Lecture Notes in Educational Technology

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Innovations in Smart Learning

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Lecture Notes in Educational Technology

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Preface

Smart learning environments are emerging as an offshoot of various technology-enhanced learning initiatives that have aimed over the years at improving learning experiences by enabling learners to access digital resources and interact with learning systems at the place and time of their choice, while still ensuring that appropriate learning guidance is available to them there and then.

The concept of what constitutes smart learning is still in its infancy, and the International Conference on Smart Learning Environments (ICSLE) has emerged as the platform to discuss those issues comprehensively. It is organized by the International Association on Smart Learning Environments and aims to provide an archival forum for researchers, academics, practitioners, and industry professionals interested and/or engaged in the reform of the ways of teaching and learning through advancing current learning environments towards smart learning environments. It will facilitate opportunities for discussions and constructive dialogue among various stakeholders on the limitations of existing learning environments, need for reform, innovative uses of emerging pedagogical approaches and technologies, and sharing and promotion of best practices, leading to the evolution, design and implementation of smart learning environments.

The focus of the contributions in this book is on the interplay of pedagogy, technology and their fusion towards the advancement of smart learning environments. Various components of this interplay include but are not limited to:

- Pedagogy: learning paradigms, assessment paradigms, social factors, policy
- Technology: emerging technologies, innovative uses of mature technologies, adoption, usability, standards, and emerging/new technological paradigms (open educational resources, cloud computing, etc.)
- Fusion of pedagogy and technology: transformation of curriculum, transformation of teaching behavior, transformation of administration, best practices of infusion, piloting of new ideas.

ICSLE 2016 received 52 papers, with authors from 18 countries. All submissions were peer-reviewed in a double-blind review process by at least 3 Program Committee members. We are pleased to note that the quality of the submissions this

year turned out to be very high. A total of 13 papers were accepted as full papers (yielding a 25 % acceptance rate). In addition, 8 papers were selected for presentation as short papers and another 7 as posters.

Furthermore, ICSLE 2016 features 2 distinguished keynote presentations. One workshop is also organized in conjunction with the main conference, with a total of 4 accepted papers (included at the end of this volume).

We acknowledge the invaluable assistance of the Program Committee members, who provided timely and helpful reviews. We would also like to thank the entire Organizing Committee for their efforts and time spent to ensure the success of the conference. And last but not least, we would like to thank all the authors for their contribution in maintaining a high quality conference.

With all the effort that has gone into the process, by authors and reviewers, we are confident that this year's ICSLE proceedings will immediately earn a place as an indispensable overview of the state of the art and will have significant archival value in the longer term.

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Educational Resource Information Communication API (ERIC API): The Case of Moodle and Online Tests System Integration

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Abstract. Educational Resource Information Communication (ERIC) API has been developed which enables the integration of two separate system and enhance their interoperability while keeping both systems working independently like they were. The proposed API can be easily inserted or attached to any system through making no or very little modifications to the system. With ERIC API's help, educational technology researchers can make their research (i.e., educational games) available and accessible for the potential users as the stakeholders don't need to put many efforts in terms of integrating their systems into the platform the stakeholders like schools are currently using. This paper mainly focuses on the workflow of the developed ERIC API and talks the case of integrating Moodle and Online Tests System (OTS) so students can grant Moodle permission to access the information of the tests they are supposed to take, whether or not they have completed particular tests, and how they performed in the tests.

Keywords: Privacy. Learning Management System. Machine to Machine. Secure Communication. Authorization. Anonymity.

1 Introduction

Werkle et al. [5] proposed a Personal Learning Management System which uses OpenSocial API to combine the functions of a learning management system (CLIX Learning Suite) and a personal learning environment (LearningTube) to give students a better learning environment according to their learning history, goals and preferences. Vozniuk et al. [4] also designed three learning analytics apps with OpenSocial API for a social media platform for collaboration and learning, Graasp, based on the results of requirement analysis from 32 teachers' opinions. Kardara et al. [3] designed SocIoS API and framework on the top of seven popular social

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nwtworks (i.e., Dailymotion, Facebook, FlickR, Google+, Instagram, Twitter, and YouTube) so components can access social networks' data via a uniform access mechanism.

Although OpenSocial API and its derived specification and frameworks can help to integrate functions that other applications and social media sites provide, the integration requires users' credentials of the system which provides the features or data that they want to use or access. OAuth is an authorization standard that allows an OAuth client application to access the resources stored in the OAuth server on behalf of the resource owner and not requires the owner to share his or her credential [2]. It may be a good solution for integrating lightweight applications and widgets into a learning management system. However, OAuth solution may not perfectly work to solve the need when we want to integrate two applications (or more) and each of them has its own authorization process for users.

This research aims to develop an Educational Resource Information Communication Application Program Interface (ERIC API) which can be plugged into internet-based systems so users of one system will not need to provide their credentials of another system to make the two systems capable of exchanging the needed data and information while running independently and have database secure and access being private from other systems.

The next section briefly introduces the structure and the workflow of ERIC API with the case of integrating Moodle and an online test system, OTS [1]. Section 3 describes the integrated system and Section 4 discusses the benefits of the integration and talks possible future works that can be done later.

2 Workflow of ERIC API

When a student logs in Moodle, the Moodle authenticator has to check whether or not his or her credential such as username and password is correct. To enable the interoperability of Moodle so it can work with other independent system like OTS – an online test system, it needs to store the student's username into session after his or her identity has been verified. Fig. 1 shows how ERIC API works in the integration of Moodle and OTS.

Before a Moodle block (as shown at bottom left of Fig. 1) can ask for the student's test relevant information from OTS and show on the block, Moodle has to get permission from the student so OTS can respond its information access request. To get the student's permission, the client module of ERIC API at Moodle site (i.e., we call service requestor) first retrieves the username from the session and converts it to a specific Universally Unique Identifier (UUID). The client module then redirects the student to the permission granting page of the server module of ERIC

API at OTS site (i.e., we call service provider). On the permission granting page, the student has to enter his or her OTS's username, password and select at least one privilege (e.g., allows Moodle to show the tests he or she is supposed to take) that he or she wants to grant for Moodle to access. The server module randomly generates an authorization code and redirects the student back to the service requestor with the confirmation of granted permissions after it verifies the student's identity from OTS' database. As soon as the student confirms his or her authorization via entering the correct authorization code, OTS block on Moodle will be able to send information requests of the granted permissions to OTS and get the data its needs to show on the webpage.

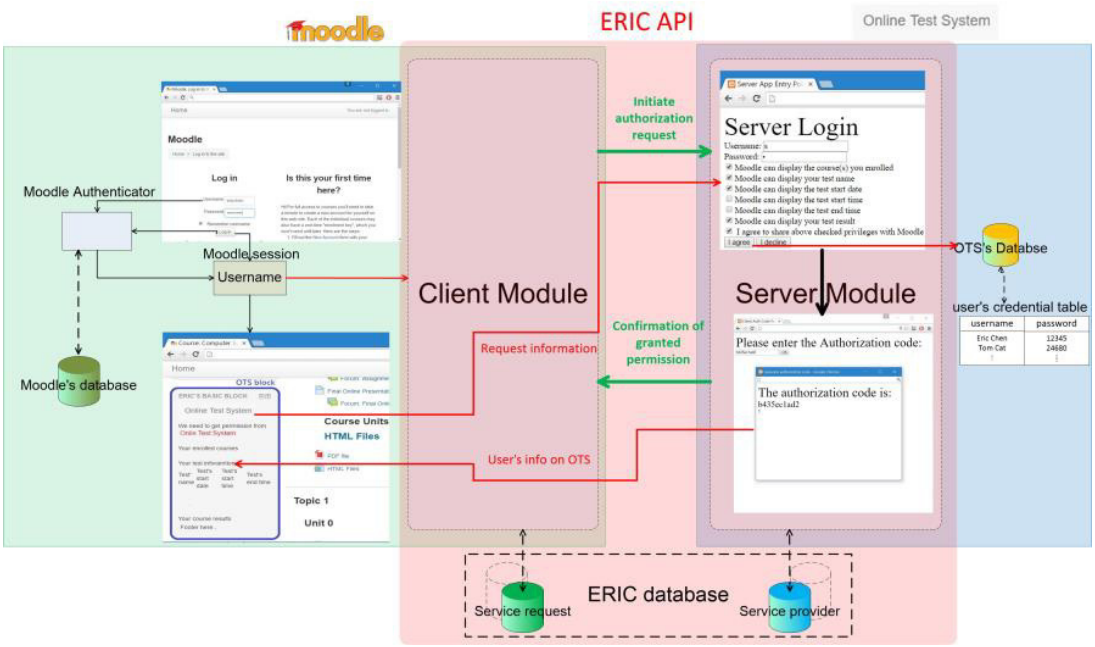


Fig. 1. ERIC API Architecture

3 Case of the Moodle and OTS Integration

In this section, we use a case to explain how a student grants Moodle to access and show the information that he or she has on OTS when the ERIC API is plugged into Moodle. As Fig. 2 shows, when a student logs in Moodle, he or she can see a block on the left side on Moodle.

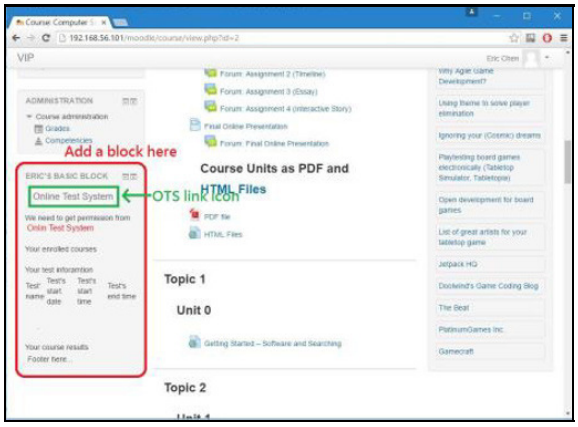


Fig. 2. A Moodle block

The student can click the "Online Test System" link to setup which permissions he or she wants to grant for Moodle to access. Fig. 3 shows he or she allows Moodle to access and show the courses he or she enrolled, the test names and their start dates he or she needs to take, and the performances he or she got.

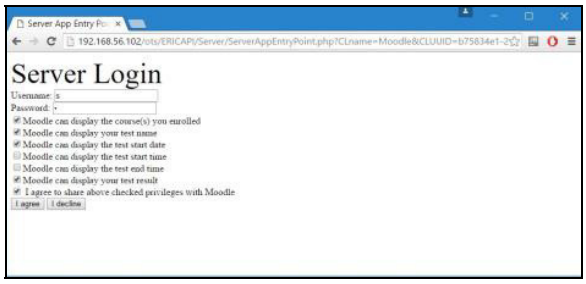


Fig. 3. Permission granting page at service provider side

Fig 4 shows that the Moodle block now can show the information on OTS that the student authorized it to access via sending requests to OTS with client module of ERIC API.

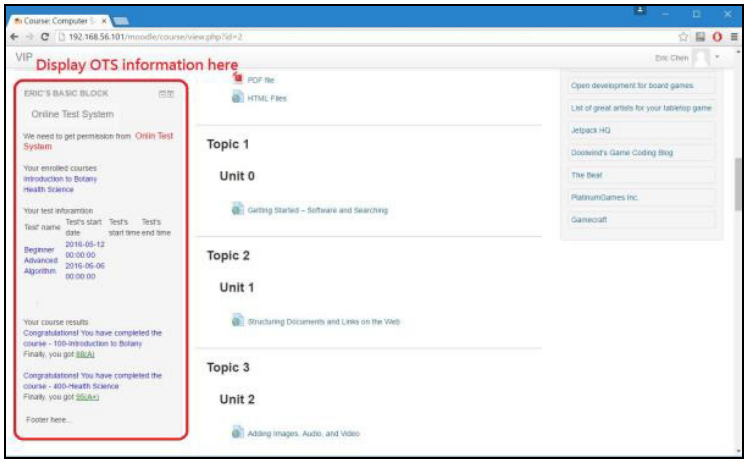


Fig. 4. The Moodle block with built-in ERIC API can now access the student's information on OTS.

4 Conclusion

The research team developed ERIC API that makes two systems capable of working together without asking users of one system to keep authorizing the system to access the service and the data that the other system offers. Also, ERIC API is developed to provide system administrators quick and easy installation process so they can integrate the services provided by two separate systems with very few efforts. In many cases, educational technology researchers design and develop good technology-enhanced learning systems and tools for administrative personnel, teachers, and students, but then they find that it is very difficult for them to make the stakeholders really benefit from or adopt their research results due to the difficulties, heavy efforts and concerns that the stakeholders may have for integrating the research systems/tools into the existing platform or system they are using. The development of ERIC API can not only make stakeholders be exposed to more useful applications, systems, and tools but also help researchers promoting and testing their research results effectively and easier. Moreover, the research team would like to conduct a pilot to evaluate the effectiveness of ERIC API by collaborating with teachers and schools to test the usability of the integrated systems.

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