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A Survey of Cloud Based Health Care System

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ABSTRACT: Cloud communicating is an emerging technology that can be integrated with traditional health management used to provide better health services. Again social media nowadays become an important medium of communication. The scalability, adaptability, cost reduction, and high performance features of cloud improve the medical services. This paper surveys integrations of cloud computing and social media with existing health management system.

KEYWORDS: Cloud computing; HealthCare; Social media; Wearable sensor

I. INTRODUCTION

Cloud computing is one of the emerging technologies that has an increasing impact on both private and public sectors. It represents an on-demand service model for delivering resources ranging from storage and data access, via computation to software provisioning. Typical categories of cloud computing include Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS) & security as a Service (SecaaS). In the IaaS category, virtualized infrastructures are provided as a service (computing, storage, server, network e.t.c). There are different types of IAAS services in cloud such as Amazon EC2, Amazon EBS and Amazon Simple Storage Service (S3) e.t.c. PaaS offers platforms for the developing, running, testing and deploying software as a service in cloud (e.g. Microsoft Azure, Google App Engine). SaaS provides different cloud based software packages on demand as a service eliminating the needs for installing and maintenance of the software on user's computer (e.g. Google Docs). The most important benefits of cloud computing include scalability, cost reduction, data availability, reliability and resilience.

Traditional healthcare systems mainly include personal and public healthcare services, teaching and research activities. Personal healthcare services are offered at hospitals, homes and different organizations. Public healthcare services involve guidelines for drugs, food and safety policies to maintain a healthy environment. Teaching and research activities are essential for prevention, detection, tracking and treatment of diseases. Integrating IT solutions with health care brought a significant benefits by solving issues of human errors, processing large volume of patient's information besides saving papers and storage space and allowing patients, doctors, hospitals and other healthcare providers to view and share your health information.

Integrating cloud computing and health sector solve many issues. For better treatment constant medical supervision of chronic patients or habitants at remote, isolated and underserved locations is needed. In this context, advanced electronic healthcare services are required to be made available through a network anytime, anyplace and to anyone. Cloud computing can be used for storage and processing of huge medical records. If these records will be available at cloud then can be easily shared. Doctors can use these records to track and monitor patient health status. They can also provide suggestion and health alert to their patients. Patients can also view their records. Health sector and social media can be integrated to provide better communication between doctors, patients and health care clinic.

This paper is organized as follows. Section II contains the survey of existing work and section III contains some research challenges. Finally the section IV concludes the paper.

II. STUDY OF EXISTING SYSTEM

There are a number of research work have been done to integrate cloud computing, health sector and social media. Existing work can be classified as integration of cloud computing with health care system and integration of social



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media with health sector. The integration of health care system with cloud computing is further classified based on public cloud integration and private cloud integration.

A. *Integration of healthcare system with public cloud*

In [1] a mobile application is developed for ambulatory electrocardiographic monitoring based on Android and iOS (iPhone Operating System). This application helps medical personnel to guide diagnose procedures efficiently using their smartphone and manage the daily activities connecting different zones. Kardia board is used to acquire ECG data from patient and this data is sent to smartphone (Android phone or phone use Apple IOS). The developed application at smartphone analyses, process, and uploads data to remote server in cloud where further processing is done. The application helps doctors and patients to access, view and monitor the patient health status. By using this application, doctors are able to receive ECG waveform from data bases in smartphones which may lead the diagnosis to serious problems. The disadvantage is that the developed application can be used only on Android based phone or apple IOs phone. The authors of [2] have developed a wearable – textile platform based on open hardware and software that collects motion and heartbeat data and stores them wirelessly on an open Cloud infrastructure for monitoring and further processing. Sensors are attached to patient body which collects bio-signal (heart rate, pulse rate, blood pressure and temperature), motion data of the patient and send data to the smartphone of patient using Bluetooth link. Smartphone forwards data to Google Cloud Service centre using REST Web services. Authors use java based application in cloud for data processing and sending health alert to patient. In cloud Google chart is used for data visualization. In paper [4] authors use cloud computing to connect different medical institutions at Malaysia to share medical information. In health sector medical applications can be loaded into cloud's dynamic environment and treating the medical devices as the part of the cloud, where software modules are automatically deployed on demand when required with appropriate resources which can improve medical functionality. Local HIMS (Hospital Management Information system) is hosted into cloud. Also this system connects different medical devices in cloud to improve their processing capability. TCloud [5] proposes a home health care system using cloud computing. In TCloud system patients, medical personnel's and doctors will be connected to get different services. The services provided are drug therapies management (for improving compliance with doctor recommendations), sleep and light management (sleep monitoring) and physical activity management of patients. To implement TCloud OPENSTACK is used as IAAS. SWIFT component of open Stack is used to provide database functionality via redundant storage and NOVA component empowers Virtual machines. Apache is used as web server and Mysql as database server. User communicates with the TCloud through a Web Portal and SOAP interface. STRIDE method is used for security threat modelling. LIDDUN method is used for privacy thread modelling and equipment elicitation.

B. *Integration of health care system with private cloud*

DCP social network [6] enables communication between clinics, doctors, patients and among the doctors. It is a private cloud system which connects clinics, specialists and patients for better treatment management and information sharing management. They propose two algorithms. The first algorithm initializes the working group list into the proposed P2P network and integrates them with current network such as Swedish National projects (NPO) and the second algorithm enables user to search DCP social network using criteria such as near distance and location. Here patients can easily choose their doctors. To implement DCP they use P2P Tester simulator and workstation with win 7.

C. *Integration of health care system with social media*

The recovery of patient of depends upon the right treatment. To get the right treatment there must be proper communication between patients and doctors. There are different approaches are used to improve the communication. The authors of paper [3] proposed that the communication between patients and doctors can be improved by using social media such as facebook or twitter or any other social networking sites. The communication will be between patient to doctors, doctors to doctors and patient to other patients. Doctors communicate with other doctors to share information about health or medical cases that they handle. It will give benefit to doctors to increase their knowledge and to improve their capability in patient treatment. Two way communications will also be formed between doctor and patient. Patient can consult about his or her illnesses that patient suffered, so did the doctor can give advices and health information that will be useful for patient. Communication between patients is also formed. Patient can share his experiences about the illness to other patients. The proposed health social media in [3] considers the three characteristics of the health community. The first characteristic is the security and confidentiality of patient health information. The second characteristic is the difference of unstructured social data with structured health data. The third



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characteristic is the truth of information and the credibility of people that involved in the health community. They define the functionality to overcome these issues.

D. Comparative study

Paper Name	Purpose	Technology used	Advantage	Disadvantages
A mobile application for ambulatory electrocardiographic monitoring in clinical and domestic environments [1].	A mobile application is developed for ambulatory electrocardiographic monitoring based on Android and iOS (iPhone Operating System). This application helps medical personnel to guide diagnose procedures efficiently using their Smartphone and manage the daily activities connecting different zones	Kardia Board to acquire ECG data from patient. Bluetooth 4.0 interface to transmit data smart hone. Android bases and Apple iOS bases phone is used.	Doctors are able to receive ECG waveform from data bases in smartphones which may lead the diagnosis to serious problems. Patient can view and upload their ECG data as and when required.	Developed application can be used only on Android based phone or apple IOs phone.
Managing Wearable Sensor Data through Cloud Computing [2].	Development of a wearable – textile platform based on open hardware and software that collects motion and heartbeat data and stores them wirelessly on an open Cloud infrastructure for monitoring and further processing and sending health alert to patient.	Arduino board as a wearable part. Bluetooth interface to send data to Android smartphone. Rest Web service. SOAP message interface and HTTP/HTTPS protocol for data exchange. Google cloud service for data storage and processing. Google Chart for data visualization. Java for developing cloud application.	Help patient to get health alert. Help doctors to monitor patient.	Propose system use Bluetooth interface which can be easily manipulated. Paper does not consider the privacy of patient data.
Design of Health Social Media to Improve the Quality of Patient's Recovery [3].	Use of social media to improve communication between patients and doctors.	Social media (facebook ,twitter or any other sites)	Improved communication between patient and doctors that help in recovery of patient	

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			suffering from certain diseases.	
Cloud Services - Enhancing the Malaysian Healthcare Sector [4].	Cloud based HIMS in Malaysia	Cloud Infrastructure(SAAS,PAAS) Local HIMS	Improve communication among different medical institutions. Sharing of information Improving the processing of medical devices by connecting them to cloud.	Paper does not give any details of implementation.
A home healthcare system in the cloud – addressing security and privacy challenges [5].	Propose a home health care system for patients.	OPENSTACK as IAAS (SWIFT & NOVA component). Apache and Mysql SOAP interface User access through Web portal.	Improved drug therapies management Sleep and light management Physical activity management of patients.	Do not consider the privacy of patients.
Co-Designing an Intelligent Doctors-Colleagues-Patients Social Network [6].	A platform for communication among clinics, specialists and patients.	P2P Tester simulator. workstation with windows 7 and 3 GHZ Core.	Information sharing. Better communication among doctors and patients. Better security as DCP is a private cloud system. Users can access their data using internet, mobile phones.	Do not consider health alert system. Do not propose any security algorithm.

Table –I Comparative study of Cloud & social media based Health Care System

III. RESEARCH CHALLENGES OF INTEGRATION OF CLOUD & SOCIAL MEDIA TO HEALTH CARE SYSTEM

Health sector is integrated with cloud computing to get different types of services. Health sector contains huge amount of information. To process and manage this information cloud computing is used. The scalability, adaptability, cost reduction and high performance features of cloud makes it possible to get health services at doorstep. But the problem is integrating health sector with cloud does not solve the problem of direct communication between doctors to doctors, doctors to patients and patients to patients.

Some researchers integrate health sector with social media to compensate the gap of communication. There are two problems in the integration of social media with health sector. First, the data in social media is unstructured while in health sector it is structured. Secondly as the social media is public so the data is insecure and not reliable. Again social



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media do not have any data processing applications which process the health records to provide the different types of services.

So when a new health care system will be designed by integrating cloud and social media the above challenges must be considered.

IV. CONCLUSION AND FUTURE WORK

In this paper different cloud based health care systems are surveyed. There are some system which integrates health care system with social media to compensate the lack of direct communication among doctors, patients and health management system. My future work will be implement a cloud based health care system and integrate it with social media.

REFERENCES

1. Saldarriaga, A, J., Pérez, J.J., Restrepo, J., and Bustamante, J. ,” A mobile application for ambulatory electrocardiographic monitoring in clinical and domestic environments”, IEEE Health Care Exchanges (PAHCE), 2013 Pan American ,pp: 1-4, 2013.
2. Doukas, C., and Maglogiannis, I.,” Managing Wearable Sensor Data through Cloud Computing”, Third IEEE International Conference on Cloud Computing Technology and Science (CloudCom), pp: 440-445, 2011.
3. Ibnualim, I., and Supangkat, S. H., ”Design of Health Social Media to Improve the Quality of Patient’s Recovery”, International conference on Cloud Computing and Social Networking (ICCCSN), pp: 1-4, 2012.
4. Ratnam, K. A., and Dominic, P. D. D.,” Cloud Services - Enhancing the Malaysian Healthcare Sector”, international conference on Computer & Information Science (ICCIS), Vol: 2, pp: 604-608, 2012.
5. Deng, M., Petkovic, M., Nalin, M., and Baroni, I.,” A home healthcare system in the cloud – addressing security and privacy challenges”, IEEE International Conference on Cloud Computing (CLOUD), pp: 549-556, 2011.
6. Pirahandeh, M., Kim , D., ” Co-Designing an Intelligent Doctors-Colleagues-Patients Social Network”, International Conference on Cloud Computing and Social Networking (ICCCSN), pp: 1-4, 2012.

BIOGRAPHY

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