Healthcare Patient Tracking System via Cloud Access

Khaltar.B[1], AAmir Shahzad [1], Muhammad Irfan[2], HyangRan Lee [1], Malrey Lee[1*]

[1, 1*] 561-756,Center for Advanced Image and Information Technology, School of Electronics & Information Engineering, Chon Buk National University, 664-14, 1Ga, Deokjin-Dong, Jeonju, Chon Buk, Korea
{baatarchuluunkh}@yahoo.com, {mail2aamirshahzad}@gmail.com, {orange1469}@naver.com,*{mrlee} @jbnu.ac.kr (corresponding author)
[2] Infrastructure University Kuala Lumpur (IUKL), Malaysia
Kuala Lumpur,Malaysia
{Irfanview2}@@gmail.com

Abstract. Cloud computing is a new technology in arena of computer, and information technologies. Several remote servers are joined together and network resources are used that provide various services such centralized storage, remote access to software and hardware, and other communication facilities according end-user prospective. In this research paper, simulation based cloud computing environment is deployed which keeps tracks and monitors the cardiology patients information through Radio-frequency identification (RFID), RFID tags are employed that directly connected with patients and configured to transmit information toward patient acquisition sensor(PAS). PAS designed is directed to transmit unidirectional information to local controller or local sever, several local servers are connected remotely within cloud environment and end-users (i.e., doctors and family friends) are allowed to visualize the real time information of patients via cloud access.

Keywords: Cloud Computing; Wire/Wireless LAN; Patient Acquisition Sensor; RIFD Tags; Multimedia Display

1   Introduction

Cloud computing is a new evolution that utilized the existing technologies in more concise ways and with minimal cost.   The end-users can access the cloud computing infrastructures and various resources, without requirements of detail knowledge, technology awareness, and installation of software and hardware. This evolution provides facilities for end-users to emphasize on their business rather than technology implementation obstructions [1—3]. Cloud computing uses virtualization technology which distinct a computer (or computers) in several virtual devices, and each of them is defined and designated to manage specified computer jobs. The cloud users can access the cloud resources by the mean of electronic devices such as cellular phones, laptops/desktops, tablets and others; cloud resources are used without interaction of users therefore; processes speed are increased, percentages of errors are decreased, and with minimal labor cost. Cloud providers used all their cloud resources as

services and these services are offered and categorized in three models such as infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS). Like traditional networks, cloud services are accessed and utilized with limitation and specification of network promises, and deployment models. Typical, cloud deployment models are divided into three categories: private cloud, public cloud and hybrid cloud, and other are: community cloud, distributed cloud, intercloud and multicloud [4], [5].

Whereas, the proposed study employed a hybrid cloud model, this combines the model functionalities of private and public cloud. Radio-frequency identification (RFID) is a wireless technology that uses the electromagnetic signal (fields) to transformed the information by mean of RFID tags which are attached with various objects [6—8]. RFID is solution for automatic identification and data capture (AIDC); electronically, information is store in tags by tracking the attached objects. An interrogator is used that perform the two-ways signal functionalities such as, to send signal to tag and to receive signal to tag. Several types of RFID tags are designed and used in various fields (or in application) such as industrial production tracking, automobile tracking and toll collection, temperature tracking, human tracking and others [6—11]. In this study, RFID tags are used and bio-signals are captured as normal/abnormal blood pressure, level of patient sugar and normal/abnormal heart pumping rates [12].

With the enhancement of technology, RFID tags are also connected with web bowers. Thus, information can be transmitted and visualized by connecting to specify URL. The hospital or/and medical center staff can also keep and visualize the real time information of their designated units or/and patients status on web browser. Overall, information has been centralized storage in database which should be retrieval on demands [12].

2   Proposed Methodology

To make the patient health monitoring system more scalable, reliable, efficient, cost effective solution and with minimal interaction of end-users efforts, simulation based cloud computing environment is proposed and designed.

This study is emphasizes to monitor the medical information of cardiology patients, but could be test for tracking and monitoring of other patients in hospitals or/and health care centers. The medical information of cardiology patient is carried by medical RIFD tag (MRT) and monitor by local machine via medical intelligent sensor (MIS). Local machine is also integrated with databases engine that simultaneously store the real time medical information of patient. As consequences, numbers of medical units are connected with local main server (LMS) that reacts as private cloud server, by this scenario numbers of hospitals and medical centers could be connected via private clouds, end-users should access the patient medical information via public cloud privileges. Fig 1 visualized the disaster scenario in which miTag is used to share the patient information.
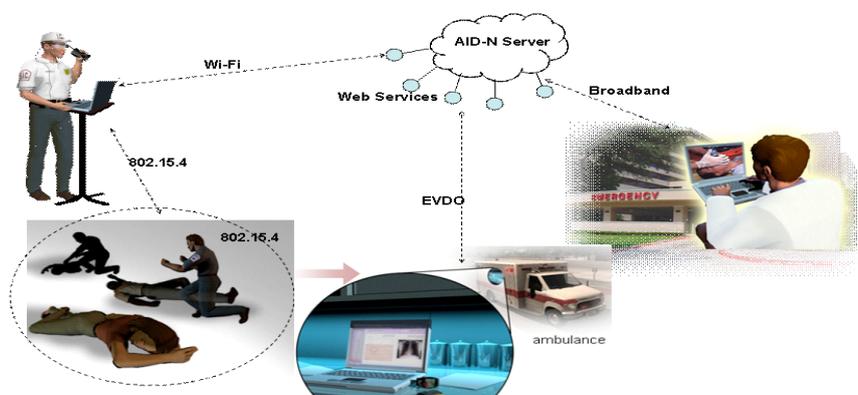
Fig. 1. Patient Tracking in Disaster Scenario using miTag [12]

3   Conclusion and future work

To monitor the patient dynamic status and process the information in real time to several machines or to the designated consultants, a development has been required? Therefore, the current study employed a cheap and reliable way to keep the track of patient dynamic status and process the information to designated controller (or server) through patient acquisition sensor (PAS). In cloud computing environment, number of RIFD tags used that captured the patients' information, sensors are used that monitor and process the information toward servers and designated consultants can view their patient status via could access using facility of cellular phones, laptops/desktops and other communication devices.

In future work, the simulation design will be deployed in real environment and also further enhancements will make for end-user prospective.

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