

Enhancing M-Learning System Using Cloud Computing

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Abstract—The main aim of this paper is to study the concept of M-Learning system enhancement using Cloud computing technologies. M-Learning system can be enhanced by the new Cloud computing technologies. M-Learning system is flexible and it has some advantages than the traditional educational system. Furthermore, MCC-Mobile Cloud computing is the new technology which integrates Mobile Computing and Cloud computing which has many advantages than M-Learning. Storage space, processing speed and other services from the cloud environment are utilized in MCC to enhance the networked collaborative learning process. This paper discusses the concept of Mobile Learning and Cloud computing, Cloud architecture and its benefits. It also discusses the benefit of Cloud computing in Mobile Learning. Through Cloud computing and Cloud environment the learner's mobile device is able to receive unbroken transmission signals which enhances the barrier free communication process. Mobile Cloud computing modifies the teacher's role from lecturing to facilitating the learning process i.e. student centered learning.

Keywords— M-Learning system, Cloud computing, MCC (Mobile Cloud Computing), Cloud architecture, Cloud environment, Student centered learning

1. INTRODUCTION

M-learning through cloud computing is the new area to explore. Due to the rapid development of cloud computing technology, M-learning technology and Information and Communication Technology, there is a high demand to enhance the current educational system to cater the needs of the tech-savvy learner. The current classroom education system has many disadvantages. To enhance the current educational system many new strategies like E-Learning, Web learning, and M-Learning are incorporated in the traditional face to face teaching and –learning system of education. The rapid growth of communication technology and mobile devices can be utilized in a better way in educational communication. Mobile learning is learning by means of wireless technological devices that can be pocketed and utilized. When compared to class room system the mobile learning is one of the best ways of learning. Mobile learning is an efficient and effective way because mobile it is taking learning anywhere and anytime. Mobile devices make a potential changes in the learning system. Mobile learning provides a convenient learning environment to its users. M-Learning advantages includes interaction, portability, collaborative, engaging learners, increases interest, just-in-time learning and autonomy [1]. In mobile learning the cloud plays a vital role because data sharing is the very important role of this learning so cloud takes the responsibility of data sharing, security and the load management during the peak hours of access without affecting the network band access.

Mobile learning has some limitations such as restriction of hardware, software installation cost, Maintenance cost, but Mobile learning using cloud computing will overcome this limitations [2]. Cloud based mobile learning combines the cloud computing with mobile environment and overcomes the obstacles related to the performance (battery life, storage and bandwidth) environment (heterogeneity, scalability and availability) and security (reliability & privacy) [3]. Now cloud computing is a hot research topic because of its flexible dynamic infrastructure, quality of services (QoS) and configurable software services [4].

This paper includes mobile learning in cloud based environment which helps the learners to learn anytime and anywhere at low cost. The mobile live video learning system offers a convenient and cost-effective way of making higher education accessible to large number of students [5].

2. RELATED WORKS

N. Mallikharjuna Rao and et al describe how to influence on cloud computing and influence on this technology to take education to a wider mass of students over the country [6]. Mohamed Osman and et al, discussed mobile learning its key concepts which includes mobility of the technology and mobility of learners and mobility of learning [7]. Mrs. Bhuvana Raghvendra Bajpai focused on the exiting device and technologies appropriate to realize M-Learning as a new stage of progress in D-Learning and E-Learning [8]. Kritike et al, dealt with notion of a mobile device cloud [9]. Minjuan Wang and et al, studied mobile

learning and cloud computing to explore how cloud computing changes traditional mobile learning [2]. Hoang T.Dinh and et al, conducted a survey of Mobile Cloud Computing which helps general readers have an overview of definition, architecture and applications of MCC [10]. Meilian Chen and et al introduced the concept and system architecture of cloud computing, then designs a structure of mobile learning system based on cloud computing and analyzes its process and function modules [11].

Mohssen M. Alabbadi described the use of cloud computing in mobile learning and creating M-Learning as a service (mLaaS) [12]. Pragaladan .R, Leelavathi .M discussed the study of mobile cloud computing and the challenges of mobile cloud computing [13]. Anwar Hosain Masud presented the cloud based M-Learning Architecture for Higher Education [14]. Hossein Movafegh Ghadirli explained the application of cloud computing in mobile intelligent tutoring systems [15].

3. MOBILE LEARNING

Mobile learning means learning through mobile devices such as smart phone, PDA, tablets, net books, and iPads. Mobile learning becomes popular because mobile devices have some wonderful features like mobility, optimized and easy to use. Now days the usage of mobile devices is increased since they have effective communication tools and they are wireless communication and also they are portable. The advantage of mobile learning is the learners can learn at anytime and anywhere. By using mobile learning technique we can pass contents and services to the university students through their personal wireless mobile devices. Mobile learning has three components; they are mobility of learners and learning and learner technology [6].

Advantages of M-Learning

- By means of mobility we can use it outside of classroom and use it while moving from one place to another place
- Students can have educational system on their mobile devices; they can pass educational materials between their friends.
- Learners can learn at their home instead of going library or browsing center
- Not only students by using mobile learning, the companies also trained their trainers.
- Mobile devices have low prices than desktop PCs
- Smaller size and light weight than desktop PCs
- It provide location dependent education by using GPS technology
- This system helps to learn while you browse.

- Student can access study material, audio library, video clips from anywhere including public place and moving buses and trains.
- Students can interact with teachers after the class hours for their study purpose every student can learn at their own places.
- Not a fixed time to learn, students can their flexible time
- Saving the cost of learning materials

4. CLOUD COMPUTING

Cloud computing is the use of computing resources as a service over a network. We can use services from the cloud data centers for learning over mobile phone even we are in a small village or remote area. In cloud computing all the computing processes are can take place on the web than PCs. Cloud computing provides the services such as platform, infrastructure and software. Cloud computing shares networks, servers, storage applications and services. Cloud computing reduces the cost effectiveness for the implementation of the hardware, software and license for all. It is an adoptable technology. This improves the current education system quality at an affordable cost. Cloud providers are Amazon, Google, Yahoo, Microsoft and etc.

Advantages of Cloud computing

- No license required
- No Installation fees
- No maintenance cost for the software

Cloud service models

Data center layers provide the required hardware and infrastructure for clouds. The cloud services are classified based on a layer concept.

1. Infrastructure as a Service (IAAS) which provides hardware, storage, servers and network components.
2. Platform as a Service (PAAS) which offers the environment for software building, testing and developing.
3. Software as a Service (SAAS) which supports a software distribution with specific requirements.

Cloud Computing Models

- **Private Cloud:** Available within the organization for their needs
- **Public Cloud:** Available for the public use-large organization
- **Community Cloud:** Specific community uses-Education, Health, etc.
- **Hybrid Cloud:** Combination of Private, Public and Community Cloud

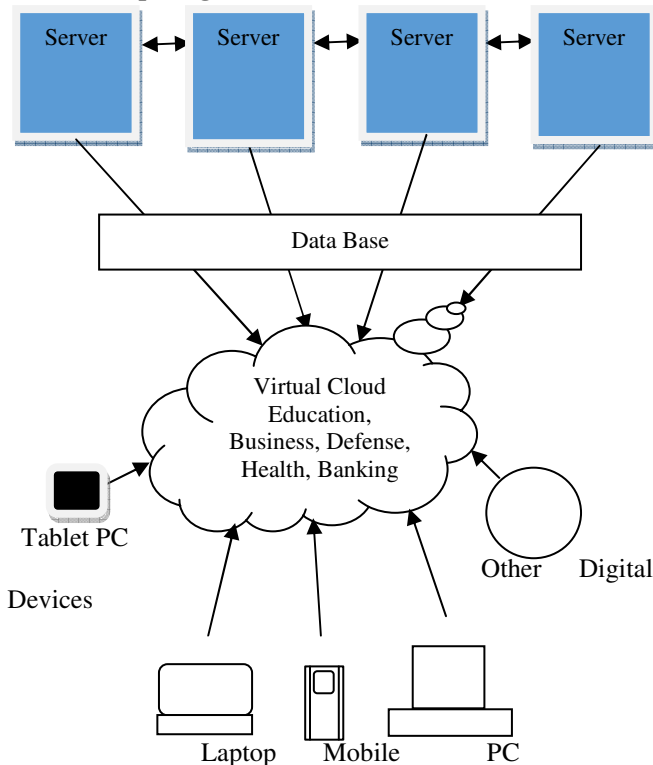
Cloud Computing

Figure 1: Cloud Framework

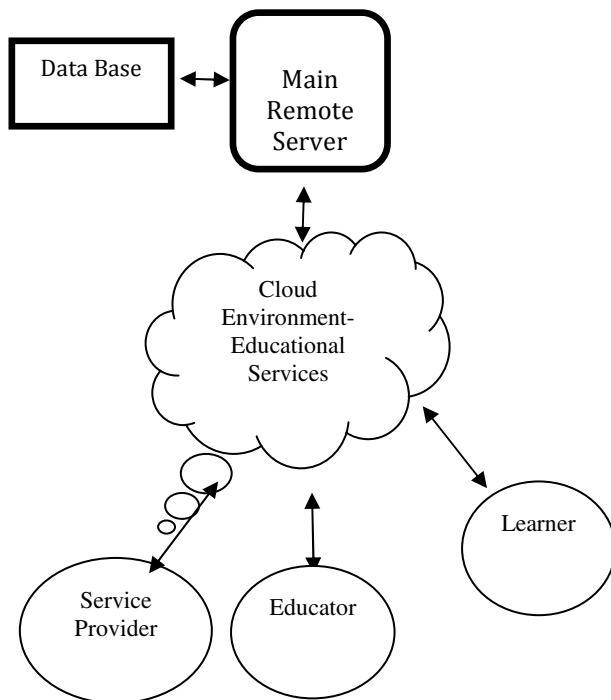
EduCloud Framework

Figure 2: EduCloud Framework

5. MOBILE CLOUD COMPUTING

In mobile cloud computing both data storage and data processing can take place outside of the mobile devices. Here, all the mobile software's are transferred into centralized powerful computing platform in the cloud. It reduces the cost of implementation and development of mobile applications. MCC supports much mobile application such as mobile learning, mobile banking, mobile advertising, mobile entertaining/gaming, mobile health, mobile social networks and mobile enterprise solutions. Mobile cloud learning integrates cloud computing into mobile learning. Mobile cloud has four types; they are public cloud, private cloud, hybrid cloud, community cloud. MCC provides data processing and storage services in clouds. MCC is the combination of mobile web and cloud computing.

Advantages of mobile cloud computing

- **It costs less:** Users can use variable mobile devices to access learning content without purchasing, installing or updating any software.
- **Flexibility:** Allows for adjustments, depending upon learner's needs.
- **Accessibility:** Rural area students can use services from the cloud data center for learning where mobile network is not available.

Architecture of mobile cloud computing

In mobile cloud computing architecture, mobile devices are connected to the mobile network through base stations (BTS, access point, satellite). Base stations establish and control the connections and interface between the network and mobile device. Mobile user request are transferred from mobile network into cloud via internet. In cloud, cloud controller processes the mobile user request to provide mobile users with the corresponding cloud services. These services are developed with the concept of utility computing, virtualization and service oriented architecture.

6 INTEGRATION OF CLOUD COMPUTING IN MOBILE LEARNING

Mobile devices do not need a powerful configuration (CPU speed, memory capacity) because all the complex computing can be processed in the clouds.

Lower cost: application can run on the cloud .so we don't want any memory space and software in mobile device and no files to be saved so the cost will be reduced.

Improved performance: performance faster because all are on cloud, only fewer programs are in mobile device .so mobile device runs faster.

Reduced software cost: All software's are on cloud so the software installation on mobile is not required so no cost for software.

Instant software updates: Applications are web based so updates happen automatically. No need to pay or download an upgrade with our mobile device.

Improved document format compatibility: In cloud computing we have more compatibility for opening the files than mobile devices.

Increased data reliability: cloud computing never loss data, computer crashing in cloud should not affect the storage data because data and applications are stored in several servers and several backup copies of the data also available.

Universal document access: All our documents are instantly available in cloud we need not to take our documents wherever we go.

Device independence: If the user's mobile device changes there will be no compromising in running programs and opening documents and it will require no special hardware or software to buy as well^[5].

Increased mobile device Battery life: using cloud for processing and storing result will save the battery life of mobile devices.

Hardware: the hardware limitation of mobile devices will prevent the users for some applications but using clouds reduce the cost of implementing these applications.

7 CONCLUSIONS

The integration of Mobile learning and Cloud computing technology leads to enhance the M-Learning system. Mobile cloud learning positively impacts the learning process. MCC-Mobile Cloud Computing makes it easier for students to obtain knowledge through their mobile device without worrying about other hardware capabilities. Mobile learning using cloud computing will improve the current system of education and it will reduce the cost. Using cloud computing in mobile learning will eliminate weakness of the mobile handheld devices (hardware and software resource). MCC offers many opportunities to improve the current M-Learning system by the way of accessibility and quality of service. In the future, cloud computing will become the basic environment and platform to support the enhancement of mobile learning system through cloud services.

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