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Resource Management in Mobile Cloud Computing: MSaaS & MPaaS with Femtocell and Wi-Fi

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ABSTRACT - *In Technology world mobile applications are growing explosively so we are emerging latest cloud computing concept service oriented architecture (SOA) in Mobile platform. It's evolution of new computing technology, Mobile Cloud Computing (MCC). This paper provides a perceptive resource management solution for mobile and mobile based services. Femtocell and Wi-Fi consist private cloud Network overcomes many performance obstacles (e.g., Battery life, Storage, Network availability, bandwidth) for localization of DATA. MSaaS and MPaas application overcome and improve other resource (Quality of services, Pricing, Standard Interface). For this reason, we proposed Femtocell and Wi-Fi rooted MSaaS & MPaaS applications for Management of all resource and improvement of performance of MCC.*

Keywords: - *Mobile Cloud Computing (MCC), Mobile Platform as a Service (MPaaS), Mobile Software as a Service (MSaaS), Service Oriented Architecture (SOA).*

I. INTRODUCTION

The Mobile Phone Technologies have grown in past two or three years and today we are using Smart Phones with latest technology applications. Our Smart phones are doing more than our Expectation but still we have performance issues for their uses. Our System can overcome Mobile Performance Issues by latest Mobile Cloud Computing technology applications with Femtocell Network and Wi-Fi. Mobile devices (e.g., Smartphone and tablet PC) are increasingly becoming an essential part of human life as the most effective and convenient communication tools not bounded by time and place [1]. Mobile users accumulate rich experience of various services from mobile applications (e.g., iPhone apps and Google apps), which run on the devices and/or on remote servers via wireless networks and now by Cloud Computing.

We are using Android application on smart phone for our regular life routines. We start our life with exercise or healthcare related application we find our destination with navigation application and also remove hunger with android application. Now we can say we are addicted to technology or dependent on technology. Rather than addiction or dependency we are paying a lot for that type of application or in Internet services. We are using Cloud Computing technology for better services but we have other end requirement of Mobile Cloud Computing [1]. MCC have many Performance related issues of mobile devices and application usage.

This Paper discusses that performance issues and Resource management improvement in mobile cloud computing. Paper purposed Problem Domain; Highlight all the resources and purposed solution system for their improvement; Design consideration of the system, both at the software and hardware level; discussion of operation and functional and design objective; Conclusions.

II. OVERVIEW OF MOBILE CLOUD COMPUTING

Cloud Computing was next generation technology for our present infrastructure but now we are widely computing our information in cloud computing. Cloud computing offering many advantages to users in Infrastructure, Software, platform but it is not igniting for Mobile platform.

So the term mobile cloud computing was introduced not long after the concept of cloud computing. It has been attracting the attentions of entrepreneurs as a profitable business option that reduces the development and running cost of mobile applications, of mobile users as a new technology to achieve rich experience of a variety of mobile services at low cost, and of researchers as a promising solution for green IT [2]. This section provides an overview of MCC including definition, architecture, and advantages of MCC.

1. What is mobile cloud computing?

The MCC forum defines MCC as follows [3]:

'Mobile cloud computing at its simplest refers to an infrastructure where both the data storage and data processing happen outside of the mobile device. Mobile cloud applications move the computing power and data storage away from mobile phones and into the cloud, bringing applications and MC to not just smart phone users but a much broader range of mobile subscribers'.

Aepona describes MCC as a new paradigm for mobile applications whereby the data processing and storage are moved from the mobile device to powerful and centralized computing platforms located in clouds. These centralized applications are then accessed over the wireless connection

based on a thin native client or web browser on the mobile devices.

Alternatively, MCC can be defined as a combination of mobile web and CC [4, 5], which is the most popular tool for mobile users to access applications and services on the Internet.

Briefly, MCC provides mobile users with the data processing and storage services in clouds. The mobile devices do not need a powerful configuration (e.g., CPU speed and memory capacity) because all the complicated computing modules can be processed in the clouds.

2. *Architectures of mobile cloud computing*

From the concept of MCC, the general architecture of MCC can be shown in Figure 1. In Figure 1, mobile devices are connected to the mobile networks via base stations (e.g., base transceiver station, access point, or satellite) that establish and control the connections (air links) and functional interfaces between the networks and mobile devices. Mobile users' requests and information (e.g., ID and location) are transmitted to the central processors that are connected to servers providing mobile network ser-vices. Here, mobile network operators can provide ser-vices to mobile users as authentication, authorization, and accounting based on the home agent and subscribers' data stored in databases. After that, the subscribers' requests are delivered to a cloud through the Internet. In the cloud, cloud controllers process the requests to provide mobile users with the corresponding cloud services. These ser-vices are developed with the concepts of utility computing, virtualization, and service-oriented architecture (e.g., web, application, and database servers).

The details of cloud architecture could be different in different contexts. For example, four layer architecture is explained in [6] to compare cloud computing with grid computing. Alternatively, a service-oriented architecture, called Aneka, is introduced to enable developers to build. Microsoft .NET applications with the supports of application programming interface (APIs) and multiple Programming models. Presents architecture for creating market-oriented clouds and proposes architecture for web-delivered business services. In this paper, we focus on a layered architecture of CC (Figure 2). This architecture is commonly used to demonstrate the effectiveness of the CC model in terms of meeting the user's requirements.

Generally, a CC is a large-scale distributed network sys-tem implemented based on a number of servers in data centers. The cloud services are generally classified based on a layer concept (Figure 2). In the upper layers of this paradigm, Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS) are stacked.

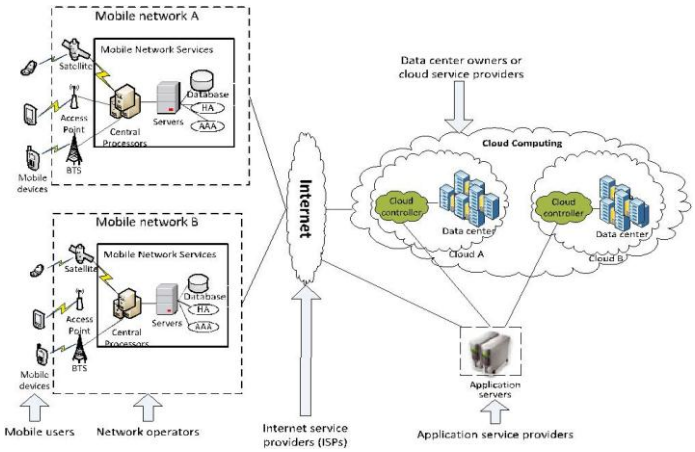

Figure1: Mobile cloud computing architecture

Data centers layer. This layer provides the hardware facility and infrastructure for clouds. In data center layer, a number of servers are linked with high-speed networks to provide services for customers. Typically, data centers are built in less populated places, with a high power supply stability and a low risk of disaster.

IaaS. Infrastructure as a Service is built on top of the data center layer. IaaS enables the provision of storage, hardware, servers, and networking components. The client typically pays on a per-use basis. Thus, clients can save cost as the payment is only based on how much resource they really use. Infrastructure can be expanded or shrunk dynamically as needed. The examples of IaaS are Amazon Elastic Cloud Computing and Simple Storage Service (S3).

PaaS. Platform as a Service offers an advanced inte-grated environment for building, testing, and deploy-ing custom applications. The examples of PaaS are Google App Engine, Microsoft Azure, and Amazon Map Reduce.

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. Salesforce is one of the pioneers in pro-viding this service model. Microsoft's Live Mesh also allows sharing files and folders across multiple devices simultaneously.

Although the CC architecture can be divided into four layers as shown in Figure 2, it does not mean that the top layer must be built on the layer directly below it. For exam-ple, the SaaS application can be deployed directly on IaaS, instead of PaaS. Also, some services can be considered as a part of more than one layer. For example, data storage service can be viewed as either in IaaS or PaaS. Given this architectural model, the users can use the services flexibly and efficiently.

Software as a Service (Microsoft Live Mesh)
Platform as a Service (Google App engine, Microsoft Azure)
Infrastructure as a Service (EC2, S3)
Data Centers

Figure 2: Service-oriented cloud computing architecture

3. Advantages of mobile cloud computing

Cloud Computing is offering new service oriented architecture and advantages for our existing system. Today we are using cloud oriented services in internet for different devices. CC offers some advantages by allowing users to use infrastructure (e.g., servers, networks, and storages), platforms (e.g., middleware services and operating systems), and software's (e.g., application programs) provided by cloud providers (e.g., Google, Amazon, and Salesforce) at low cost. In addition, CC enables users to elastically utilize resources in an on-demand fashion.

But Mobile devices (e.g., Smartphone and tablet PC) are increasingly becoming an essential part of human life as the most effective and convenient communication tools not bounded by time and place. Mobile users accumulate rich experience of various services from mobile applications (e.g., iPhone apps and Google apps), which run on the devices and/or on remote servers via wireless networks and now by Cloud Computing. So mobile cloud computing have requirement of new service oriented architecture and new advantages in Mobile platform. Our this paper is offering new service oriented architecture and advantages in mobile platform with this latest technology Mobile Cloud Computing.

Cloud computing is known to be a promising solution for MC because of many reasons (e.g., mobility, communication, and portability). In the following, we describe how the cloud can be used to overcome obstacles in MC, thereby pointing out advantages of MCC.

1. Extending battery lifetime
2. Improving data capacity and processing
3. Improving reliability

In additional MCC also inherits some advantages of cloud computing for mobile services with our service oriented architecture as follows:-

- ***Dynamic provisioning.*** Dynamic on-demand provisioning of resources on a fine-grained, self-service basis is a flexible way for service providers and mobile users to run their applications without advanced reservation of resources.
- ***Scalability.*** The deployment of mobile applications can be performed and scaled to meet the unpredictable user demands due to flexible resource provisioning. Service providers can easily add and expand an application and service without or with little constraint on the resource usage.
- ***Multi-tenancy.*** Service providers (e.g., network operator and data center owner) can share the resources and costs to support a variety of applications and large number of users.
- **SYSTEM OVERVIEW**

The proposed system provides solution for the all resource management issues and implements cloud computing advantages in Mobile Cloud Computing for future generation.

Mobile Cloud Computing based Application system is developed for better performance in local data and application on mobile phones. We are paying high charges for local data and application to internet provider or telecom companies. This system is providing high speed data access on network for mobile phones .Today we are using many applications in our premises for our local records. We are also phasing technological and performance issues for own data like Network availability in our premises, high charges for internet data plan, Energy consumption, and storage capacity. Mobile phones Companies are promising for high performance in battery life and computing power and they are also delivering those types of smart phones in market.

MCC is technology which promising better service oriented architecture and solving major performance issues in mobile platform. New Service Oriented Architecture providing MSaaS, MPaaS, MNaaS, MIaaS. System is providing Mobile Software as a Service (MSaaS) and Mobile Platform as a Service (MPaaS) with Wi-Fi and Femtocell Network [7, 8].

III. SYSTEM DESIGN

The Mobile Cloud Computing based application system like MSaaS and MPaaS utilize in Wi-Fi and Femtocell network for high speed data uploading and downloading. This system is Wi-Fi and Femtocell network based client server approach software[7,8]. Software is providing unlimited secure storage space on local server with multiple user also providing application cloudLet platform with high speed local data. Wi-Fi and Femtocell network have high bandwidth for local network data and low power consumption on small computing devices like mobile Phones.

1. Software Architecture

The Software consist Android Application for mobile phone and database system on server with memory allocation application system.

2. Android Application Program

Android application program is developed in Eclipse framework and providing interface between mobile user and server system for space allocation and application access in

network. Wi-Fi and Femtocell Network both are best network for mobile and computer connectivity in local area Network.

3. Server

Server is deployed on personal computer and its allocating secure storage memory space for multiple client like mobile phones. This server is connecting with android application with HTTPS.

4. Hardware Architecture

The basic requirement is Wi-Fi and Femtocell devices for high speed network and mobile devices for communication and application also local server apace for MSaaS and MPaaS .Mobile software as a service can be implement in Attendance monitoring system and platform service can manage in Storage space .

IV. METHODOLOGY AND FLOWCHART

Importance of this system is improving resource management in mobile platform because users are paying high charges for least services like storage space, computational power and application interface. Storage space and Application interface is authenticate or authorized in our system. Online cloud providers have disadvantages like security, portability. Mobile data and local application data have required high security in user satisfaction. No one wants to upload his personal data on cloud but each one wants disaster recovery and backup of data. Mobile cloud Computing is one solution of mobile performance issues and we are using mobile cloud computing service oriented architecture for all issues in our system that can understand by system flowchart Figure 3.

The user have to install the apk on mobile then get connection with secure IP login on Femtocell or Wi-Fi network with hotspot connecting tool after the connection user will get authentication password and ID with server. This User-Id and Password will allocate data space on server and application authorization for new user. Register user can get application options for Data Oriented and Application Oriented function .Data oriented option provide multiple data function like Download, Rename, Delete etc. Application Oriented option facilitate with all server application for organization betterment.

V. CONCLUSION

In this paper, we proposed system with new service oriented architecture of cloud computing for management or improvement of resource in latest Mobile Cloud Computing Technology. System is delivering better result and resolving performance issues. Android users are experience new performance on their existing Mobile phones. Mobile cloud computing is one trend for future of mobile technology because it's combining both MC and CC advantages and our system is also.

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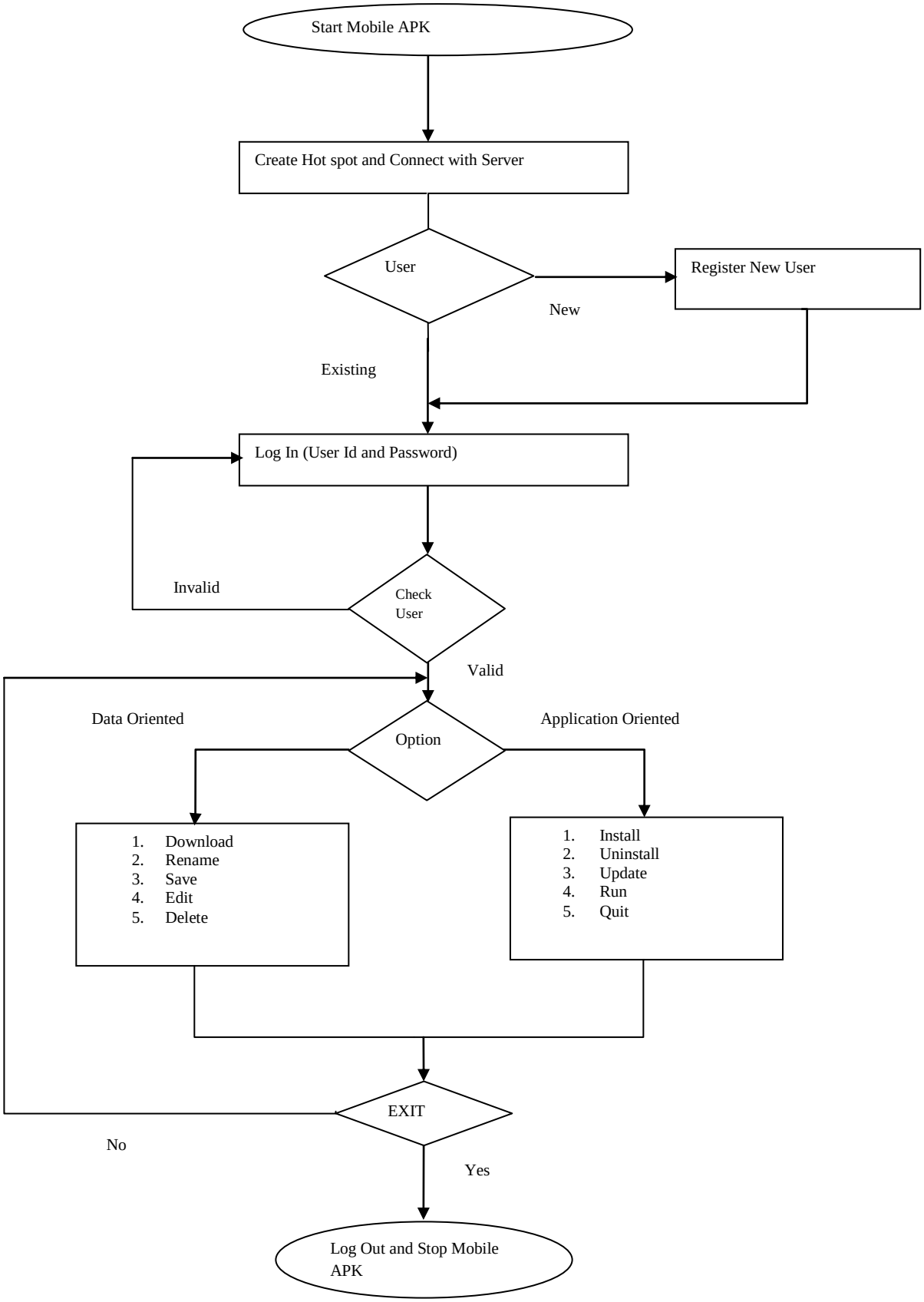

Figure 3: Flowchart for system implementation in Wi-Fi & Femtocell Network

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