

**Conceptual framework for cloud based ubiquitous learning environment through
M – Learning**

Anirudh Chauhan, Lakshay Kumar

*Department of Computer Science and Engineering, SRM University, India
anirudhlp90@gmail.com, lakshay_kumar75@yahoo.com*

Abstract: Cloud computing is a recent trend in storing and managing data over a network. Cloud computing entrusts remote services with a user's data, software and computation. Here, we propose a design where a ubiquitous learning could be possible through m - learning, where people (in our case students) can access data like lecture notes, assignments etc. on their mobile devices, from anywhere. A university can have a dedicated cloud which everyone could access and upload their content, which would be accessible from anywhere and easily run on mobile devices, be it any platform or operating system, making it convenient for everyone to access and read data without the use of heavy & expensive software. Student can access their college data from a dedicated web application or a mobile application synchronized with the university cloud. The next generation computing started with the advent of Cloud computing and this framework would integrate the energy efficient cloud based service with m – learning, making the education system cheap and paper free. The display limitation of these devices means that it is crucial to deliver the right content at the right time.

Key words—Cloud Computing, Mobile Application, Mobile Learning, Private Cloud.

1. INTRODUCTION

Cloud computing is the use of computing resources (hardware and software) that are delivered as a service over a network (typically the Internet). Cloud computing is being considered a new computing paradigm with implications for higher utilization, and better management, greater flexibility and availability at lower cost. Because of this, cloud computing has been receiving a good deal of attention lately.

Mobile devices are part of normal daily interaction. The cost of mobile access to the internet is steadily decreasing. The research aims towards implementing education through mobile devices using cloud services. Like Desktops and Laptops are primarily used for e-learning, devices such as cell phones and PDA's are used for Mobile learning (M-learning). This helps in reducing equipment cost in delivering education and making it convenient for everyone to access and read data without the use of heavy & expensive software by using cloud based services.

There are 4 types of cloud deployment models available in the market today: [5]

Public Cloud – applications, storage, and other resources are made available to the general public by a service provider. These services are free or offered on a pay-per-use model.

Community Cloud – shares infrastructure between several organizations from a specific community with common concerns (security, compliance, jurisdiction, etc.), whether managed internally or by a third-party and hosted internally or externally. The costs are spread over fewer users than a public cloud (but more than a private cloud).

Hybrid Cloud – is a composition of two or more clouds (private, community or public) that remain unique entities but are bound together, offering the benefits of multiple deployment models.

Private Cloud – is cloud infrastructure operated solely for a single organization, whether managed internally or by a third-party and hosted internally or externally.

We opt for a Private cloud (see Table I) as this infrastructure is operated solely for a single organization (college). Mobile learning (m-learning) is designed based on electronic learning (e-learning) and mobility. This paper

presents benefits of combining m-learning and cloud computing to enhance the communication quality between students and teachers.

Table I. Main Differences between Public and Private Cloud

Feature \ Model	Public	Private
Ownership and management	Service provider	Organization (University)
Access	By subscription	Limited to staff and students
Customization	Not possible	Yes

The successful use of Cloud Computing in higher education presupposes the existence of three key elements, namely virtualization, the intelligence from the network and a robust ecosystem. These offer the basis for obtaining operational efficiency, security, activity continuance, scalability, interoperability leading in the end to innovation.

2. UNDERSTANDING CLOUD

Cloud computing utilizes the maximum potential of networked computers, sharing data and processing power using innovative ways. We already use cloud computing in our daily life, probably without even realizing it. If we use Google, YouTube, MySpace, or other Web services, we're already part of the cloud. The general principle behind all these services is the same: using applications running on a remote server to manipulate data stored on a remote server. Plugged into the Internet, our local computer can access these remote files just like they were stored on our local hard drive.

Cloud computing allows computers to pool their resources, effectively turning the entire network into one giant computer. Now that most computers are hooked up to one giant network, the Internet, we have created a supercomputer that encircles the globe. [3]

The main aim of cloud computing is providing services. It provides various types of services, some of the important services are SaaS, PaaS and IaaS.

Software as a service (SaaS):

It is a model of Software deployment whereby according to the demand of the customer a provider provides licensed application for the specified time.

Platform as a service (PaaS):

Generates all facilities required to support the complete cycle of construction and delivery of web-based applications wholly available in Internet with built in services so there is no need of downloading software or special installations by developers.

Infrastructure as a Service (IaaS):

It provides resources, such as servers, connections, storage and other necessary tools to construct an application design according to the need of organizations, making it quick, easy and economically viable.

1.1 Working of cloud

In an institution, buying computers for everyone isn't enough -- we also have to purchase software or software licenses for each system. Instead of installing a suite of software for each computer, we'd only have to load one application. That application would allow students to log into a Web-based service which hosts all the programs the user would need for his or her job.

1.2 Advantages

Cost Efficient, Unlimited storage, Automatic Software Integration, Easy access, Quick Deployment.

3. UNDERSTANDING M - LEARNING

Mobile learning (m-learning) is designed based on electronic learning (e-learning) and mobility. However, traditional m-learning applications have limitations in terms of high cost of devices and network, low network transmission rate, and limited educational resources. Cloud-based m-learning applications are introduced to solve these limitations.

Mobile learning has the following benefits:

- It offers "ubiquitous" learning;
- It is efficient for college students;
- It can be a source of entertainment to students;
- It allows online connectivity and sharing;
- It allows learners to learn at their own convenience;
- It is cheap and cost efficient;
- It saves a lot of paper;
- It allows to constantly update themselves.

"Ubiquitous" learning allows students to access the information that they need, whenever and wherever where they need it. This method of learning eliminates the waste of learning time by offering the exact information that is needed at any place and not the information that may be needed sometime in the future, eliminating the excess accumulation of information.

Mobile learning is efficient for college students. With increasing commuting time between their home and college, students can take advantage of the times they have to wait at train stations or bus terminals, and also of the actual travel duration, to update themselves with the information on their smartphones or tablet PCs.

Mobile learning can be a source of entertainment to students. With the increased features of mobile devices, these devices have become very appealing to the youth. It transforms young students' learning from something that they need to do, into something that they like to do. One good example of entertaining multimedia content for youth audience would be combining gaming and learning.

Mobile learning allows online connectivity and sharing between users. Mobile learning takes advantage of the online connectivity enabling users to access online content and not only the local content stored on the mobile device. Online connectivity also allows users to share information, ask questions, share progress or transmit results.

Mobile learning allows someone to learn at its own pace. While regular classes have a predefined duration and usually have predefined starting time, mobile learning classes allow students to learn at their own convenience, if they are already familiar with the content they could skip it or if taking more time to understand they could refer it when they feel they need to.

Mobile learning is cheap and cost efficient. Mobile learning can be much cheaper than regular classes, as it doesn't require physical attendance therefore travel and lodging costs are eliminated.

Mobile learning saves a lot of paper. In a classroom the locus of control over learning remains firmly with the teacher, she could easily distribute a soft copy of study material to everyone and the students may take a printout if required thus saving lots of paper.

Mobile learning allows constantly updating skills. While regular classes can quickly become boring, mobile learning content can be constantly updated and, because it allows access to information when is needed it, it enables students to constantly be up to date with the class.

Utilizing a cloud with the large storage capacity and powerful processing ability, the applications provide

learners with much richer services in terms of data (information) size, faster processing speed and longer battery life. Mobile learning's core philosophy is learning anytime, anywhere. Fig. 1 denotes Mobile Cloud Computing.

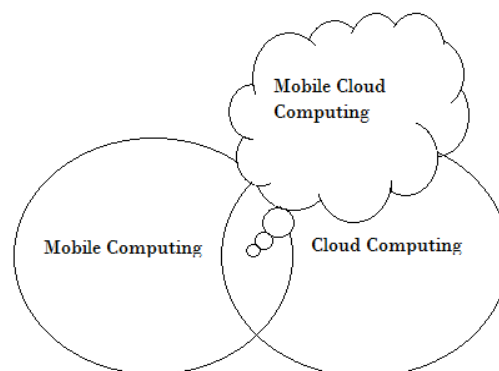


Fig. 1 Mobile Cloud Computing

4. EXISTING PROBLEM

Traditional e-learning network is located in a campus network or an Intranet with its construction, maintenance, and investment being made by enterprise itself. Students and learners cannot afford time off to take a class travel itself make traditional training too expensive and disruptive e-learning is revolutionizing the training world and the ability to erase geographical boundary. E-learning was introduced as an alternative to location based learning. Learners are no more required to be physically present at the course delivery location. This proved revolution in the education system.

4.1 Disadvantage of Existing System

Existing system is slow process and it has overloading problem. Existing system is location based learning process. Existing e-learning is located in a campus network or a using intranet with its construction, maintenance and investment being made by schools or enterprises itself for all.

5. PROPOSED MOBILE CLOUD APPLICATION

Mobile Cloud Computing refers to an infrastructure where both the data storage and the data processing happen outside of the mobile device.

5.2 Basic Concept of application

Mobile learning (m-learning) applications which support the ubiquitous learning are developed in wide variety of languages, platforms and technologies. The m-learning

content may be of simple text type to complex multi-media content with image, audio and video file formats. The m-learning application that runs on mobile device may be a dedicated stand-alone application, a client – server model or mobile Web browser based application.

5.3 Users and Content

The m-learning application developed consists of four users:

- Students;
- Lecturers;
- I.T. Service Department;
- Administrative Staff;

The user/learner interface is simple and intuitive, without much graphics and drawings. It will reduce the amount of memory required by the application and reduces the time of development. The original version would be designed with interactive and user-friendly icons and menus. The application targets the mobile devices with touch screen, but can be accessible by any kind of device running on a specific platform.

The Cloud Computing solution will allow to all categories of users access to stored files, lecture notes, database and other applications from anywhere in the college campus at request.

6 CLOUD BASED M-LEARNING APPLICATION FRAMEWORK FOR UBIQUITOUS LEARNING ENVIRONMENT

A mobile learning system requires a Mobile Learning device, an m-learning application and m-learning content. The m-learning application framework helps to run diverse mobile-learning content. The m-learning content may be of simple text type to complex multi-media content with image, audio and video file formats. The m-learning application that runs on mobile device may be a dedicated stand-alone application, a client – server model or mobile Web browser based application.

An m-learning application can be designed as a dedicated stand-alone application that can run on individual mobile device, a client-server model which requires a client application running on mobile device and a server application runs in a remote-server or on mobile web browser that requires back-end application-server connectivity while sending requests from the mobile device.

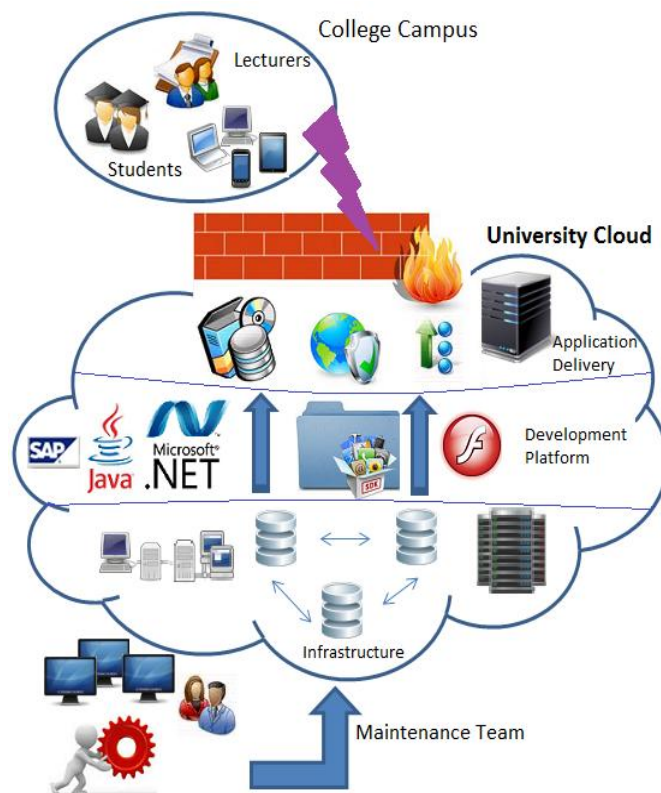


Fig. 2 Proposed Conceptual Framework

Fig. 2 shows how a private university cloud would function. The students would access the content through a mobile applications or a web service which the lecturers would upload and all these services would be managed by the network architects or the administrative staff.

The Cloud Computing solution will allow to all categories of users access to stored files, e-mail, database and other applications from anywhere at request (Nicholson, 2009), which leads to a more efficient use of information.

Students already use many of the cloud technologies in their personal life (Erçan, 2010). By using a cloud model and applications based on cloud, they obtain the advantage of the ability of working and communicating in the educational environment without taking into account space and time. The teaching staff shall benefit of support in preparing their teaching portfolio (presentations of lessons, conferences, articles, etc.), in teaching practice (methods and teaching techniques, study materials, feedback) and in evaluating (methods and techniques of evaluation and management of the results).

Researchers will benefit from the advantage of using the latest technologies, experimenting the results and communication, while paying for using this services.

Developers may design, build and test applications that are executed on the infrastructure of the cloud provider and deliver those applications directly from the servers of the provider to the final users. System administrators obtain general processing, storage, database management and other resources and applications through the network. The rest of the administrative staff will benefit from services and infrastructure 24/24, from everywhere at low costs.

The cloud based mobile services would be accessed through a mobile application where there would be a separate login for the students, teachers and the admin.

In case the user is a student, he/she logs in to the application environment and has been shown in Fig. 4; the user is authenticated by the server which stores the unique profile for each learner. Upon logging to the application the user profile is synced with the type of device that he uses. After successful login the main screen for module selection is presented in Fig 5. The main screen shows the list of choices for the learner to choose his learning activity like Course Selection, Test Selection or Assignment Selection.

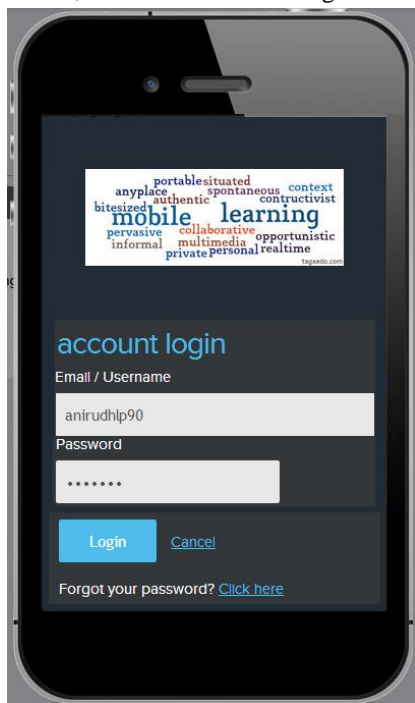


Fig. 4 Login Interface

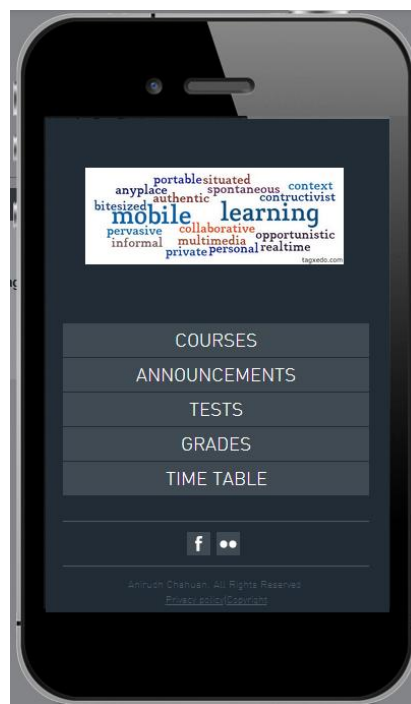


Fig. 5 Main Screen

7 CONCLUSION

Our email, files, programs were all formerly stored on a computer – or on our campus' mainframe. Today, these operations – and our data – may reside on servers in Redmond – or in Bangalore. And this may not just be for our computing needs. Today, it may be for our entire campus and all of the institution's students and faculty. In the next five years, institutions of higher education expect to cut 20 percent of their IT budget by moving applications to the cloud. [5]

Cloud Computing could be a technological innovation that both reduces IT costs for the college and eliminates many of the time-related constraints for students, making learning tools accessible for a larger number of students. The efficiencies of cloud computing can help universities keep pace with ever-growing resource requirements and energy costs. Cloud computing allows students and teachers to use applications without installing them on their mobile devices and also allows access to saved files from any mobile device with an Internet connection.

This paper gives an idea of how the mobile applications can be integrated with cloud services and implements it at a college level.

REFERENCES

- Nicholson, J. (2009). "Cloud Computing's Top Issues for Higher Education," University Business Solution for Higher Education Management. [Online], [Retrieved October 5, 2012], <http://www.universitybusiness.com/viewarticle.aspx?articleid=1342&p=4#0>
- Ercan, T. (2010). "Effective Use of Cloud Computing in Educational Institutions," *Procedia Social and Behavioral Sciences*, 2, 938–942;
- Sarachandran Nair. C, "Cloud Computing: An Emerging Technology In The Sultanate of Oman", ISSN (Online): 2277 128X, *International Journal of Advanced Research in Computer Science and Software Engineering*
- Cloud Computing (2013), [Wikipedia;en.wikipedia.org/wiki/Cloud Computing](http://en.wikipedia.org/wiki/Cloud_Computing)
- "From Tactic to Strategy: The CDW 2011 Cloud Computing Tracking Poll," July 2011.