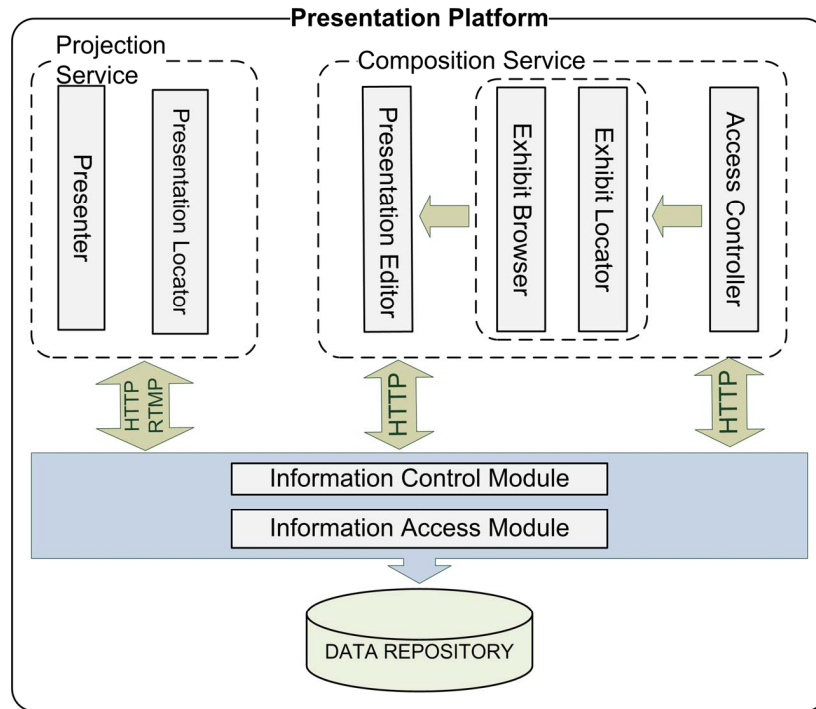
Figure 2. Platform's architecture

to the museum's archaeologists specialized on educational programs, while tour guides, teachers and other museum staff may compose their own presentations by using the existing ones. Finally, archaeologists, teachers, tour guides and individuals are able to search for and attend a presentation that meets their interests.

A. Presentation Authoring

In order to create a new slide the user should follow a number of steps. Figure 1 depicts the steps for generating a presentation using Museum's exhibit database. Exhibits can be either artifacts or collections of them in showcases. First, one should define the audience profile by setting its language and type. In particular, for the Athanassakeion Museum, the content is provided in Greek and English, for students, adults and experts. Afterwards the user creates a new presentation or selects an existing presentation to update. Consequently, one retrieves exhibits' information from the database based on criteria like thematic entity, era, class, excavation site and museum's hall for the specific audience. The user can preview each exhibit's detailed information and add it to the presentation. After adding the desired exhibits, one can switch to the Presentation Editor to edit and shape his presentation. A slide is automatically generated for each exhibit depicted its description and other information like dimensions, weight, excavation site, era, bibliography, etc., according to audience's preferences. An exhibit's photograph and a video (from excavation site or a documentary film, if available), are also embedded in the slide. Through Presentation Editor the user is able to edit the retrieved information and style slides' layout.

B. Presentation Synthesis

The application also offers the opportunity to instructors, tourist guides or archeologists to compose their own personalized presentations by selecting and combining slides from existing presentations. The procedure involves the following steps: a) the user inserts the audience profile and the search criteria that define the thematic entity, era, class, excavation site etc., he is interested in, b) the system suggests relative existing presentations, c) the user selects one or more presentations from the above list and a new presentation is composed by them and open in a limited version of the Presentation Editor. Next, the user is able to preview the presentation, to remove slides, or reorder them and finally, d) to save the presentation.

C. Presentation Projection

A group leader (tour guide or instructor) or even an individual visitor of the museum is able to search for a presentation. The user may locate a presentation by using the Presentation Browser. This browser is a graphical toolbox that organizes presentations and provides search functionality similar to the one in the Presentation Synthesis. The presentations are depicted as thumbnails and a brief description is available via tooltip boxes. Once the user selects the desired presentation, he is able to preview it and project it to the specific audience.

IV. SYSTEM ARCHRITECTURE

AJAX introduces a new model for developing web-based applications that are more responsive, communicate

asynchronously with the server and provide desktop-like interface while retaining the deployment benefits of traditional web applications. AJAX framework combines existing technologies (e.g., XML, CSS, XHTML, JavaScript, DOM, etc.) to built dynamic web pages on the client side. AJAX application model has been selected as the most efficient and modern approach for the development of our platform.

Platform's architecture is depicted in Fig. 2. Presentation logic is implemented in the client side. Through Composition service the user is able to search for exhibits (Exhibit Locator), preview their information (Exhibit Browser) and compose presentations (Presentation Editor). Access Controller adapts interface to user's group (e.g., archeologists, instructors, tour guides) applying access policy. Projection Service retrieves and displays presentations (Presenter) according to audience profile and preferences (Presentation Locator). Mootools [18] and MooFlow [19] JavaScript libraries are used in the development of the Exhibit Browser. An open source slideshow editor, named Slimey [14], is used as basis for the implementation of Presentation Editor. A custom extension of Slimey's SLIM, is developed to format slides and presentations.

In the server side, the database is designed to support multilingual, multimedia and multi-audience content and is hosted by MySQL database management system. The server application is implemented in PHP, runs on an Apache Web server and is comprised by two modules. The Information Control module handles: i) client requests, ii) authenticates users and informs Access Controller in the client side about their access level, and iii) implements business logic. Information Access module performs database access. This module is the only one that requires modification in order to deploy the platform at another museum.

As we mentioned in Section III, videos from excavations or documentary films might be embedded in presentations. These videos can be up to 60 minutes long. Real-Time Messaging Protocol (RTMP) is adopted for video transmission. The RTMP is a steaming protocol for flash videos that works over TCP. RTMP is designated because streaming video can be seeked to any point in the content. This feature is useful for long-duration videos since the instructor may jump ahead without waiting for the video file to download. Moreover, the streamed data are only stored in player's memory buffer and the entire video file is never copied or stored to web browser's cache. Thus, copying of copyright protected films is prevented. Red5 [20], an open source Flash media server, which supports RTMP, is used for video streaming and MC [21] media player is embedded to presentations for video playback.

V. CONCLUTIONS

In this paper we presented a web platform for the generation of personalized multimedia presentations on cultural heritage. The presentations may include images, texts, videos and sound and can be attended by tourist groups or students either on-site in a special projection room or on-line during visit preparation. Platform's implementation relies on Ajax technology and PHP, while RTMP is used for video streaming. The system is planned to be deployed in Athanasakeion Archeological Museum of Volos to enhance visitors experience and support Museum's educational programs. We aim to improve exhibits' location service and enhance the functionality of the Presentation Editor (e.g., by adding drag-drop functionality, slide duplication, different layouts etc.). Evaluation of platform's functionality and performance (e.g., streaming video quality) from different user groups including school classes is also in our plans.

REFERENCES

[1] Y. Wang, L. Aroyo, N. Stash, R. Sambeek, Y. Schuurmans, G. Schreiber and P. Gorgels, "Cultivating Personalized Museum Tours Online and On-Site", Journal of Interdisciplinary Science Reviews, vol. 34, No. 2, pp. 141-156, June 2009.

[2] Benaki Museum, Department of Educational Programmes, Athens, Greece, http://www.benaki.gr.

[3] Museum of Cycladic Art, Department of Educational Programmes, Athens, Greece, http://www.cycladic.gr/.

[4] R. Moreno and R. Mayer, "Cognitive principles of multimedia learning: The role of modality and contiguity", Journal of Educational Psychology 91: 358–368, 1999.

[5] E. Jerem, Z. Vasáros, G. Kállay and Z. Mester, "The Concept of Archaeological Presentation Sites and Visitor Centres in Hungary", Joint Archaeolingua-EPOCH workshop, EPOCH Lecture Notes, Sept. 2004, Hungary, pp. 97-106.

[6] W. Jou, K. Lee, J. Chun, H. Park, H. Jang and S. Bahng, "Combining Hybrid Media Tools for Web-Based Education", In Proc. of the Third IEEE Pacific Rim Conference on Multimedia, Advances in Multimedia information Processing, Dec. 2002, Y. Chen, L. Chang, and C. Hsu, Eds. Lecture Notes In Computer Science, vol. 2532. Springer-Verlag, London, 540-547.

[7] F. Bodendorf, M. Schertler and E. Cohen, "Producing Reusable Web-Based Multimedia Presentations", Interdisciplinary Journal of Knowledge and Learning Objects, Volume 1, 2005.

[8] Adobe Connect, web conference system. http://www.adobe.com/products/acrobatconnectpro.

[9] Cisco WebEx, web conference system, http://www.webex.com/.

[10] Openmeetings, open source web conferencing, http://code.google.com/p/openmeetings/.

[11] D. Raggett, "Slidy - an web based alternative to Microsoft PowerPoint", XTech conf. Building Web 2.0, Amsterdam, Netherlands, 2006.

[12] E. Meyer, "S5: A Simple Standards-Based Slide Show System", http://meyerweb.com/eric/tools/s5/.

[13] E. Wilde, P. Cattin, and F. Michel, "Web-Based Presentations", Proc. of Berliner XML Tage, Berlin, Germany, Sept. 2007.

[14] Slimey web presentation editor, opensource project, http://slimey.sourceforge.net/.

[15] Web-based presentation program, http://280slides.com/.

[16] Sliderocket, on-line presentation software. http://www.sliderocket.com/.

[17] Zoho on-line presentation software, http://show.zoho.com/.

[18] Mootools opensource JavaScript framework, http://mootools.net/.

[19] MooFlow opensource JavaScript Library, http://www.outcut.de/MooFlow/.

[20] Red5 opensource flash server, http://osflash.org/red5.

[21] MC Flash based media player, http://www.mcmediaplayer.com