

A Review on Mobile Cloud Computing

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Abstract: Cloud computing is the convey of on-demand computing services from applications to storage and processing power typically over the web. Cloud computing is emerging as one of the most important branch for providing seamless applications on mobile devices. This paper, cloud computing is bringing up as a new and speedily developing and accepted way of providing better and efficient applications for mobile devices. It provides mobile users with data repository and processing services on a cloud computing platform. Mobile cloud computing (MCC) is the availability of cloud computing services in a mobile circumstances from which all the entire data and complicated computing subjects can be processed in clouds and mobile devices do not need a powerful configuration like CPU speed, memory capacity etc.,

Keywords: Mobile cloud computing (MCC), SaaS, PaaS, IaaS, M- Learning, OOS, HPC.

INTRODUCTION

Over the past few years survey, advances towards the field of network based computing and applications of mobile cloud computing (MCC) has been introduced as a potential technology for mobile services[1]. It is the reinforcement of mobile along with cloud computing and wireless networks to carry high quality computational assests to network operators, mobile customers, and cloud computing job holders [1].

MCC is a new platform for combining the mobile devices[1] and cloud computing to create a new framework. This paper based on cloud computing as a currently analyzing way to issue remote mobile applications to mobile devices through internet providing a support to the lack of resources in mobile devices and also a new level of security is achieved by centralizing the maintenance of security-critical software. It contributes mobile world a new ad hoc framework where data repository and refining is performed outside the mobile device and cloud computing gets an extended features of mobility. Nowadays, Cloud Computing has been used and promoted in the field of healthcare, manufacturing, financial services, energy, communication and other key areas, which will play an important role for improving the efficient use of resources, information and integration. Mobile computing is based on three major notations hardware, software and communication[2].

The hardware can be measured as mobile devices.

- Software is the mobile applications in the devices.
- The communication includes the organization of mobile networks, protocols and data delivery[2].

LITERATURE REVIEW

M Shamim, Angona Sarker, Ali Newaz Bahar, Md. Atiqur Rahman:The major object behind the mobile cloud computing to empower the mobile user by providing a seamless and rich functionality, regardless of resource limitations of mobile devices. Though still now it is on the early stage of development, in future mobile cloud computing could become the major model for mobile application.

Jasleen:It proposes on-demand network access to a shared pool of configurable an computing that can be rapidly provisioned and unconfined with minimal management effort or service provider interaction. Mobile cloud computing is one of mobile technology trends in the future since it combines the advantages of both mobile computing and cloud computing, hence providing optimum services for mobile users. This paper have discussed security issues regarding mobile cloud computing. Securing mobile cloud computing user's privacy and also integrity of data or applications is one of the key issues most cloud providers are taking care off.

Ashfaq Amir Shaikh, Dr. Gulabchand K. Gupta:The proposed system provides the mobile cloud based architecture which helps the E-business activity with MCommerce and strong recommendation system so that customer ca7n attract and high chance to perform the transaction without any delay. It improves the overall business performance, it also provide various analysis features so that user as well as manufacturer can study the strengths and weakness of the product for future enhancement, user can rely on the recommender system and helps decision making easy to the

common user. The new framework proposed based on Cloud Computing for enhancing the E-commerce applications the new framework based on the cloud computing and solves the problem of enterprise E-commerce development.

N.mallikharjuna Rao, C.Sasidhar, V. Satyendra Kumar: e-learning is getting the popularity and this application in cloud computing will help in the development of the education offered to poor people which will increase the quality of education offered to them. Cloud based education will help the students,, Trainers, Institutions and also the learners to a great extent and mainly students from rural parts of the world will have an opportunity to get the knowledge shared by the professor on other part of the world. Even governments can take initiatives to implement this system in schools and colleges in future and we believe that this will happen soon.

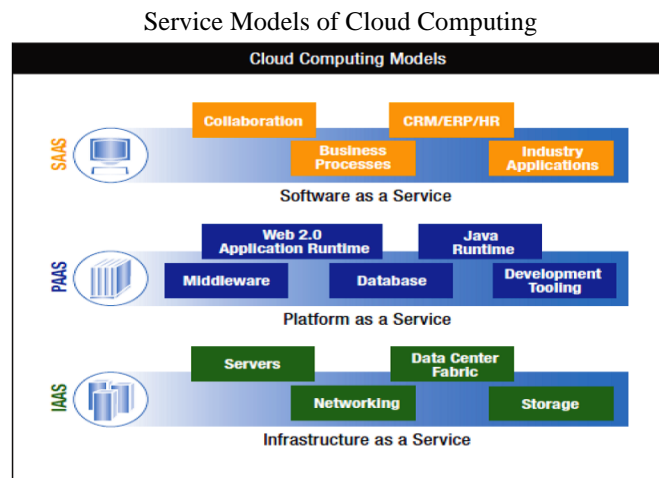
CLLOUD COMPUTING FUNDAMENTAL MODELS

1. **(SaaS):** Software as a Service supports a software distribution with specific requirements. In this layer, the users can access an application and information remotely via the Internet and pay only for that they use. Sales force is one of the pioneers in providing this service model[6].

2. **(PaaS):** Platform as a Service : offers an advanced integrated environment for building, testing Accepted in Wireless Communications and Mobile Computing and deploying custom applications[6].

- Google App Engine
- Microsoft Azure
- Amazon Map Reduce/Simple Storage Service

3. **(IaaS):** infrastructure as a Service : IaaS is built on top of the data center layer; IaaS enables the provision of storage, hardware, servers and networking Components[6].



MOBILE BASED COMPUTING

Cloud computing provides issues when tasks and data are kept on the web rather to be kept on individual devices, providing on-demand access. In mobile cloud computing, the former mobile device-based intensive computing, data storage and bulk information control have been relocated to 'cloud' and thus the requirements of mobile devices in computing capability and resources have been condensed[2]. Mobile based cloud applications provides the way to transfer the computing authority and data storehouse elapsed from mobile phones and keep it into the cloud, carrying applications and mobile computing to not about mobilephone users but to a huge widespread range of mobile supporters[2].

MOBILE CLOUD COMPUTING IN ENVIRONMENT

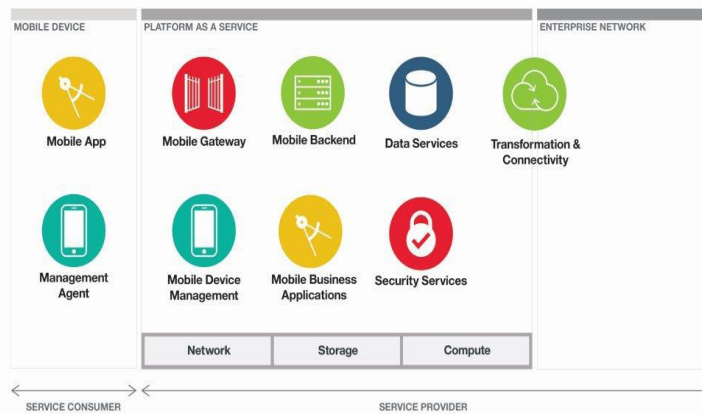
The mobile cloud is an instance of technology using cloud computing in mobile environment. The cloud computing is established on a collection of many and few new concepts in several research fields like Service-Oriented Architecture(SOA), distributed and grid computing as well as visualization and allows customers to temporary utilize computing infrastructure over the network, equipped as a service by the cloud-provider at possibly one or more levels of abstraction.The mobile cloud is divided into five layers in perspective of the composability of the system[6].

- Cloud Application Layer
- Cloud Software Environment Layer
- Cloud Software Infrastructure Layer
- Software Kernel
- Hardware and Firmware

Mobile Cloud Computing (MCC) will help to overcome constrains of mobile devices in particular of the processing power and data storage [6].

ARCHITECTURE

The general architecture of Mobile Cloud Computing can be shown in, mobile devices are connected to the mobile networks along base stations, access point, or satellite that establish and control the connections and functional interfaces between the networks and mobile devices. Mobile user provide appeal and data that are transmitted to the central processors that are connected to servers providing mobile network services[6].The mobile cloud architecture guidance provided by this paper can help enterprises understand common architectures that have been proven in numerous successful enterprise deployments. It views how a mobile device can be supervised by mobile device management, integrated to the essence cloud components including mobile arch, mobile backend, mobile business applications, data services and security services while transformation and connectivity gets relevant data from enterprise systems and puts it in a format that can be strengthened on mobile devices[6].



APPLICATIONS

There are a few applications of cloud computing as follows[3]:

- Cloud computing provides dependable and secure data storage center.
- Cloud computing can realize data sharing between different equipments.
- The cloud provides nearly infinite possibility for users to use the internet.
- Cloud computing does not need high quality equipment for the customer and it is easy to use.

APPLICATIONS OF MOBILE COMPUTING IN CLOUD ENVIRONMENT

The rise in sales of mobile devices and increasing development in the field of mobile cloud computing, mobile applications have gained a growing share in the global mobile market. Some of the applications of mobile computing are as follows[6]:

1. M-Commerce in Cloud Computing

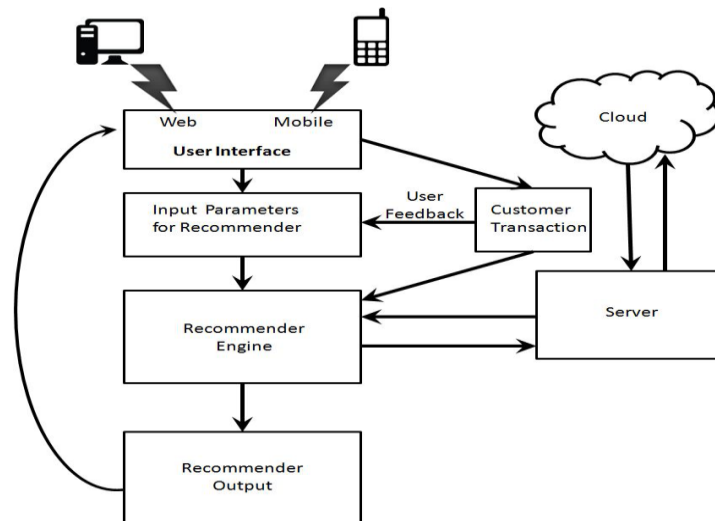
Mobile commerce is a business model for commerce using mobile devices m-commerce applications generally used to satisfy some tasks that are require for mobility like mobile transactions and payments, mobile messaging, and mobile ticketing.. Proposes a 3G e-Commerce platform based on cloud computing[5].

Advantages of M-Commerce

M-Commerce is related to E-commerce however the advantages of M-Commerce is still difference, following are the main advantages provided by typical M-Commerce application

- M-Commerce is portable i.e. anytime, anywhere approach[7].
- M-Commerce provides wider range.

- Reducing Transaction Cost.
- Much easier than E-commerce to use.
- Reducing time to order.



Cloud Based M-Commerce Proposed Architecture

2.M-Learning in Cloud Computing

Mobile learning (m-learning) is designed based on electronic learning (e-learning) and mobility. traditional m-learning applications have certain constraints in terms of high cost of devices and network, low network transmission rate, and limited educational resources. The applications provide learners with much services in terms of data size, faster processing speed and longer battery life[5].

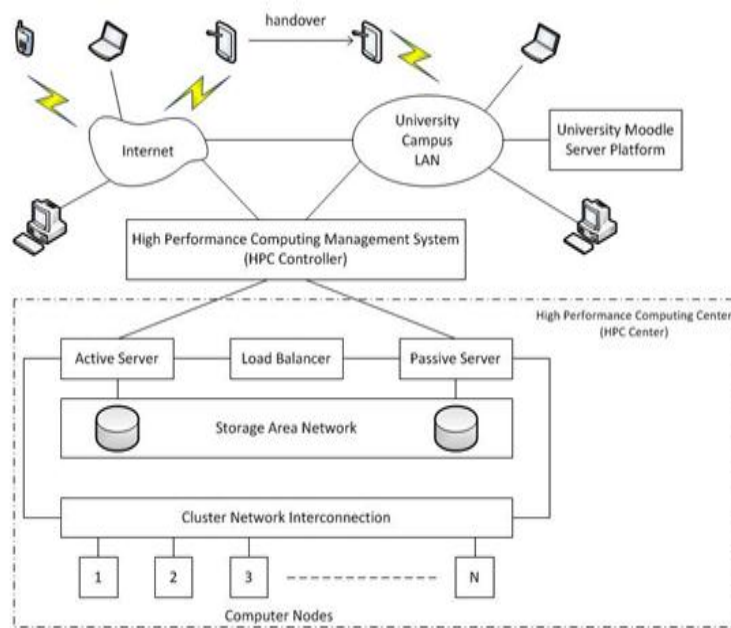
The benefits of cloud computing in e-learning can be divided into four groups[9]:

- reducing the costs of using resources
- flexibility in the use of infrastructure
- increased availability
- the client is the end user

The Mobile Cloud Computing for Mobile Learning is given on below diagram [8] This Model incorporates High Performance Computing (HPC) Cluster Infrastructure. The communication between the end-user devices and HPC Center is in a cloud computing platform due to the various service requests. The terminals can be connected to the HPC Cluster Infrastructure that is inside the University Local Area Network (LAN), or they can be connected on external network (internet). The University Moodle Platform Server (Moodle Course Management System) hosts educational resources and it is connected on the University LAN. The user may access the Moodle platform by the University LAN or through the Internet in order to collect the necessary data that must to be computed by the HPC center[8]. Likewise, the data that needs to be processed can be gathered by the HPC cluster infrastructure throughout the University LAN if the data is too large and cannot be collected by the mobile terminal. When the user wants some data to be computed by the HPC cluster infrastructure which is sends as a request to the HPC center. When the HPC acknowledges the request it receives the data directly by means of the user terminal or from the University Moodle Platform[8].

The user can access the HPC center either by the University LAN, or directly by the internet, through the HPC Management System (HPC Controller). The HPC Controller manages the authorized access to the HPC Center, and it is directly connected on both passive and active server. Like that a redundancy is provided in case the active server goes Out Of Service (OOS). The passive and the active servers are connected to the Load Balancer, which determines which server is active. The Load Balancer also determines which server needs to manage the load (either the active, or both), i.e., the incoming service request from the user. Both active and passive servers are connected to the storage area network and the cluster network infrastructure[8]. The server takes additional data from the storage area network that needs to be processed (computed), and then it forwards all the necessary data to the cluster network infrastructure for further computing. The cluster network infrastructure consists of N interconnected computer nodes. One of these nodes is the main node, or master node, and it determines which nodes should perform the computing of data. Like that parallel processing is enabled. Once the data computation is completed, the final information is sent back to the user. If

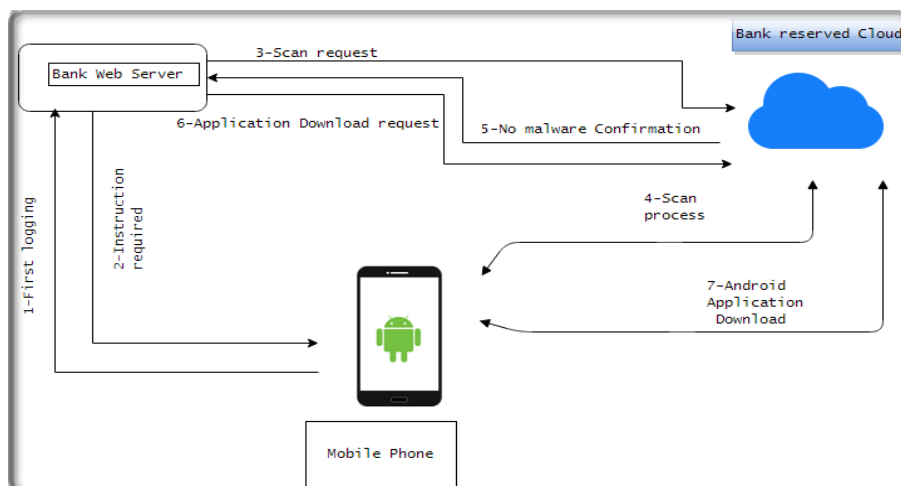
the master node fails to operate normally, then another node becomes master node. Like that a redundancy among the nodes is achieved[8].



3.M-Banking in Cloud Computing

Mobile banking is used for checking the balances, account transactions, payments etc., by a mobile device such as a mobile phone or Personal Digital Assistant. Mobile banking nowadays is most performed by means of SMS or the mobile Internet but can also use special programs like clients, that can be downloaded to the mobile device. It is settled in mind that, M-Banking scheme should have: lower key sizes, lower processing and time requirements, higher data encryption level, higher data signature level, highly sophisticated authentication process, ease of use, end-to-end security, need of communication through emails elimination, mitigation of the impact of viruses and malwares, withstand against attempted theft or loss, higher level of randomness and dynamicity, input-to-output diffusion, and withstand against most common attacks such as reply, dictionary, and search trial attacks[5].

Now mobile banking application is installed and user can login using his user name and first authentication level password that will allow him to, just, open the application without having any level of access authorization to the SD card or financial transaction[5]. After that, user will choose a second level password for partially privileged use of the SD card within 5 minutes after first login to the application to secure the conjunction between first and second passwords. The second password will open only one user-chosen directory from which the third authentication key can be copied and then pasted to its file in the application activity. Bank server will generate an OTP called OTP_third and put it in the user-chosen memory location on the bank provided SD, user accesses the location and copy the OTP_third to the application to fully open the SD card for the application[5].



**CONCLUSION**

Implementation of cloud computing in mobile based applications is going to be a trend in future since it combines the advantages of both mobile computing along with cloud computing, through providing ideal services for mobile users. Mobile Commerce with cloud based architecture solves the major issues related to M-commerce like bandwidth and scalability. The cloud computing has the important scope to change the whole education system. In present scenario the e-learning is getting the popularity and this application in cloud computing will surely help in the development of the education offered to poor people which will increase the quality of education offered to them. Cloud based education will help the students, staff, Trainers, Institutions and also the learners to a very high extent and mainly students from rural parts of the world will get an opportunity to get the knowledge shared by the professor on other part of the world. Mobile cloud computing is one of mobile technology trends in the future since it combines the advantages of both mobile computing and cloud computing, hence providing optimum services for mobile users.

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