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Citation	The IEEE 13th International Conference on Advanced Learning Technologies (ICALT 2013), Beijing, China, 15-18 July 2013. In Conference Proceedings, 2013, p. 471-472
Issued Date	2013
URL	http://hdl.handle.net/10722/189848
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Using Cloud Computing and Mobile Devices to Facilitate Students' Learning Through E-Learning Games

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Abstract

The recent advance in cloud computing and mobile devices empowers many innovative e-learning systems or games with increased interactivity and improved features. In this paper, we consider an innovative framework of cloud-based e-learning games that can be assessed through mobile devices to enhance students' learning anytime and anywhere. Being model-based, our proposal is adaptive and highly portable that can be easily customized to any existing cloud platform. Besides, our proposed framework allows course instructors or game designers to flexibly modify any part of an e-learning game, and continuously monitor the performance of individuals who try to compete with each other to attain better results. It is worth noting that this paper reports an on-going work, namely the iGame@Cloud system, for which a thorough evaluation will be conducted later. After all, our proposal stimulates many interesting directions for further exploration.

1. Introduction

Undoubtedly, new telecommunication technologies or services including the High-Speed Downlink Packet Access (HSDPA) named as the 3.5G, the Long-Term Evolution marketed as the 4G LTE, the IEEE 802.11, namely the WiFi for Wireless Fidelity, based products, or lately the mobileTV, have been continuously reshaping our daily living. With the availability of powerful mobile devices connected to a high-speed wireless network, with the maximum data rate as several to tens of mega-bits per seconds nowadays, many attractive mobile learning applications realizing the concept of learning anytime and anywhere have been developed in recent years, and actively sought the world-wide attention of educators, students, lifelong

learners or professionals in various disciplines. Among many successful applications, the Cellphedia [1] is a Mobile Social Software (MoSoSo) developed very early in the United States to promote the sharing of knowledge, in which users can send and receive encyclopedia-type inquiries between specific, pre-defined groups of users through text messaging on mobile phones. In Europe, there are many exciting mobile learning projects including the MOBIlearn [3], the Mobile Learning Framework 5 project and the Kaleidoscope mobile learning initiative [2]. Essentially, the Mobile Learning Special Interest Group (SIG) provides a forum for researchers to share new findings and technology in mobile, contextual and ambient learning across and beyond Europe. In Hong Kong, there was a mobile learning project conducted in a primary school in 2009 in which around 40 GPS-enabled 3G phones were used for data acquisition, conducting live interviews or surveys in the Hong Kong International Airport with the aid of GPS and video-recording functions, and also the uploading of captured data via the Internet to the back-end server for real-time analysis to support learning activities outside their classroom. In addition to the uses of mobile devices for learning or assessment, new technologies continue to fuel the blending and rapid development of new fields of research such as the edutainment for educational entertainment. An example is the digital game based learning (DGBL) approach as advocated by M. Prensky to combine serious learning and interactive entertainment in a fun, engaging and highly exciting medium.

Furthermore, in response to a call for applications by the Hong Kong Wireless Development Center in May of 2008, our team in the University of Hong Kong developed a mobile quiz game platform based on the concept of game rooms with real-time synchronization and the client-server model targeted for a mass of

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hundreds or thousands of players participating in the Beijing Olympic Games 2008 on the China's 3G (TD-SCDMA) network. The system design is reliant against any possible system or network failure.

In this paper, we consider an innovative system framework of cloud-based e-learning games, namely the *iGame@Cloud* system, that can be assessed through mobile devices to enhance students' learning anytime and anywhere. Being model-based, our proposal is both adaptive and platform-independent that can be easily customized to any existing cloud platform. Besides, our proposed framework allows course instructors or game developers to flexibly modify any part of an e-learning game, and continuously monitor the performance of individuals who try to compete with each other to attain better results. It is worth noting that this paper reports an on-going work for which a thorough evaluation will be conducted later. After all, our proposal shed light on many interesting directions for future exploration.

2. The System Design

The system architecture of our proposed cloud-based e-learning game system, named the *iGame@Cloud*, is shown in Fig. 1. Basically, the system includes the following components:

- a) the E-Learning Game Portal;
- b) the Interactive E-Learning Game Server running on the Cloud platform
- c) Administration Console Portal;
- d) Mobile Devices including smartphones or tablet PCs such as the iPad.

After registration, each user logs in our cloud-based E-Learning Game Server via the wireless network like the 3G, 4G or WiFi through the user interface already loaded onto their mobile devices. During the schedule time, the E-Learning Game Server will push some relevant questions, possibly embedded with some video clips, for the user to answer. Each user will be given with 3 options, namely "Skipping 1 question", "50:50" – that is to remove 50% of the options that are incorrect, and "Prolonging the Time Limit" – that will instantly double the amount of time (10 seconds) allowed for the current question. In each round, those users who had given the incorrect answers for 3 times would be required to exit from the current game session. The server will only display the correct answer for each round only when all the answers are received from the registered mobile phone or timeout. Thus, our cloud based e-learning game platform is essentially a round-based game that requires data synchronization on the server side.

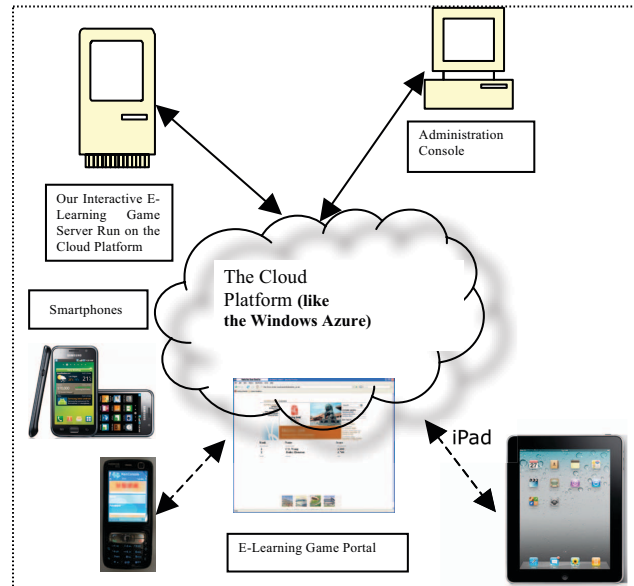


Fig. 1: The System Architecture of our *iGame@Cloud* Platform

3. Concluding Remarks

In this paper, we reported an on-going project in which we have proposed and are building a cloud-based e-learning game system to facilitate learning/revision anytime and anywhere. Our developed e-learning game system is so generic that can be readily extended to any wireless network, and will be thoroughly evaluated later. After all, our work shed light on many interesting directions for future exploration.

4. References

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