



Proposed Customized Architecture of Mobile Cloud Computing in Health Care Domain

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Abstract: Nowadays, cloud-computing frameworks such as Google AppEngine, Amazon Web Services and Windows Azure platform have become increasingly popular among IT companies and application developers. Concurrently, we have observed a prodigious increase in the usage, deployment and development of smartphone platforms and application around the world. In this paper, we are going to discuss the current state of art in the combination of these two popular technologies, known as Mobile Cloud Computing (MCC) and we assume that MCC will be the soul of healthcare revolution. MCC provides advance kind of facilities and amenities for patients and medical personnel. This paper represents the architecture of Mobile Cloud Computing for Health Care Big Data Analysis. Google's Android operating system based mobile system presented in paper makes healthcare data storage, update and retrieval by using cloud computing.

Keywords: Mobile Application, Performance Testing, Automated Testing, Functional Testing, Test Metrics

I. INTRODUCTION

Many advance developments have been taken place in the field of information and communication during the last ten years. Geographically separated people on the earth feeling closer with the recent development in the field of communication technologies like wireless communication and mobile computing. Also, technologies like cloud computing and smart devices with different smart operating system has provided add-on benefits in the area of wireless communication. Smart mobile devices provide diversity of the features that offers more comfort in term of information access and exchange [1]. It helps us in our daily activities like finding locations, online shopping, time and budget management and easy access of social media technologies, smart office and many more. In recent days, many healthcare mobile applications are also available that helps us to measure blood pressure and weight management [2].

The birth of the smart phone has changed the way of using different advanced technologies that people all over the world was using previously. Nowadays, people are able to work from home, which saves commuting time in heavy traffic. Also, find is location in any big city becomes very easy and quick with the help of location based services. As we all know facilities always comes along with the challenges, great level security is required to guard the ones' data from unauthorized access over wireless channels.



Figure 1. Mobility Features

Another advance technology, which allows users to access stored data anytime from any location is Cloud computing (Figure 2). Technology like cloud computing can implement and utilized by any individual or organization to improve productivity and performance of the individual as well as the organization and it helps to decrease the complexity and cost at the same time [5].



Figure 2. Cloud Storage Concept

Moreover, combining this highly used technologies i.e. cloud computing and mobile computing to consume the unlimited services provided cloud through the smart mobile devices gives an another integrated technology well-known as Mobile Cloud Computing [7]. In cloud computing number interconnected shared resources to minimize capital cost and maximize the utilization of the resources. In recent days, Mobile cloud computing is technology used by all most domains because of its high reliability, easy access and low cost. Mobile Cloud Computing is an immerging technology for cloud-healthcare systems. Mobile Cloud Computing enables modules for handling information data in spread, pervasive and general manner supporting mobile platform and server side application [6].

Mobile based health care infrastructure is mainly focus towards two specific goals: providing medical information everywhere and all the time without computing complexity and the

availability of m-health applications. Mobile based healthcare applications can provide a large set of applications and facilities with mobile based medicine support, patient nursing, location-based medical service availability, anytime emergency management, personalized patient observing and anytime availability of the healthcare details, providing countless advantages to both patients and medical individual ([3], [4]).

RELATED WORK

Many mobile applications for general healthcare data administration are already accepted and used by many people ([8], [9]). An author in [10] focuses mainly on the advantages of accessing digital health record on mobile for the immediate actions for elderly citizens. The main function of the application is to offer all time reliable communication between patient based home interface and care taker using handheld devices like PDAs and Tablets PCs. Smart cards and web application interfaces allow to store patient record in binary form on the server.

Authors in the [12] mainly highlighted prototype model of cloudlet architecture. They pinpoint the real-time benefits of using architecture based real time applications. Unlike traditional approach prototype used here, a cloudlet can be chosen run time from the network infrastructure to achieve the running application of the component model.

The authors in [13] mainly studied the effect of using cloudlet parallel with mobile cloud computing in interactive application like video capturing. In paper author compares two different models to calculate system throughput and transfer delay time. In result they claim that in most cases cloudlet based model beat the cloud based model. A framework which focuses on private demotion-based services by mobile cloud computing is highlighted in [14].

In [15] authors focus on a large scale Cloudlet MCC model to determine the dropping network delay and power tolerance mainly for the multimedia based applications. Also, large scale deployment of framework covers huge area and permits the remote mobile users to continuously connect with cloud services from remote locations when they are in the area where with less broadband communication requires high quality service.

II. IMPORTANCE OF CLOUD COMPUTING IN HEALTH CARE DOMAIN

The main purpose of smart mobile based application for healthcare is provide mobile user interface using which they can access all information related to the patient health on one touch and offer more variety of services which are scattered at different places. The main goal of mobile cloud computing in healthcare domain is to replace the conventional human resource based system with the smart decision support system [16][17].

The Forum on mobile cloud computing represents it as “an infrastructure where both the data storage and the data

processing happen outside of the mobile device” [18]. In [19], authors define MCC is considering as advance prototypical for smart phone platform: “it will be transferred to a centralized and powerful computing platform in the cloud”.

MOBILE HEALTH CARE APPLICATIONS

There are various applications of mobile cloud computing in health care. Authors in [21] present mobile health care applications in the universal environment.

- Broad health monitoring services allow patients to be supervised at anytime and anyplace through wireless communications.
- Expert emergency management system can manage and direct the wheels of emergency vehicles effectively and in time when receiving calls from emergency case or incidents.
- Health-aware mobile devices detect pulse-rate, blood pressure, and level of alcohol to attentive healthcare emergency system.
- Widespread access to healthcare information helps patients or healthcare service providers to provide the current and past medical information.
- Pervasive lifestyle incentive management can be used to pay healthcare expenses and manage other related charges automatically.

THE MCC OFFERS SEVERAL ADVANTAGES, LIKE [20][23]:

- **Improving battery lifetime:** the technique of computation offloading is proposed to migrate the complex treatment from limited devices i.e. mobile devices.
- **Increasing data storage capacity and processing power:** MCC is model which allows mobile users to store/access cloud data.
- **Enhance reliability:** the data storage on a number of different computers in the clouds at different locations improves reliability.
- **Runtime provisioning of resources and scalability:** It provides easy way for running the applications without any advanced arrangement of resources and adding services.
- **Multi-tenancy:** services can be consumed by a variety of applications and number of users. There is no location related barriers for data access. User can access data any time at any location.
- **Flexible Integration:** services provided by different service providers can be integrated easily through the cloud. Also, it will add extra flexibility in data access and storage.

III. PROPOSED ARCHITECTURE AND SYSTEM:

This paper mainly focusses on providing architecture for smart operating system based devices an application using cloud based environment in the domain of the health care. Application allows user to access their hospital data in their mobile devices. Also, some symptoms data delivered with the application in offline mode for the basic first aids. Application also, helps user in taking doctor appointment from the list of corresponding doctors. Moreover, application provide many reach interfaces for different users of the application. It supports anytime online interaction between doctor and patient as and when required. Proposed architecture uses various cloud computing services which are [11] platform independent and automate communication with users and make backend data management easy. The cloud base data storage manages overall physical infrastructure of an architecture. Moreover, it is also responsible for data back and recovery. It handles the user requests and queues the multiple request coming from different remote devices. Cloud infrastructure is also responsible for maintaining users account, data manipulation and billing related issues.

Due to advancement in the different technologies like: cloud computing, social media and wireless communication technologies another advances technology named the Big Data is invented which allows to access huge amounts of stored or obtained data by different sources like cameras, sensors and many more.

When it comes to patients' life and death some real time processing of data is required to provide correct timely decisions.

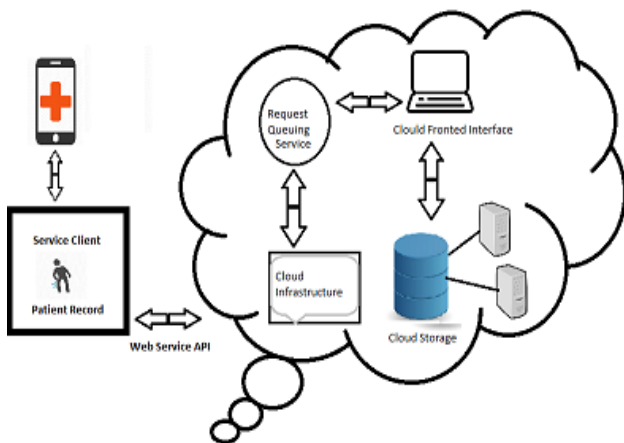


Figure 3. Cloud Storage Concept

Figure-3 illustrates the proposed system architecture for deploying and developing mobile based healthcare application using Cloud Computing.

The client running on Android device as application is having several modules. The Patient user interface of application gets and provides patient health records stored on the cloud. The communication with the cloud is performed using REST full web service API that is natively supported by Android OS. Data is communicated in term of platform independent language XML and HTTP protocol is used to transport the data.

IV. CONCLUSION

The application provides the help to the healthcare communal which allows easy, cost effective and faster access of health related data and it provides effective way for interaction between hospital staffs and the patients. The Mobile Cloud Computing system can significantly provide the better benefits for individual and hospitals, by reducing administrative and medical cost and better patient care. New technologies like Mobile Computing and Cloud Computing provides new opportunities to improve health care services. The main focus of MCC is an autonomous environment in which mobile devices are able to retrieve their computation, data storage, access of services and other required resources independently and proficiently anytime and anywhere.

Future work might include generation of networked healthcare system by integrating the healthcare with other smart city systems. Also, development of more realistic application in the area of health care based on the proposed architecture to provide better personalized medical care.

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