IMPLEMENTING MOBILE APPLICATIONS AS CLOUD COMPUTING: ISSUES AND CHALLENGES

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ABSTRACT

At present, mobile application and network is Provide a high energy and performance a important role in Attractive the internet network infrastructure. In accumulation, the mobile devices and their applications have huge technique in the service ever had, and industrial quickly. Mobile cloud computing is projected to make much more pioneering with multi applications. Mobile computing involve mobile communication, mobile hardware and software, and currently there are many mobile cloud applications such as web browsing, email access, video playback, document editing, image editing, Google's Map, Cisco's web EX on theiPad, Gmail for iPhone, etc. These applications are using the software as a service model. In this paper, a case of the art mobile cloud computing and its execution ways are presented. Some of the taxing issues as well as hope examine instructions will
also be sharing.

I. INTRODUCTION

Rapid development of information technology (IT) industry for the last several decades has introduced us with many new terms. It started with the invention of the first computer device and since then, it has been revolutionized many times in various areas. In those early days of computing, mainframe computer is expected to lead the future of computing, when huge scale machines and mainframe computers were used to implement different tasks and various applications. Nowadays, we are doing the same tasks but in a flexible, much cheaper, and are in a portable manner, either by using desktop computer or mobile devices to several types of servers tied together to create a so called Cloud Computing System (CCS). There are many approaches and debates about cloud computing [1], [2]. As it is now most recent research area especially in the information technology industry and education. Moreover, many applications about how cloud computing provides resources and computing infrastructure on the urgent demand from consumers in different sectors. Meanwhile, the consumers can use the services and applications on the cloud through internet. Nowadays, this cloud computing is not only limited to the personal computer, but it also has an influence and profound impact on the mobile technology. These cloud computing resources are occupying and converging in a new and the fast merging field of Mobile Cloud Computing (MCC). In addition to boost the demand, mobile applications also require more resources to be equipped to make the user experience better. The resources, for instance, Google app Engine and Amazon EC2, are considered as a suitable cloud platform in which MCC as new example for mobile applications.

In the script of MCC are divided two approaches, first is a simple approach and second is a mobile device approach [3]-[5]. The main reason is that all mobile devices (smart phones, tablets, etc.), currently are more intelligent and highly efficient. The benefit of this approach is that it equips the user with an ownership to fully serviced over store and maintain data on the user mobile device. This article starts with some background to mobile cloud computing, and followed by the definitions of related terms. Next, Section II highlights the concept of mobile cloud computing application and a summary of its importance. Then, in Section III, two mobile cloud computing solutions will be explained and the general purpose of mobile cloud computing and its applications on specific mobile will also be discussed. The benefits of both solutions will also be explained. Next, Section IV highlights of some potential issues of

mobile cloud computing. Finally, the conclusion and the future research directions are explained in Section V.

II. TERMS FOR DEFINITION

Mobile cloud computing (MCC) generally is the state-of-the-art mobile disseminated computing which involves three components: mobile computing, cloud computing and wireless networks. MCC aims to enhance computational capabilities of resource-constrained mobile devices towards rich and increasing user experience. MCC equips business and education sectors the opportunities for mobile network operators as well as cloud providers. More comprehensively, MCC can be defined as a rich mobile computing technology that influences united flexible resources of diverse clouds and networks technologies toward absolute asks , storage, and mobility to serve a multitude of different mobile devices anywhere, anytime over the special channel of Ethernet or Internet regardless of heterogeneous suitable environments and platforms based on the pay-as-you-use principle might including consumer, enterprise, femtocells, trains coding , end-to-end security, home gateways, and mobile broadband-enabled services. Thus, MCC is defined as an expansion of cloud computing with a new ad-hoc infrastructure which depends on a mobile device [7], [8] (Fig. 1).
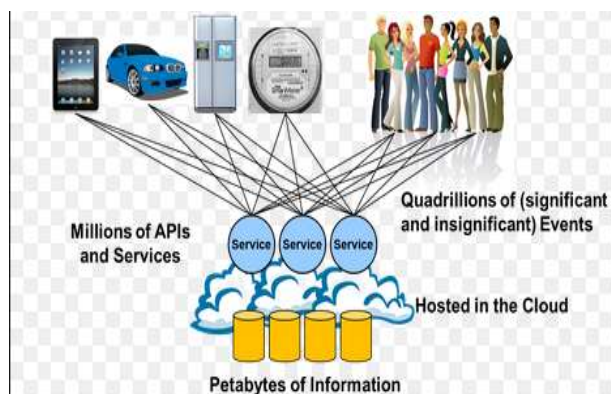

Figure. 1. Mobile cloud computing components

MCC consists of a complex network and involves many relationships between infrastructure providers, Applications Services Providers (ASP), while end user and developers, are connected over the internet.

III. THE NEED FOR CLOUD COMPUTING

In this era, all information in different sectors became at finger tips any place at any time, and it has been driving vision via mobile cloud computing [9]. Only in this case the user can have a better experience in mobile cloud computing environment over mobile devices. In addition, the mobile could computing contributes user's information in terms of location, context, accessed high services, applications and

network intelligence. Furthermore, MCC offers effective solutions to the limitations currently faced by cloud computing such as, constraint bandwidth capacity and poor network connectivity. Thus, to cope these constraints, a solution is to instantiate customized service software close cloudlet [10]. And then to use the service over a wireless network. For the last two decades, the number of mobile users in all domains has increased tremendously and so are the all smart phones. In the modern era of innovative technology, the majority of mobile devices is much better whether in memory capacity, speed of display, power of battery or network connectivity for various features, which allow the user to flexibly access via diverse applications and a lot of services on the mobile cloud.

A. Stable Solutions for Mobile Cloud Computing

There are many methods help to equip suitable solutions for mobile cloud computing, and in this article, it will be categorized into two families: General purpose MCC and application specific MCC. Each of them have their advantages and disadvantages of not mutually exclusive [11].

IV. GENERAL PURPOSE MOBILE CLOUD COMPUTING (GPMCC)

In GPMCC, a public system is built which uses the cloud infrastructure to contribute in improving Mobile device performance efficiency. It is very important to obtain on the label is for a mobile device over internet in order to use specific resource or special application is in demand with high manner. A lot of individual applications can perform these tasks, but why not using these resources in a more general purpose mode so that the computational power limitation of mobile devices is alleviated incrementally to develop mobile computing. So some general tasks which are that local level computed on the many mobile devices are outsourced to the cloud as they happen. By this manner the computer resource of the many remote computers is influenced and no need to develop specific applications for that purpose [12].

A. Using Clone Clouds via Boost Performance for Smart Phones

A number of researchers have introduced the main idea of improving and developing the performance of hardware restricted smart phones by using their proposed clone cloud architecture to be used to boost performance Fig. 2 explains a paradigm for mobile cloud computing. They have created virtual clones of the number of the smart phone accomplishment environment in the cloud (computer, laptop or many servers) and transfer the accomplished tasks to those virtual devices [13]. So they conducted off load accomplishment from smart phone to a computational infrastructure hosting a cloud of smart phone clones. If the smart phone is lost or destroy, the clone can be used as a backup. While

another benefit is that hardware restriction of smart phone is coping – the task is transferred to effective and high computation devices in the cloud. It also facilitates and makes the developer's job flexible and easy as there are no or few amendments needed for their applications.
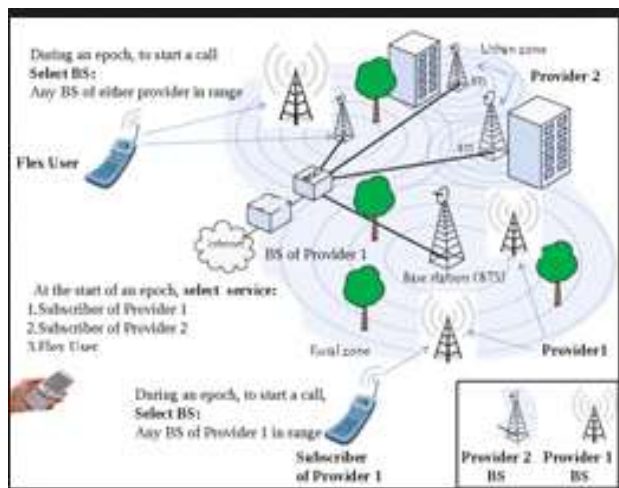

Fig. 2. Paradigm of mobile computing architecture

V. MOBILE CLOUD COMPUTING WITH APPLICATION SPECIFIC (MCCAS)

MCCAS is a specific application being improved and developed for mobile devices which help to employ cloud computing. With application mobile computing, we can check our email messages, bills, bank accounts, and other private information only by using mobile devices. Whole functionalities obligate each exchange data to make it safely and strong from any attack. Mobile computing services have simplified all live in different sectors especially in education and business world. Attached to a new device that includes a lot of functionalities became every day and is based on mobile computing, as examples, BlackBerry from RIM iPhone from Apple, Net-Book, etc. [14]. Applications consist of software that runs on a mobile device and performs certain tasks for the user of the mobile phone like e-mail or chatting needs ,MCCAS needed because the internet is used to join as the communication resource and not only for storage or other services that computational power for instance reported by World Mobile Applications Market, about 7 billion (free and paid) application downloads were made globally in 2009 for example and increasing in next year's alone from both native and third-party application stores, generating revenues of $3.9 billion in the same year. In addition, MCCAS has the highest ability to make modern mobile devices more powerful computing devices and equipped with many applications. Here are some of the methods for specific applications in mobile cloud computing.

A. Service of Mobile Clouds

A number of researchers have introduced service clouds for mobile cloud computing and named Mobile service clouds. A lot of their model enables dynamic embodiment, installation, arrangement and rearrangement of services to be used by the mobile users. Fig. 3 explains many devices that can be attached to
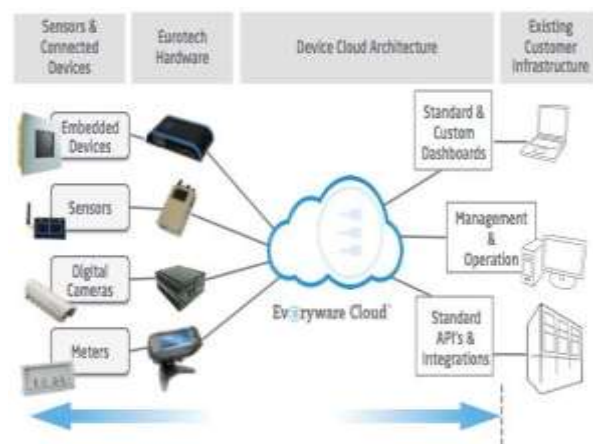
cloud computing.

Fig. 3. Devices with cloud computing.

B. Flexible Application Weblets

A numbers of researchers created flexible applications that increase and enhance powerful smart phones, utilizing flexible computing resources from the cloud. A flexible application can have one or more weblets in it, while wallets have the most important feature of portability. Any given wallet can contribute in switched between both mobile and stationary devices. One significant difficulty with this kind of application is the requirement of security for these app weblets. The weblets of single application usually can communicate independently or with other applets. Wallets can be interchanged between mobile devices and clouds. The researchers have also suggested a good solution for authentication; secure session administration, secure decampment between weblets implementation mobile devices and those on the clouds.

B. Convenient Web Services

Meanwhile, other researchers suggest a suitable method for creating and developing mobile applications using cloud computing and Restful web services. Convenient web services which called Restful web services are so much simpler and flexible to use. The main aim is to offload computational capacity, storage and security for different kinds of mobile device to cloud by utilizing the restful web services [15].

VI. CHALLENGES AND ISSUES

From the above explanation, it is clear that mobile cloud computing is an expanded branch of cloud computing. However, there are some challenges and

issues that appear to be barriers to this dynamic change (from cloud computing to mobile cloud computing). Mobile Computation Offloading, Seamless Connectivity, Long WAN Latency, Mobility Administration, Context-Processing, Constraint of Energy, Vendor/data Lock-in, Security, and Elasticity are some of the challenges and issues that hinder MCC success and adoption. The cloud is computationally powerful while the mobile devices have restricted computational resources; therefore, there is a need to have a balance of both components. Here are the barriers and possible issues:

A. Barriers of Services

There are three types of service models supported in cloud computing as a service, including software, platform and information. But in current mobile cloud computing, only one software as a service is implemented because majority of mobile devices has insufficient storage capacity, power of the battery, poor display and computing power. Absence of norms acute shortage or lack of open norms is an another barrier for mobile cloud computing that may lead to problems such as restricted scalability, unreliable availability of service and service supplier lock-in.

B. Possible Issues
1) Mobile devices of resource poverty

One of the main and important issues in mobile cloud computing is restricted resources in mobile devices. Generally, the mobile devices have less computational power, storage capacity, poor display and power battery limitation as compared to the personal computers. Fig. 4 displays the performance comparison of mobile and non portable devices with anticipations. A suitable solution for this issue is presented in many studies. By presenting offloading computation. In addition, privacy, security, reliability and handling issues should be taken into account into the high cost of energy. Therefore more energy is wasted in solving these problems.

2) Hiding and network bandwidth

There are many other issues related in mobile cloud computing including restricted bandwidth and high hiding of the network. For instance, the bandwidth for 4G cellular systems may be restricted by cell tower bandwidth in another area with less power signal reception leads to lower bandwidth and higher hiding. Wi-Fi is a suitable solution to improve network hiding but if the number of mobile users is more than the bandwidth is decreased. Upgrading to 5G wireless network or more can be a good solution to the bandwidth and hiding limitations. Another convenient solution is the use of Cloudlets.

3) Fragmentation and network availability

Internet efficiency involves constant and high speed connection that must be guaranteed in mobile cloud computing. The modern mobile device has always been connected to the cloud any place or anytime with the easiest way that the user wants to be connected for different needs.

HTML5 as a current technology comes with a convenient solution by enabling data caching over a mobile device and this make it possible for a cloud application effectively to ongoing working in case of interrupted connectivity [16].

4) Security and concerns

The development in technology has also brought many new security hazards within it. Every user wants the high protection of his/her data and is curious about it. In this respect, there are two main security issues regarding the mobile cloud computing. First is mobile device security and the second is cloud security. In spite of mobile devices using the clouds for computing resources and applications. The nowadays majority of smart phone devices has built-in special security features and high quality to protect the devices of any abuse. Meanwhile, Google Device

Application private policy states the facility and flexibility for the users to remotely lock or clear the information and protect them with a stolen if they lost their mobile devices. In addition, some counter measures cloud access protection and established device identity with high protection to be adopted for better security of different smart phones and the clouds [17], [18].

VII. CONCLUSION AND FUTURE RESEARCH

This article has highlighted a comprehensive overview of mobile cloud computing. The suitable solutions for mobile cloud computing have also been discussed so that the readers can have a better understanding of the mobile cloud computing and its applications. Some critical and challenges issues as well as problems that exist in mobile cloud computing and the solutions for those issues by some experts have also been presented. In addition, as mobile cloud computing is a new model it still has an opportunity for future research expansion in the following areas:

Security issues are still frightening and there should be an appropriate solution for it.

Architecture for the mobile cloud diverse wireless network should be investigated.

A single access platform for mobile cloud computing via various operating systems platforms

(e.g. Android, Symbian, Apple, Chrome) needs to be established .

Mobile cloud computing are the most emerging branches of cloud computing and it has invaded our life in all sectors. The main aim is to use cloud computing techniques for implementing efficiency applications and storage with the processing of data on mobile devices. Mobile cloud

Computing will equip many benefits to the

mobile device users and applications enterprises. The mobile industry has broad range rapidly and tracks constantly. The number of mobile users has been boosted swiftly and also smart phones and different sophisticated mobile devices are in the domain of almost every individual. The internet usage and mobility concern have leaped and reached to obsession, so we predict
mobile cloud computing application with its new innovation will invade the future.

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