



An Enhanced Mobile HealthCare Monitoring System in Mobile Cloud Computing

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ABSTRACT: Cloud computing is on-demand computing that does not reside at the users' premise. Instead, the computing resources are owned and managed by a service provider and the users access the resources via the Internet. Mobile computing provides new opportunities to personal users of healthcare services. Mobile and cloud technologies are at the heart of healthcare's transformation. Tablets are replacing paper medical charts, private clouds are enabling secure access to medical records, and mobile cloud collaboration tools are improving information sharing among medical professionals and academics. Mobile devices are being considered as service platforms for mobile health information delivery, access and communication. Wireless and mobile communications lead to the emergence of a new type of advanced service for health care, making mobile health care systems more realistic and feasible in terms of providing expert-based medical care. Cloud Computing provides functionality for managing information data in a distributed, ubiquitous and pervasive manner supporting several platforms, systems and applications. The implementation of a system that enables autonomic computing is that "Systems manage themselves according to an administrator's goals and new components must be integrated effortlessly".

Keywords: Mobile Internet Applications, EHR, EMR, m-Healthcare

I. INTRODUCTION

Cloud Computing is no more considered as an emerging technology. Now, it's a reality and this low-cost computing power is gaining popularity among businessmen, especially medium and small size, and governmental organizations, as people are realizing the power of cloud environments. "Cloud computing is such a type of computing environment, where business owners outsource their computing needs including application software services to a third party and when they need to use the computing power or employees need to use the application resources like database, email, etc., they access the resources via internet.

Mobile technology has expanded dramatically around the world. Along with 3G and 4G, these advances have had a huge impact on many walks of life. The utilization of smart phones and tablets has transformed communications, commerce, and entertainment, among other fields. Their emergence has improved service delivery, empowered consumers, businesses, and entrepreneurs, and changed the way in which people access information and make transactions. Now this technology is composed to alter how health care is delivered, the quality of the patient experience, and the cost of health care. Mobile technology is helping with chronic disease management, extending service

to underserved areas, and improving health outcomes and medical system efficiency.

Mobile phones as a service platform can provide several societal, business and governmental services. Further developments will allow mobile devices with unique features that can sense the environment and physiological parameters to enhance quality of life and remote monitoring of patients. However mobile devices have limitations in computational capacity and power consumption. Hence, cloud computing could be regarded as an unlimited resource that can be accessed anytime and anywhere in the world.

II. RELATED WORK

The mobile health service is provided by the mobile health providers. The provider gives the facility of health monitoring according to patient's convenience with the maximum use of mobile device. The client who wants to use this application subscribes to the mobile health provider through his mobile. The providers register them as authenticated user after validation of information. The further communication is done through the mobile only.

Remote monitoring devices enable patients with serious problems to record their own health measures and send them



electronically to physicians or specialists. This keeps them out of doctor's offices for routine care, and thereby helps to reduce health care costs. The chronic disease areas are congestive heart failure, pulmonary disease, diabetes, and skin ulcers. With around the clock monitoring and electronic data transition to care-givers, remote devices speed up the treatment of patients requiring medical intervention. Rather than having to wait for a patient to discover there is a problem, monitors identify deteriorating conditions in real time, and alert physicians. For example, it is crucial that patients monitor their blood glucose levels and gear their insulin intake to proper levels. In the "old days" based on face-to-face encounters, patients had to visit a doctor's lab or medical office, take a test, and wait for results to be delivered. That process was expensive, time-consuming, and inconvenient for all-involved. Having to get regular tests for this and other conditions is one of the factors that drive up medical costs. However, it is possible to use remote monitoring devices at home that record glucose levels instantaneously and electronically send them to the appropriate health care provider. Patients are using "Gluco Phones" [1] that monitor and transmit glucose information to caregivers while also reminding patients when they need to undertake glucose tests. This puts people in charge of their own test-taking and monitoring and keeps them out of doctor's offices until they need more detailed care.

III. PROPOSED WORK

The main aim of this paper is to implement a mobile internet application in the cloud environment for health care management system for the hospital applications, in which the patients can download the hospital management system software and also able to get appointment form the corresponding doctors and also able to view basic symptoms and immediate first aids to be taken. Also in this paper we have decided to have online interaction of the patients with doctors whenever required, we also consider autonomic computing issues, which defines a set of architectural characteristics to manage systems where complexity is increasing but must be managed without increasing costs or the size of the management team, where a system must be quickly adaptable to new technologies integrated to it, and where a system must be extensible from within a corporation out to the broader ecosystem and vice versa. The primary goal of autonomic computing is that "System manages themselves according to an administrator's goals and new components must be integrated effortlessly". The purpose of applying Mobile Cloud Computing in medical applications is to minimize the limitations of traditional medical treatment (e.g., small physical storage, security and privacy, and

medical errors [2], [3]. Mobile healthcare (m-healthcare) provides mobile users with convenient helps to access resources (e.g., patient health records) easily and quickly. Besides, m-healthcare offers hospitals and healthcare organizations a variety of on-demand services on clouds rather than owning standalone applications on local servers.

IV. SYSTEM ARCHITECTURE

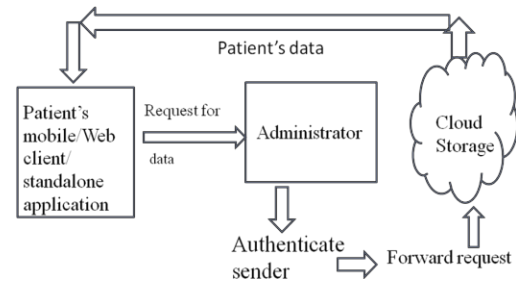


Fig 1: Patient's and Cloud Relation diagram

Figure illustrates the proposed system architecture for developing and deploying the mobile healthcare applications that utilize Cloud computing. The Cloud Service client consists of several modules. The Patient Health Record application [4] acquires and displays patient records stored into the cloud. The Cloud Storage Facilities manages the physical infrastructure (e.g., storage elements) and is also responsible for performing maintaining operations (e.g., backing up data, etc.) The Cloud Platform interface is also connected to the Cloud Service module, which handles and queues user requests. The patient is the client who uses this application. The client who wants to use this has to subscribe to the administrator (the person from the medical background) and send the necessary documents for the registration. The administrator is the person who has the medical background. Whenever the client sends the request for registration the administrator first verify the necessary documents and register him as the authorized customer with the unique PatientID. The client can access the data in the cloud storage but can't do the modification in the record. For the security purpose the administrator only has the rights to make the changes in the record. The all registered customers have their accounts with unique ID and password. These accounts are managed by the administrator. He has the backup of all information related to these account Cloud provides the storage for patient record. Send the data to the client when request is generated.



V. APPLICATIONS OF MOBILE HEALTH CARE

There are a few schemes of Mobile Cloud Computing applications in healthcare. For example, [5] presents five main mobile healthcare applications in the pervasive environment.

- **Comprehensive health monitoring services** enable patients to be monitored at anytime and anywhere through broadband wireless communications.
- **Intelligent emergency management system** can manage and coordinate the fleet of emergency vehicles effectively and in time when receiving calls from accidents or incidents.
- **Health-aware mobile devices** detect pulse-rate, blood pressure, and level of alcohol to alert healthcare emergency system.
- **Pervasive access to healthcare information** allows patients or healthcare providers to access the current and past medical information.
- **Pervasive lifestyle incentive management** can be used to pay healthcare expenses and manage other related charges automatically.

VI. IMPLEMENTATION

Many software applications, services, and data once in the domain of a local computer or local server safely secure in your building are now in the domain of the public Internet. Private health information once confined to these local networks is migrating, wholesale, onto the internet.

Patients voluntarily grant access to their health records every time they sign a contract to the health insurer that then decides on the payment disposition to the doctor, pharmacy, or hospital. For the most part, the collection and organization of this data is completely legal.

It then follows that companies want to automate and accelerate access to these records in order to offer “in the cloud” products and services to patients, doctors, and institutions.

VIII. CONCLUSIONS

The development of this application will help the healthcare community to provide cost effective and fast retrieval of health care related information and also easy means of interaction between hospital administrations and

Electronic health record (EHR) systems [6] enable hospitals to store and retrieve detailed patient information to be used by health care providers, and sometimes patients, during a patient’s hospitalization, over time, and across care settings. Embedded clinical decision support and other tools have the potential to help clinicians provide safer, more effective care than is possible by relying on memory and paper-based systems. In addition, EHRs can help hospitals monitor, improve, and report data on health care quality and safety. The Centers for Medicare and Medicaid Services (CMS) calls EHRs, “the next step in continued progress of health care.”

The fact that Google and Microsoft are heavily invested “in the cloud” extends to their new offerings for medical record services, such as Microsoft Vault and Google Health. While still in beta testing, these software giants have partnered with large healthcare providers for their programs: Microsoft with Kaiser Permanente and Google with the Cleveland Clinic. Microsoft and Google are two prominent examples of many other company offerings that are following the accelerating trend of placing previously local and private health records stored in massive data centers around the world and will provide access to healthcare records for patients, insurers, doctors, pharmacies and institutions.

VII. SECURITY ISSUES IN MAINTAINING PATIENT RECORDS

- Providing access to browser-based EHRs and EMRs with end-to-end encryption in either:
 - Tightly controlled private clouds
 - Non-private clouds only if the patient identifiers are stored in encrypted data files (in the cloud or in the storage).
- Storing de-identified patient data in centralized data bases for public access or for restricted access by authorized persons
- Applications in private clouds with end-to-end encryption.
- Hosting web conferences to dispersed audiences.
- Enabling real-time collaboration in private clouds with patient data encrypted end-to-end or in public clouds with de-identified patient data only.

the patients. The Mobile health care system can greatly improve the benefits for patients and hospitals, by not only providing better quality of patient care, but by also reducing administrative and medical cost for both patients and hospitals.



IX. FUTURE WORK

Future work might include improving security by implementing advanced user authentication techniques on the mobile device and deploying the platform in real healthcare environment for evaluating the system in terms of user acceptability and performance.

The integration and security related issues can still be considered for the future work in order for the more secure and easy, efficient integration and use of the upcoming components and current technology.

REFERENCES

- [1] Darrell West “How Mobile Devices are Transforming Healthcare”.
- [2] L. T. Kohn, J. M. Corrigan, and S. Donaldson, “To Err Is Human: Building a Safer Health System,” NATIONAL ACADEMY PRESS Washington, 1999.
- [3] D. Kopec, M. H. Kabir, D. Reinharth, O. Rothschild, and J. A. Castiglione, “Human Errors in Medical Practice: Systematic Classification and Reduction with Automated Information Systems,” *Journal of Medical Systems*, vol. 27, no. 4, pp. 297 - 313, August 2003.
- [4] Poonam B. sutar, Bharat P. kulkarni “ Cloud Computing Support for Enhanced Health Applications “, *International Journal of Engineering and Innovative technology*, Volume 2, Issue 1, July 2012.
- [5] U. Varshney, “Pervasive healthcare and wireless health monitoring,” *Journal on Mobile Networks and Applications*, vol. 12, no. 2-3, pp. 113 - 127, March 2007.
- [6] Sharon Silow-Carroll, Jennifer N. Edwards, and Diana Rodin Health Management Associates, “Using Electronic Health Records to Improve Quality and Efficiency: The Experiences of Leading Hospitals”.