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Mobile Collaborative Learning (MCL) Based on Cloud Computing

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ABSTRACT

Due to the improvement of mobile computing and wireless technology, nowadays mobile devices have become an important tool for learning and collaborations. Mobile Collaborative Learning (MCL) is an approach whereby users are virtually learning together by using their mobile devices via a communication network. This learning process taking place by a means of discussions forums, chatting, sharing learning materials such as files, video and sounds. As the demand for accessing these online learning resources increases, there is a concerned problem on how to manage this huge number of users to access services continuously and simultaneously with a guarantee of better services. Cloud computing is found to be a solution for this problem. It has a significant effect since it guarantees the users better performance, efficiency, security as well as maintenances with a minimum cost. The introduction on Mobile Collaborative learning in this field is very useful as many of the students and other individuals afford to own devices that can be used in the collaboration and learning process via cloud environment such as smartphones, tablets and PDA. In this paper, a Mobile Collaborative Learning, MCL architecture is proposed, the architecture describe in details on how the users will able to collaborate using their mobile devices to access and share information for learning purpose. Cloud storage is provided in order to provide wide and flexible service that will guarantee availability of service all the time.

Keywords: M-learning, cloud computing, collaborative learning.

1. INTRODUCTION

With the cutting-edge of technology, nowadays everything treated as a services starting from hardware, software as well as platform1-3. Due to the advancement of mobile
computing and wireless technology, Mobile Collaborative Learning (MCL) become a popular service among those services offered via the communication network. In a simple meaning, MCL is an approach whereby users are virtually learning together by using mobile devices, tablets and PDA through a communication network. This learning process taking place by a means of discussions forums, chatting, sharing learning materials such as files, video and sounds. Unlike to classroom learning, due to the mobility of the mobile services this approach provides a wider area for a learner to learn anything available in the cloud server, anywhere, anytime provided that the network connection is available.

Recent researches revealed that MCL is mostly intensive model for conducting research especially distance and e-learning environment. This approach offers different features and functionalities to all users in order to access online knowledge that is particularly free of charge, wide, active and in varied demographics. Since the costs for mobile devices to use this service are affordable to most of the users, this approach seemed to face some challenges on its implementation. These challenges starting from limited number of resources to accommodate those users such as hardware and software, provision of poor services such as performance, security, reliability and scalability. All of these will be missed in these MCL based on ordinary model of servers for collaborative learning. To overcome those limitations, MCL based on cloud computing seemed to be a solution. Its ability to provide better performance, security, efficiency and maintenances for the services under a minimum cost seemed to be the reason for many of the consumers to choose cloud in their implementation for running their daily business and provision of their services. This statement is supported by the facts that, the success behind all services providers and business companies such as Google, Amazon, EBay, Flipkart, IBM and others are based on the trust of the consumers to these company, and these trusts are caused by provisions of good services offered which are the results of implementing cloud computing to offer those services. In this paper, we present a proposed Remote Mobile Collaboration Learning, MCL based on cloud computing. The frame work will work in the presence of cloud server, in which the resources materials and other things are available in the cloud for guarantee of availability and security of the services all the time. The remaining of the paper is arranged as follows: Section 2 present a literature review of similar work conducted by different scholars; Section 3 present in details the concept of Mobile Collaboration Learning; In section 4, a proposed framework is described and how it will operate. Section 5 finalize with conclusion and then give the direction of the future work of the study.

2. LITERATURE REVIEW

With an increasing growing of e-learning based in cloud computing, many researches presented by different scholars to outline how the architecture and frameworks of this approach should be. In this section, we present some of the recent works that describes and propose techniques and approaches. In study number, the authors proposed a framework for collaborative learning known as CoMobile, in this framework, different open sources operational components were deployed such as MMS, SMS and control servlets. An instant
messaging framework collaborative learning using mobile is proposed in study\textsuperscript{7}. In this framework, difference clients’ applications that distributed from various location contains instant messaging clients and JavaSpaces. Furthermore, AlAjmi \textit{et al.}, in their study\textsuperscript{8} describe a real time learning system which includes student, teacher content and mobile learning server. In this system, a teacher is responsible to manage the learning contents. Different tools are available to enable the teacher to accomplish that process by uploading the notes contents including audio, video and other types of files. Other tools such as searching tools and class manager for showing student progress were also included. Moreover, a flexible component centric model is presented in paper number\textsuperscript{9}, this model is designed between students, teacher and group. Their attention is on face to face collaboration and a user interface specification. Yazhen \textit{et al.},\textsuperscript{10} present a study on the use of mobile communication technology as a tool for collaboration learning, in this study they explained the use of 3G based mobile phone technology as the efficient mobile based learning since the users can learn by using these mobile phone anytime and everywhere they are. A mobile learning theory is proposed in\textsuperscript{11}. Depending on the nearby environment, users can use their mobile devices to operate them in order to opt the suitable contents such as audio, video and other learning materials. Users can record can takes notes according to their understandings by make use of their mobile devices, but these contents are limited only in videos and audios. Guoxin in their study\textsuperscript{12} shows how 3G technology using mobile phone becomes an effective way for an interactive learning process in which many levels of designing tactics and approaches can be used for this purpose. In their designing, 3G mobile devices are the terminals used for interactions and the users have many options that are given to them depending on their goals. A client server based architecture for Mobile Collaborative Learning is proposed in study number\textsuperscript{13}, this architecture is a virtual learning environment that makes use of mobile phone for collaboration purpose. The learning contents from this architecture are designed to be stored in the server and they are accessible whenever they are needed for educational purpose. And last, Chiu Pin Lin in his study number\textsuperscript{14} proposed a learning environment later called it as Mobile Collaborative Learning Environment (MCLE). This framework was an initial study of Empirical Practice CSCL situation by means of integrated Edu classes, Tuple Spaces and Group Scribbles. Different other applications are designed for assisting and attracting students in face to face collaborative learning while doing class activities. The results showed that, during completion of the learning activities, this one to one mobile technology improved instructional design and definitely stimulates inspirations to the students as well as to improve student’s mutual communications among themselves.

3. MCL ENVIRONMENT

3.1 Collaborative Learning

The term collaborative learning is a keyword which stands for different methods of learning which involves different users located from different demographics areas. In academic organizations, this approach can be thought as a cooperative study between student and student or student to teacher.
The approach of Collaborative learning is constructed on the hint that learning process indeed a public act whereby conversations between different learners takes place. In order to create a good collaborative learning, a cycle of different phases was proposed which act as a road map to be followed for successfully designing and implementation of collaboration learning. The phases involved in this road map are as follows:

- Enhancing Interdependence
- Collaboration Assessment
- Creation of Boundary-Spanning Skills
- Practice Collaborative Learning
- Capturing and Disseminating Learning
- Creative Value

Figure 1 below shows the proposed cycle to be followed while designing and implementing collaborative learning.

Figure 1 - Road map cycle for designing and implementing collaborative learning.

The above road map is going parallel with some different activities that are necessary and required during the implementation of collaboration learning. These activities include:

- Setting clusters for each member.
- Monitoring each member
- Displaying member status
- Synchronization of multiple discussion
- Delivering messages

The above-mentioned activities will smooth the collaborative learning process management for better performance and evaluation in general.
3.2 Mobile Collaborative Learning

As mentioned earlier, due to advancement of wireless technology, mobile technology has been altered as a main communication tool since it is well suited in attractive collaborative learning environments. The perception of Mobile Collaborative Learning (MCL) is totally differ from that one of classroom based learning. This educational approach offers several opportunities, such as providing chances to the group of users who are occupied in similar or different organizations to contribute in achievement of certain goal by means of mobile devices.

Nowadays, it is clear that we are in a mobile age community whereby, mobile technology has the capability to provide support on almost everything. It is clear that, nowadays the knowledge is the hands of everyone in the community, by employing mobile devices all activities such as delivery of quality education, collaboration and communications, any type of assessment and evaluations can be easily achieved and in an effective manner with a minimum cost of operations and supports. Additionally, the mobile collaboration learning comprises of wide and large access of essential and important satisfied information that are shared among users in timely manner, it increases the diversity of interactions between different users and minimize the cognitive load throughout the learning process.

In that way, mobile device emerges as an important tool to enhance and expand the performance of MCL. Hence, in order to develop a good and effective MCL, different software and hardware items should be taken into consideration to assimilate with the users of the system to sponsor a good delivery of knowledge in efficient manner. Typically, different components are involved during the designing and implementation. In general, these components will be taken into consideration:

3.2.1 Learning Device

This is the primary hardware requirement for mobile collaboration learning, it can be either smartphone, tablet, notebook, PDAs or any other device with same characteristics and that has the ability to be connected through wireless technology such as Wi-Fi, CDMA and GSM.

3.2.2 Mobile Learning Application

In order for collaboration to takes place, there should be means to enable users to interact by using their mobile devices. Mobile application is a type of software which will enable users to perform that operation. This software should be made to be available for downloading from different storage such Google Play Store and even from a particular website where the developer decides to put it. The application should offer different options in which user can perform for learning purpose such as discussion, chatting, messaging and others.

Moreover, the application should compose of different multimedia contents such as video and audio, but also it should support activities such as file uploading and open learning materials. Further, in order to for the MCL to be successfully, basically it must contains some important running tools which will provide different choices such as visualised collaborating processes, lectures materials, quizzes, tests, opening users, discussion forum, viewing grades and other options. And lastly, it is a vital to design an MCL that has the capability to be with the support of configuration of middleware architecture.
3.2.3 Middleware

Middleware refers to the software which simplifies and smooth the data and information exchanges taking place between two application programs that resides within the same environment or across varied hardware and network environment.

The MCL system should be designed to provide a wide support to the mobile application by using different languages, technologies and platform layout. In another side, the middleware construction should support essential frameworks in which the system should be used in a variety types of mobile devices of different manufactures and from varied distributed geographic areas.

4. PROPOSED MCL FRAMEWORK

In order for the system to be successful, it must reflect to what users would expect to get from it, in that way the architecture of the system should be systematized in such away the latest technologies can be supported by that architecture. Additionally, the system should be client-server architecture, so that the request and reply could be easily handled and the overloading could be minimized in mobile device due to continuous running. As shown in Figure 2 below, the proposed architecture composed of mainly five (5) important parts which are Client side (mobile devices), Wireless Access point, Web server, Cloud Storage and User.

![Figure 2 - Proposed framework for MCL](image-url)
4.1 Client (Mobile devices)

These are the end users which can use devices such as smartphone, iPad, notebook, tablets and PDAs which are pre-installed an MCL App in order to access the contents available to the webserver. In order to access the learning system, the devices must be connected to the internet through wirelessly technology so that they will easily access the services available in the web server such as discussion, tests, quizzes, forums, downloading materials, viewing materials and so on.

4.2 Wireless AP or Cell phone Tower

The aims of wireless access point are to enable the mobile devices to be easily connected to the network. It has the same aims as cell phone tower, in which it aims to simplify the reception of cell phones signals and other wireless communication devices in the cellular network.

4.3 Web server

The primary and main task of web server is to store the contents, processing them and reply back the request sent by clients. Usually, the communications between clients and server are taking place by using HTTP (Hypertext Transfer Protocol). In this server, the collaborating learning system will be stored with all contents and services that should be provided to the end users. It contains database which store all contents and information that are available and to be accessed by clients through their mobile devices. In that case, the status of database is dynamically updated every time whenever any operations are performed in the server. Not only the web server used for offering WWW services but also it can be used for the monitoring and administrative purposes.

4.4 Cloud Storage

The cloud storage is the one which guarantee the availability of services whenever they are required. The contents from the webserver are automatically updated whenever they are uploaded by users. Hence the download and upload operations between webserver and cloud storage appears by means of synchronization. If it happens the webserver is not available due to some reasons, then the users must communicate directly to the cloud storage for accessing the contents, and when the webserver is back again, the updation of the contents and all process taking places when it was offline will be updated in order to maintains the integrity of the contents between cloud storage and webserver.

4.5 Administrative Users

The administrative user is the one responsible for managing the whole system, from uploading contents, updating some contents, managing users who are going to use the cloud service etc. All of these management activities are taking place via the webserver.
5. CONCLUSION AND FUTURE WORK

Recently, cloud computing has appeared as a convincing model for handling and offering different services over the internet. The growth of cloud computing is speedily moving background of Information technology and eventually rotating it to the long-held potential of helpful computing into a realism. Cloud computing can support publics and countries in general, it can change education and learning process at al. The whole world of information now can be made to be available by all people using cloud-based learning that is opened and can be reached anytime and anywhere using hand-held devices. In this paper, a Mobile Collaborative Learning, MCL architecture is proposed, the architecture describe in details on how the users will able to collaborate using their mobile devices to access and share information for learning purpose. Cloud storage is provided in order to provide wide and flexible service that will guarantee availability of service all the time.

In future work, we expect to implement this proposed architecture in which mobile learning android application will be developed for accessing the contents from the cloud storage and make users to easy access the contents stored from the cloud server.

REFERENCES