Secured Online Exam management System

Rachitha M V[1], Shwetha P[2], Sophia M[3] , Spurthi R[4] , Tharunya S[5]

[1]Assistant Professor,Department of Computer Science,Vemana Institute of Technology,Kormangala, Bengaluru

[2,3,4,5] Student,Department of Computer Science,Vemana Institute of Technology,Kormangala, Bengaluru

Abstract—*Main objective is to present a Secure Exam Management System (SEMS) for M-Learning Environments.Making learning process as learner-centered, e-learning can be enhanced. Enforcing exam security in open environments, each student has his/her own mobile/tablet device connected to a Wi-Fi network through which it is further connected to the Internet can be one of the most challenging tasks. Aim is to identify various vulnerabilities that may violate exam security in m-learning environments and to design the appropriate security services and countermeasures that can be put in place to ensure exam security. It also integrates the resulting secure exam system with an existing, open-source, and widely accepted Learning Management System (LMS). Multifactor authentication can be adopted.*

Keywords — LMS, E-learning, Internet.

I. INTRODUCTION

E-LEARNING has experienced an extraordinary growth over the last years that its global industry market is estimated to be worth USD 91 billion [9]. Learning Management Systems (LMSs), due to being essential tools of e-learning, have been adopted by many organizations to establish and provide access to online learning services.
With the augmented use of Learning Management Systems (LMS) like Moodle, the demand to perform exams online is higher than ever. Providing a dedicated exam room with many computers is a possible but very expensive solution. Performing exams on student laptops increases the number of simultaneous exams but also the possibility for cheating.[10]

The expansion of mobile devices provides a new ways to learn (mobile learning or m-learning). The 2015 Horizon Report [11] mentions that Bring Your Own Device (BYOD) learning technology is expected to be progressively adopted by institutions in one year's time or less to make use of mobile and online learning. Forecast of the number of smartphone users for 2019 is 5.6 billion globally which is three times that for 2013 [12].

Online Examination System is a software solution, which allows any industry or institute to arrange, conduct and manage examinations through an online environment. It can be done through Internet/Intranet and/ Local Area Network environments. Online examination is one of the vital parts for online education system. It is efficient, fast enough and reduces the large amount of material resource. An examination system is developed based on the web. [1] When thinking about online exams two topics come to one's mind right at the beginning. Firstly, the possibility of automated evaluation of standardized questions like multiple choice, numerical or matching exam questions. Everyone doing exam evaluations on hundreds of students knows about the number of hours involved in evaluating those tests, even with standardized answer sheets. It is very practical for lecturers using Moodle or any other LMS to use automated evaluation in their exams. Secondly, when providing computerized tests performed on private laptops, the testee can access local files, use already installed applications or Google for help. As for the requirements when delivering such tests, there is a higher need for more security than is usually available on a regular laptop or provided by any Web browser. [10].

II. PRINCIPLES OF M-LEARNING

1. Access*:* A mobile learning environment is about access to content, peers, experts, credible sources, and can be started via a smartphone or iPad, laptop or in-person, but access is constant–which in turn shifts a unique problem to learn on the shoulders of the student.

2. Metrics*:* As mobile learning is a mixture of the digital and physical, measures of understanding and "performance of knowledge" will be available.

3. ***Cloud****:* The cloud is the enabler of "smart" mobility. By accessing the cloud, all data sources and project materials are constantly available, allowing for previously unreachable levels and styles of revision and collaboration.

4. Transparent*:* Transparency is the natural by-product of connectivity, mobility, and group effort. As planning, thinking, performance, and reflection are both mobile and digital, they gain an immediate audience with both local and global

communities through social media from twitter to facebook, to instagram.

5. Play: It is the main characteristics of authentic, progressive learning in a mobile learning environment learners are encountering a changeable and unplanned set of data, domains, and collaborators, changing the tone of learning from academic and compliant to personal and playful.

6. Asynchronous : It is one of the most powerful principle. This unlocks an educational environment from a school floor and allows it to move anywhere, anytime in pursuit of truly entrepreneurial learning. It also enables a learning experience that is increasingly personalized: *just in time, just enough, just for me.*

7. Self-Actuated: With asynchronous access to content, peers, and experts comes the potential for self-actuation.

8. Diverse: With mobility comes diversity. As learning environments change constantly, that fluidity becomes a norm that provides a stream of new ideas, unexpected challenges, and constant opportunities for revision and application of thinking. Audiences are diverse, as are the environments data is being gleaned from and delivered to.

9. *Curation:* Apps and mobile devices supports curation. By design, these technologies adapt to learners, store files, publish thinking, and connect learners, making curation a matter of process rather than ability.

*10. Blending:*A m- learning environment will always represent a blending of sorts–physical movement, personal communication, and digital interaction.

11. Always-On: It is self-actuated, spontaneous, iterative, and recursive. There is a need for information access, cognitive reflection, and interdependent function through mobile devices.

12. Authentic: All of the previous 11 principles yield an authenticity to learning. [5]

III. LITERATURE SURVEY

Learning Management Systems must change to adapt to new user requirements and technologies. They do not contain interoperability standards to communicate with external applications and also contains few technical difficulties with mobile devices. One possible solution to overcome these challenges is the integration of m-learning initiatives with LMSs.

M-learning is very similar to e-Learning. First definitions of mobile learning focused on technology, what means that they understood this model as learning with a mobile phone, personal digital assistant (PDA), audio player, digital camera or recorder. It is not only a matter of device but it has to be connected via wireless networks, so it supports and increases learning possibility. One of the most accepted definitions of mobile learning is by Traxler: it is a learning model that makes the most of all hand-technology like mobile/telephone or other devices [7].

Learning Management Systems (LMS) are well-known among most education and training institutions. To explore the learning experiences of state college students using mobile electronic textbook (e-book) readers some research was done. The purpose was to build a rich description of how students used e-books delivered on mobile computing devices for college-level, introductory sociology courses at a public state college in the south-eastern United States. The bounding frame was comprised of the literature on mobile technology, mobile learning theories, and e-books. A theoretical lens of learning theories was placed within the mobile learning framework. These lens were used to provide insight to the student's learning experiences. And the conclusions were from this study: students expressed competence in their use of the mobile e-books, they valued the use of the mobile e-books for their learning, students were individualized in their learning with the mobile e-books, and they enhanced their learning opportunities [13].

Even though LMS are a mature technology, they have left the lead of innovation in e-learning to mobile devices and tablets. Thus e-learning has been enhanced by Mobile learning (M-learning) by increasing communication and conversation opportunities to make the learning process more cooperative and learner-centred. Ref [14] describes a way to integrate mobile devices and educational applications with a LMS as Moodle through web services. It was rather than just creating mobile apps that reproduces LMS functionalities on a mobile device, this provides a necessary tools to allow mobile devices to interact with the LMS. It proposes an open specification of web services to support the integration of mobile external applications with Moodle.

Context awareness is essential being a highly modified environment with different capabilities. There were some major challenges. Those are: To define the learning context, how to sense it, and how to react to the changes. This provides a general architecture that facilitates contextualization using current widely-used web standards. It provides a systematic approach to achieve contextualization defining major components and their functionalities without deepening into details. It uses web services to connect to resources making

them reusable and distributable. In addition, all technologies and platforms were available under General Public License (GPL) hence facilitating immediate implementation. Therefore m-Learning could be the only solution. [15]

IV. PREVIOUS EXPERIENCES

Mobile learning experience was conducted by Ariana L. Leonard in Wesley Chapel, Florida. This is one example for M-learning experience. This shows the use of mobile phones in the classroom where students can search. She decided to organize students into groups and send them tracks in English or Spanish so they had to translate and understand them, and thus complete the activity. From this, an open channel of communication between teacher and students was established. It also was found that students were less afraid to ask questions when they did not know or did not understand something. Another change was that students spent more time on the activities and even improved their scores on the questions [8].

In New York, another experiment was conducted by Professor Thomas J. Philips, who claimed that there had been a change in the role of teacher and student. No longer was the teacher who brought the reality to the student, or who gave the instructions, now it was the student who portrayed the knowledge of their territories and the teacher became a facilitator of learning [8].

V. SYSTEM ARCHITECTURE

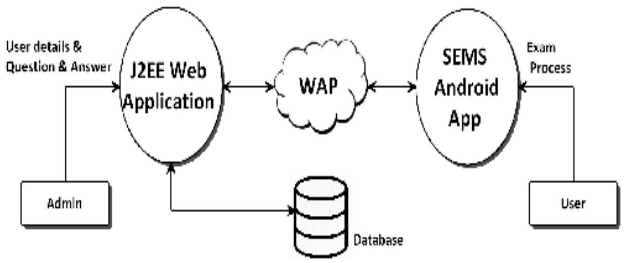

Fig. 1 System architecture of SEMS

The traditional client-server structure is broken into the database server and application server, i.e. the three layer client/server architecture, as shown in fig.1.

Admin registers the user's details, questions and answers onto database using J2EE web application. J2EE is a platform independent, java-centric environment for developing, building and organizing web based enterprise applications online. It consists of a set of services, APIs and protocols that provide the functionality for developing multi-tiered web based applications. Java database connectivity is the standard interface for java databases which stores all the registered information's (such as user's details, questions).

Before mobile service providers had limited opportunities to offer interactive data services. But then Wireless Application Protocol (WAP) was introduced. It is a technical standard for accessing information over a mobile wireless network and it is a web browser for mobile devices that uses the protocol.User has to install SEMS Android app and then login into it to take up online exam in his/her mobile. This app allows user to access the database by using WAP.

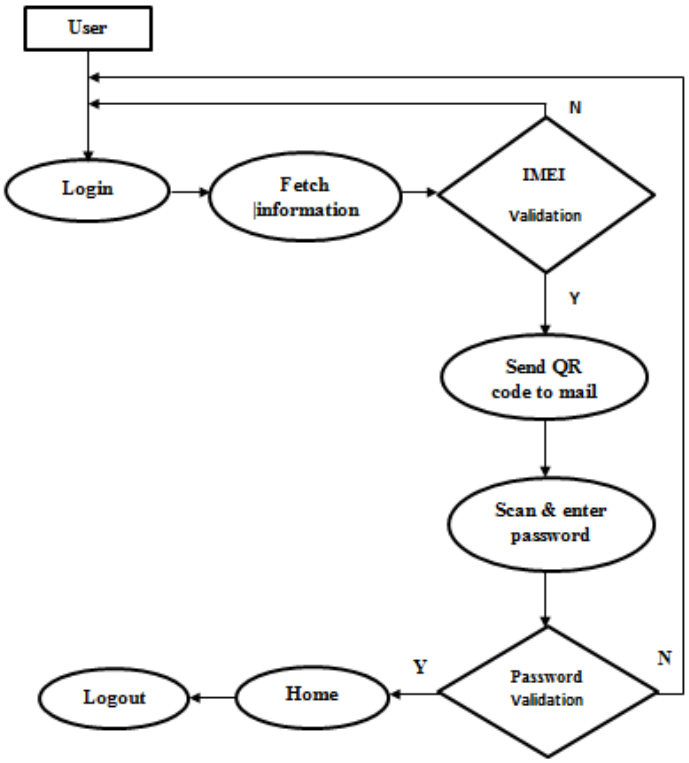

Fig. 2 Flow diagram of user login process

On the particular day of exam, the user has to carry his/her own mobile phone whose IMEI number has been already registered by the admin. When user logins into the SEMS app, IMEI number is fetched from the server. If it is valid then the password will be encrypted into QR-code and sent to the respective user's mail- id. After scanning process, the entered password will be validated which allows the users to take up the exam. If anywhere validation process fails, it will process back to login page. As soon as he/she completes, the score of their exam will be displayed.

VI. ESSENTIAL SERVICES AND FUNCTIONALITY

1. Secure and Random Distribution of Exam Question.
   - Enabling the teacher to define a bank of exam questions and to link them to his/her subject through an appropriate interface.
   - Enabling the teacher to specify a subject's exam properties such as date, time and subject.
   - Securely authenticating and enrolling students.
   - Creating exam instances by random distribution of exam questions to the enrolled student's mobile/tablet devices according to the predefined exam properties.
   - Students answer the exam questions through the Exam Client Software Interface.
   - Processing students' answers to determine their grades.

2. Preventing the "Unattended Exam" Issue.
   - Proctor Approval Based Strategy.
   - QR-Code Based Strategy.
   - NFC Based Strategies.[9]

VII. CONCLUSION

M-learning is an alternative for information delivery and provides collaborative learning which is flexible. This paper enables the teacher to specify a subject's exam properties through an appropriate interface.Online examination will reduce the quick occupation of evaluating the answers given by the applicants physically and it will decrease paper work.Securely authenticating and enrolling students, using a well-known secure authentication mechanisms into exams at the pre-defined date and time through the Exam Enrolment Interface. Creating exam instances by random distribution of exam questions to the enrolled students' mobile/tablet devices according to the predefined exam properties. Multifactor authentication is been adopted for stronger security.The resulting design is complete LMS with secure exam services that can be consumed by Legacy systems through web browsers as well as by m-learning systems.

REFERENCES

[1]. (2016 Jan) Deepankar Vishwas Kotwal1, Shubham Rajendra Bhadke2, Aishwarya Sanjay Gunjal3, Puspendu Biswas4," ONLINE EXAMINATION SYSTEM", International Research Journal of Engineering and Technology (IRJET)

[2]. (ref14)M. J. Casany, M. Alier, E. Mayol, J. Piguillem, N. Galanis, F. J. Garcıa-Penalvo, and M. A. Conde, "Extending moodleserv- ~ ices to mobile devices: The moodbile project," in Proc. 6th Int. Conf. Mobile Ubiquitous Comput., Syst., Services Technol., 2012, pp. 24–28.

[3]. (ref11) J. S. Kissinger, "The social and mobile learning experiences of students using mobile E-books," J. Asynchronous Learn. Netw., vol. 17, no. 1, pp. 155–170, Jan. 2013.

[4]. (ref..) E.I. Basaeed1, J. Berri1, M.J. Zemerly1 and R. Benlamri2 1 Etisalat University College/Computer Engineering Department, Sharjah, UAE 2*Lakehead University/Software Engineering Department,* Ontario, Canada," Web-based Context-Aware m-Learning Architecture", in iJIM – Vol. 1, No. 1-10,

[5]. [Online]. Available :www.teachthouht.com/learning/12-principles-of-mobile-learning/

[6]. HongmeiNie, *Math,Physics and Information Engineering*College,Zhejiang Normal University," Design and Development of the Online Examination System Based on B/S Structure",in2nd International Conference on Teaching and Computational Science (ICTCS 2014)

[7]. (2012 IEEE)MariluzGuenaga, IratxeMentxaka, AndoniEguíluz, Susana Romero, Javier GarcíaZubíaDeustoTech Learning ,Deusto Foundation – University of Deusto ,Bilbao, Spain, "Smartphones and teenagers, threat or opportunity"

[8]. Ash, Katie. 2010. "Teachers Testing Mobile Methods." Education Week 29, no. 26: 26-27. Academic Search Complete, EBSCOhost (accessed August 28, 2012).

[9]. (2016 IEEE)Mustafa Kaiiali, ArmaganOzkaya, HalisAltun, Hatem Haddad, and Marc," Designing a Secure Exam Management System (SEMS) for M-Learning Environments"

[10]. Gabriele Frankl, Peter Schartner, Gerald ZebedinAlpen-Adria-Universität Klagenfurt Klagenfurt, Austria/Europe," Secure Online Exams using students' devices"

[11]. L. Johnson, S. A. Becker, V. Estrada, and A. Freeman. (2015). NMC horizon report: 2015 higher education edition. The New Media Consortium [Online]. Available: https://net.educause.edu/ir/library/pdf/HR2015.pdf.

[12]. (Jun. 2014). Ericsson mobility report. Ericsson, Inc. [Online]. Available: http://www.ericsson.com/res/docs/2014/ericssonmobility- report-june-2014.pdf.

[13]. J. S. Kissinger, "The social and mobile learning experiences of students using mobile E-books," J. Asynchronous Learn. Netw., vol. 17, no. 1, pp. 155–170, Jan. 2013.

[14]. M. J. Casany, M. Alier, E. Mayol, J. Piguillem, N. Galanis, F. J. Garc_ıa-Pe~nalvo, and M. A. Conde, "Extending moodleservices to mobile devices: The moodbile project," in Proc. 6th Int. Conf. Mobile Ubiquitous Comput., Syst., Services Technol., 2012, pp. 24–28.

[15]. E.I. Basaeed1, J. Berri1, M.J. Zemerly1 and R. Benlamri2, Etisalat University College/Computer Engineering Department, Sharjah, UAE, Lakehead University/Software Engineering Department, Ontario, Canada,"Web-based Context-Aware m-Learning Architecture", in iJIM – Vol. 1, No. 1, October 20