A Study of Mobile Cloud Computing (MCC) & Its Real-Time Application

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Abstract: Mobile cloud computing is an integrated form of mobile computing and cloud computing, has become industry buzzword and a major research issue in the industry. In recent year mobile application and Smartphone's device are increasing rapidly. As we know there are so many research are going on mobile clod computing therefore it is necessary to understand the technology to point out future advancement of mobile cloud computing. With the aim, this paper present brief overview on mobile computing and cloud computing and analysis on the mobile clouds computing architecture, its challenges and its real-time applications.

Keywords: Mobile computing; Cloud Computing; Mobile Cloud computing.

I. INTRODUCTION

Mobility and ubiquity are the most essential features of next generation network therefore the integration of electronic device (for example: Smartphone's, tablet etc), its ubiquitous mobile network and cloud computing resources are together creates a new field mobile cloud computing. Mobile cloud enables the developer to build an application for mobile users by which they don't need to depend on their mobile operating system because their data storage and data processing happen outside from mobile device.


Fig1: Benefit of MCC

Mobile cloud is a powerful and centralized computing platform that is located on cloud, which then accessed over the wireless network. Fig1: The data are stored outside the mobile devices in a centralized platform that can be accessed anytime, anywhere and form any device. It provides 24×7 availability of information. Mobile cloud computing will be essential part of the future mobile computing research. Mobile device are increasing day by day and now it becomes an essential part of human life. According to the Juniper research Mobile cloud computing user will grow rapidly in next five years and cloud based market generated annual revenue of $9.5 billion in 2014. According to the latest research by ABI, more than 240

million businesses will use mobile cloud computing services by 2015.Mobile user uses various mobile application such as Gmail, Google Maps, Voice search etc which run on mobile device as well as on remote server via wireless network. Mobile cloud play important role in our day to day activities at the same time it has certain advantages and disadvantages. Mobile devices adequately make the best use of cloud computing to extend their function. The mobile devices are facing some challenges such as resources (example: battery life, storage problem, bandwidth problem) and communication (example: mobility & security issues). In order to overcome from the challenges and to point out further research therefore it is necessary to understand mobile computing and cloud computing. In this paper we study overview of mobile computing and cloud computing and we make analysis of mobile cloud computing architecture, challenges, and its real time applications.

II. OVERVIEW ON MOBILE COMPUTING AND CLOUD COMPUTING

A. Mobile Computing

Mobile computing can be defined as computing environment that allows the transmission of data from any device on move. Mobile computing system provides a platform to the user to perform a task from anywhere computing device. Mobile device provides powerful interface to the user which they can exchange information, interact with other user in real-time, and utilize remote resources. [3]The Rapid growth of mobile computing becomes a popular trend in the development of Information Technology (IT). Fig2: Recent growth in the use of Smartphone's and other computing device has radically increased the use of internet. Everyone is using web and Smartphone's for E-Commerce. There are lots of shopping websites like flipkart, snapdeal; they provide shopping applications for the mobile device users therefore mobile computing also helps organization for improving business.
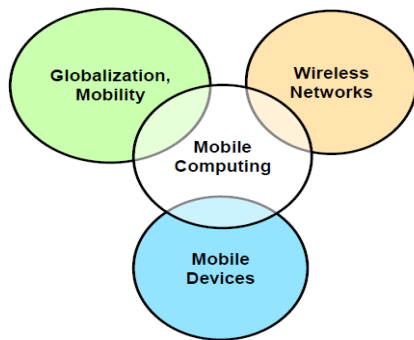
Fig2: Major driving forces for mobile computing

Cellular Network Architecture

A cellular network consist of mobile unit and switching center which are linked together and is interconnected to different parts of network, which allow access to the public switch telephone network (PSTN).
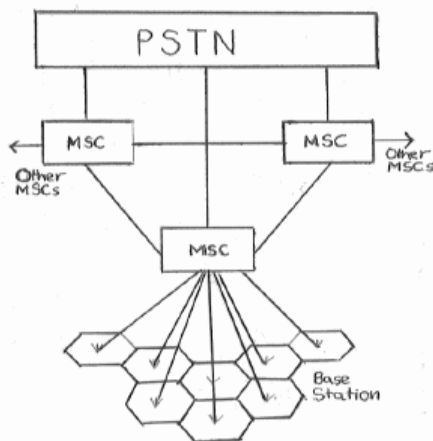
Fig 3

From Fig3: Cellular network consists of number of transceiver called base station and this base station cover a given area or cell. The mobile switching center (MSC) is responsible for routing and switching call between originators to the destination. This Mobile switching center (MSC) may be connected to the other MSC. Each cell has a number of channels and these channels are assigned to the subscribers. When mobile station (MS) is active, it get register with the nearest Base station then MSC stores the information about the mobile station and its position and this information is used to direct call to mobile stations. If mobile station moves to an adjacent cell during call then change of frequency will take place because adjacent cell never use the same frequency channel therefore this process is known as handover.

B. Cloud computing

Cloud computing is a versatile technology which allow data manipulation, accessing the data storage, infrastructure and applications online. Fig4: Reflects the benefit of cloud computing as it allows the access to the information and the computing resources from any location on the availability of internet. [1]In cloud computing information is stored in centralized server and it provides on-demand access to the information.
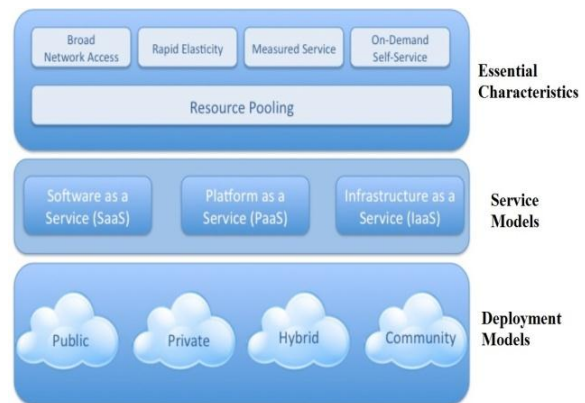

**Fig 4: Cloud benefits**

Architectural layers of cloud computing

FromFig5: Cloud service model are commonly divided into the following [2]:
- Software as a service (SaaS)
- Platform as a service (PaaS)
- Infrastructure as a service (IaaS)

**Fig5: Architectural layer of cloud computing**

- **Software as a Service (SaaS):** Software as a service is a software distribution model which allows access to the software and its function remotely as a web based service. Software as a service allows organization to access software application at a cost based on monthly fees which is less than paying for licensed price. Cloud customer can release their application in hosting environment and this application on internet can be accessed from various clients.

- **Platform as a Service (PaaS):** Platform as a service is also refers to as PaaS. PaaS is a cloud computing model that provides a platform on the internet to the customer to develop, run, and manage applications. In PaaS based service, you don't have to install software for developing the web based application. Developer can login to PaaS account and can start developing the application. [5, 7] Fig6: The typical services are Google Application Engine (GAE) and Azure form Microsoft.

- **Infrastructure as a Service (IaaS):** Infrastructure as service (IaaS) is a cloud computing model allows access to large computing resources via internet. IaaS supports o pool of hardware resources that is distributed across remote data center and user can access these virtual resources to build its own applications.
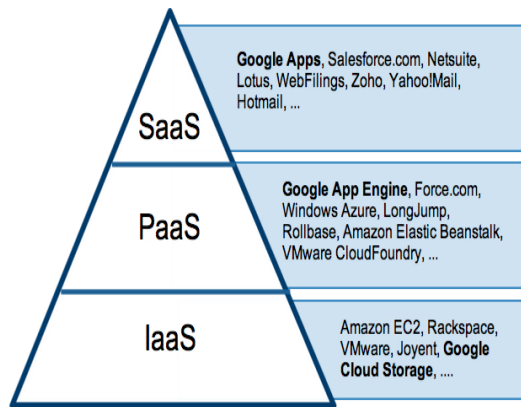
Fig 6

III. MOBILE CLOUD COMPUTING

Mobile computing is a combination mobile computing and cloud computing. Fig7: In mobile cloud computing, data storage and processing takes place outside the mobile device. The data manipulation performs on a centralized computing platform which is located in clouds. The user can also access this centralized platform through wireless device via web browser on mobile devices.
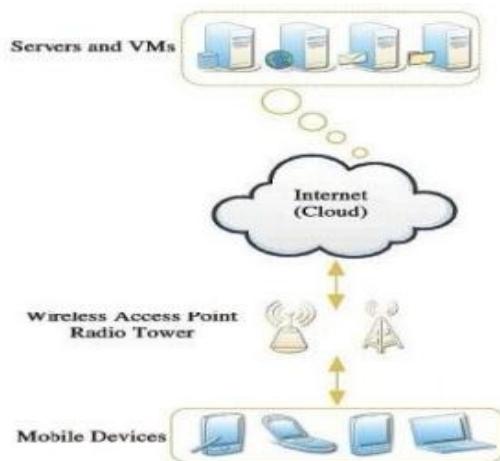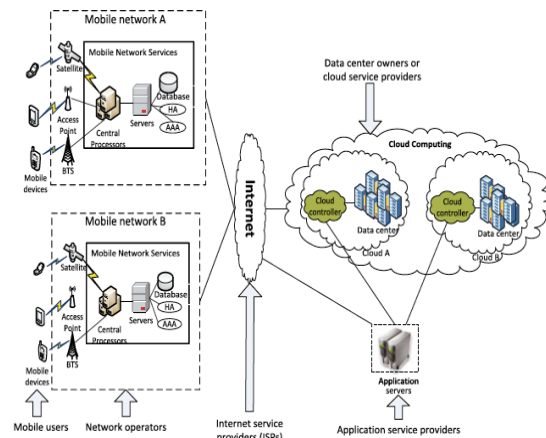

Fig7: Mobile cloud computing

E-Commerce or electronic commerce is a modern business style that uses mobile cloud computing platform for expanding their business and at the same time address the need of customers by reducing the cost of products with the help of this platform. Many business organizations are using social networking sites like facebook, whatsapp, we chat etc for promoting their business. In 2014 parliament elections in India, mobile computing platform plays a very important role in advertisement of parties.

MCC Architecture [6]:

Mobile devices are connected to the network via base station (BS) that is used to establish and control connection between the network and mobile device. When mobile user make request then information are transmitted to the central processor and this central processor are connected to the server to provide mobile service. The requests of the subscribers are delivered to a cloud and the cloud controller process this request to provide mobile users with services.

Fig8: MCC Architecture

IV. MOBILE CLOUD COMPUTING CHALLENGES

The goal of mobile cloud computing is to provide quick and rapid manipulation and access to the data from the cloud. The mobile clod computing is a centralized processing system in which processing of information takes place outside the mobile device. [4] There are so many advantages of MCC but still there are some challenges need to be address:

A. Limitations of mobile device
[8]The mobile device which involves the use of cloud computing, resource constraints is a common issue. Since resources are limited in a mobile device therefore this makes difficult to utilize the services of cloud computing.

B. Battery and network realted issues
Mobile cloud computing is a integrated form of cloud computing and mobile computing. MCC offers centralized platform to the users therefore all the processing of data takes place in clouds. This centralized processing of data consumes more battery. Applications running on mobile require more battery and network flow, To avoid these problems, we have to reduce the data exchange rate and the limited amount of data should be transferred.

C. Security of information(Data- Security)
In MCC system, data manipulations takes place on a centralized platform which is located in clouds, so the security of information needs to be addressed: there are some security issues like privacy of users and data security. One most important threat like virus, Trojan horse etc therefore these issues must be resolved to gain the trust of the customer so that they can efficiently make the use of mobile cloud computing services.

D. Qulaity of service
In mobile device, data transfer rate is not fixed and it varies from time to time. The networks of mobile device are not available at all time. These two are most important issue that are big hurdle in utilizing the mobile cloud computing services therefore quality of service need to be address for improving data manipulation speed in MCC system.

E. Standard Interface
Mobile devices and cloud are depends on web-interface as these interface are not designed for mobile device. To avoid this problem, standard interface need to be designed.

V. REAL-TIME APPLICATIONS OF MOBILE COMPUTING

A. Mobile Commerce(M-Commerce)

M-Commerce deals with purchasing or selling of goods over internet by the use of mobile device but the transaction takes place through electronic mode. There are various online shopping websites like flipkart, snapdeal, amazon, naaptol etc; they provide shopping application for mobile device user. Rapid growth in the use of Smartphone's and other computing devices increases the use of M-Commerce.

B. Mobile health care(M-Health)

MCC play a very important role in the health care sector. Mobile cloud computing provide faster access to the health record of the patient which is 24×7 available online at all time thus resulting in better health care of patient. M-health care also used to monitor blood pressure and is used to detect pulse rate by the use of mobile device. Today, many doctors are now monitoring their patient and gives tips about health care online at any time by the use of wireless technology.

C. Mobile learning (M-Learning)

Mobile learning is a combination of E-learning and mobility. Currently there are so many video lectures, E-books, notes, MCQ are available to the student online which can be accessed by their mobile devices. There are many E-Learning websites like: courser.org, edx.org, www.amitymooc.com that provide online classes in various fields to the students. Mobile cloud computing makes communication better and easy between teachers and students.

D.   Other use

There are many social networking sites like facebook, instagram; twitter etc provides facility to the user to maintain their photo gallery. The user can share photos and videos to these sites with the help of mobile cloud computing. There are various other services like Google Maps. Local weather, finding nearby restaurants etc are provided on mobile device with the help of internet. Currently many business organizations are now using mobile for advertisement and brand promotions therefore the use of MCC is very wide.

VI. CONCLUSIONS

Mobile cloud computing provides optimal services to their user by combining the advantages of mobile computing and cloud computing. Mobile cloud computing (MCC) offers centralized platform as data storage, data manipulation etc takes place outside the mobile devices. According to the latest research by ABI, more than 240 million businesses will use mobile cloud computing services by 2015. This paper discussed the overview of mobile computing and cloud computing. It also addresses mobile cloud computing architecture, challenges and its real-time applications. Mobile cloud computing (MCC) can be widely accepted one of the mobile technology trends in the future.

VII. ACKNOWLEDGMENT

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