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A Ubiquitous "M-Health" Application Using Android Appliances

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Abstract: ***In modern health care society we are presenting an innovative idea in the world of healthcare services in the form of ubiquitous M-Health android application. The key feature of this application is to provide vital information under one roof. This software covers the divergence between all the interconnected services in a health care center i.e. the interconnection between doctor, patient, pharmacist, insurance assistant, etc. and annals authority (security) for annals. The main aim of this application is to provide a user-friendly interface in stress driven situation. This application provides remote access to medical records, doctor's prescription, patient's database and patient's insurance policy. Mainly this application focuses a health environment for the stimulus information sharing using portable android devices. In order to provide security and authentication various prospective strategies like professional authentications (user authentication) in between doctor– pharmacist-patient, patient-insurance agents are used. The main objective of this application is to diminish the gap between doctor and patient.***

Keywords: Alert mechanism, Cloud technology, Health care cloud solution, Insurance services, Medical annals, Security, Wireless health care.

1. Introduction

We propose a grand prototype for health care organization. "M-Health" structure has a wide dimension of utilization in the current era. This application will use the random number of user with respective to access authority for high quality performance through the software system. In this paper we are reviewing about to improve and efficiency of medical services for residential patient in the organization. In previous survey of world health care organization of 2013, we found that the requirement of the health care system increases rapidly. For making it flexible there are several organizations are working such as National Committee on vital and Health Statistics (NCVHS) and INTERNATIONAL PROFILES of Health Care Systems, 2013 government made global survey of the health care system worldwide. The policy of each country demands ample of requirement in short time for making it user-friendly for sharing the data reports [2], [17], [19].

Mobile health care application changes the scenario for making it flexible and available within no time and no limit. For making it handy we are proposing certain technologies to build the product named as "M-Health" system. Mobile health care application gives the bridge to communicate directly between end users. However this proposed system is available on portable platforms that offer reliable and quick access to the database present in cloud. Proposed architecture is dependent on certain modules where each module is Inter linked to each other with limited authority. Mainly we are focusing on making healthy relationship among doctor and patient [1]. Doctors, Patients and mainly pharmacist are ubiquitously sharing the required prescriptions at any place and any time. This new proposing technology gives potential boost to the health environment system. Health care industry has adoption to fulfill the upcoming vast obligations. The extension of this simplex structure often leads to easy access to each module independently. The use of all these offered functionality proposed by our developed M-Health solution and will be achieved by no place, time or configuration restriction and more importantly with keeping our solution light weight in terms of storage size [2].

2. Literature Survey

Instant Dx studied the physicians daily work flow, and identified. two repetitive and time- consuming tasks, namely prescription writing and review of clinical laboratory tests, and developed a software system that enables: Prescription writing capability on any web-capable device, including portable communication devices such as mobile phones, text-enabled pagers, Palm computers, Pocket PCs, and regular desktop computers. Prescriptions are transmitted electronically to the pharmacies using On Call Data, and eliminate any wait time on part of the patients for prescriptions, or the physicians, pharmacists and office staff on the phone. On average, studies have shown that the On Call Data system can save upwards of ten minutes per prescription, or in total 2-6 hours per day of combined physician staff time [2].

Fig. 1 shows the Instant Dx conducted a study of the existing market conditions in the e-prescription and e-lab technologies available at the time of developing the On Call Data system. These systems have very low adoption rates for various reasons. The four attributes common to all of these applications are the following: Require significant behavioural change on the part of the specialist, immense infrastructure Costs, Tethered to Physician's Office, Device-dependent [2].

This paper addresses why we need an instant notification service for a ubiquitous personal care in health care system and presents its prototype application. The implemented quick notification utility has two major features:

1) The service is instrumented as a thin client function from end domain point of view. Because health cares terminals are usually small devices such as a PDA or a smart phone.
2) Two types of messages (text and voice message) are supported. We need more consideration about stored data in the health portal. We also need further study for the terminal software platform how to collaborate with open health care structure [8].

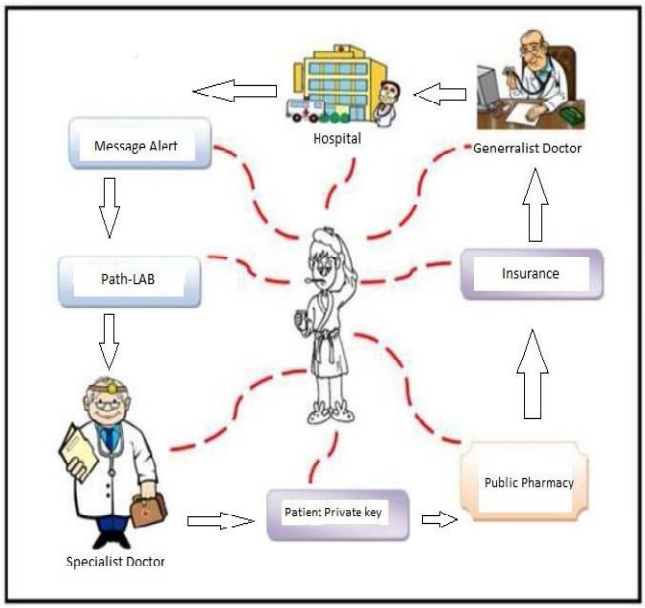

Figure 1: Global flow of the system

In this paper, we proposed a framework for mobile health care applications which works over heterogeneous networks. We proposed to include session establishment and mobility management functions of the communication stack into a middle ware host. Now days, Simple Object Access Protocol (SOAP) is used for generous applications [9], [14].

Further work on the prototype could be done to test discovery of usable data ports when mobile clients are behind NATs and firewalls. This application works under CDMA network and support for wireless Internet based for interoperability (WIPI).Also, a quantitative assessment of variations in delay and jitters of different networks and their effects on patient monitoring application demands to be completed entirely [3].

This paper serves as how particular mobile client users can approach data from mobile server and network server over cyberspace. To approach a web app functioning on a mobile phone, well rigged with a basic driver SIM, from several portal on the cyberspace, at any time customer may capture evidence from mobile and can send information to the web [5]. On other hand by connecting on vigorous website on-line user can connect to the mobile server operates the features of mobile from Internet via web appliance. Establish mobile system for a reticular mobile operating structure like symbian or windows operating system. An installment of an appropriate client/server application on mobile can be done. The approach of client/server 3-Tier architecture is used i.e. user front end with field logic and database [7].

The primary target is to transformation of the information from mobile to web server. Mobile server access the information from web server for mobile clients to perform certain operations. Different users can log in simultaneously for performing the task on mobile [4]. Simultaneously, applications are made uncomplicated by offloading the session establishment and mobility management functionality. A laboratory design using this idea for real-time patient monitoring application was developed. Their outcome accepted the benefits of the architecture and verified that the continuity of sessions could be maintained across heterogeneous network handover with reduced data losses than the current architecture. The flaw of this framework design was variations in delay and jitters of different networks and their effects on patient monitoring application in acute situations [5].

Formal health screening duties are not very unusual event for the general people. Before catching health screening, we generally fill up a paper-based pattern describing health condition and life-style, which is easygoing of “question answer” section in general. A problem of the current health screening is that, when patients fill out the screening form, they usually rely on their memory and experience. Therefore, the filled form tends to be biased to the subjective point of view. In addition, the form is dependent on the specific medical institutions and is not interchangeable between other institutions. Therefore, we need a novel screening form providing interchangeable data structure and objective info as possible. As a result of the dilemma, we are making a digital health screening solution form [1-2]. Ongoing version of the form spotlight on lifestyle information and vital index of a user and provides a link of medical treatment information to a health portal. It implements the digital health screening portal form, we allow for two primary attention points. Initially, we are tried to collect a variety of info as possible from the user. Secondly, we are attempting to deliver gathered data effectively. The major drawback of this application was the security for achieving the data [6].

In this paper, we have presented architecture and an initial model developed for a quick notification service that offers a collaborated operation between a client terminal and a server system. This research paper may subsidize to solution implementation requiring notification functionality in a personal care based on a mobile terminal. To cooperate with standard of a health industry, we all need more deliberation about stocked data in the health portal. We also need further study for the terminal software platform how to collaborate with open health care framework in the future [7], [12].

3. Proposed Work

This application is implemented by dividing it into several modules as shown in the bellow figure 2. PDA interacts with each other through each fence present in cloud. Several categories are expanded according to the structure of the system. Independent task are perform as given module prefer in given system.

3.1 User Authentication

The user will be provided a unique user name and password each time when logged. Aforementioned memo are present with particular users. The authentication method is work for only once and life time and it will assign to the each user.

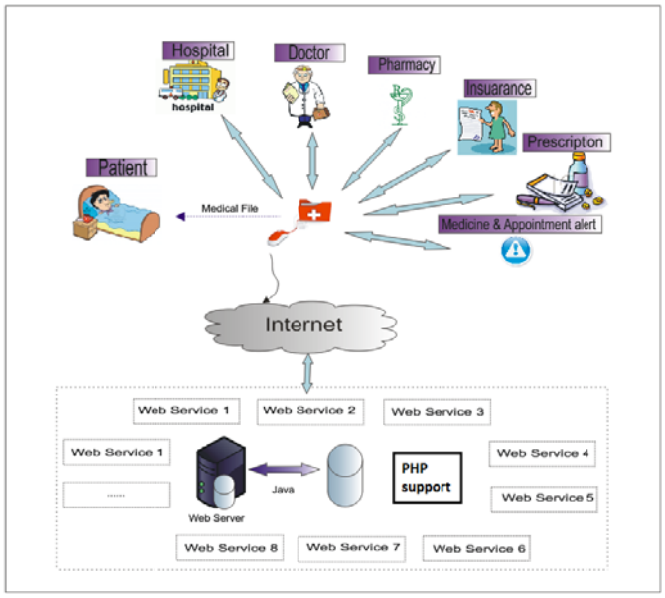

Figure 2: System architecture

3.2 Doctor Accessibility

Doctor can send and receive some information related to patient. The information is present on web server over Internet and doctor access specific patient information as per ID and generates or pre-modified report as per prescription and communicates through gadget.

3.3 Patient Accessibility

Patient can access information related to medicine, insurance policy and communicate with the doctor via mobile application. Required information is allocated as per the restriction level to the each patient.

3.4 Medical Prescription

The medical prescription will be provided to patient by the respective doctor and simultaneously can be saved into medical database of the patient. The prescription data shares only in between patients and doctors and send it to the pharmacist for hand over the medicine to the patient.

3.5 Alert Mechanism

This allows you to keep update regarding appointment with doctor, prescription alert and message regarding insurance policies with the actuary. This module of the application gives flexibility to allow patients and doctors to play their respective role with specified requirement. Alert mechanism is work by using several appliances such as mobile devices, client care server with GSM/GPRS modules [13].

4. System Evaluation

4.1 Mathematical Module

H= {Pt U D U Pr U Ia}
Where, H=M-Health App
Pt=Patient
Pr=Druggist
Ia= Insurance agent
D=Doctor

Table 1: Notation with explanation

Notations	*Description*
Ci	Consumer ith want to log in
IDi	Identity of consumer Ci
PWi	Password of consumer Ci
A	Access node
IDa	Access ID
X and Y	Access secrets
Ekey[]	Symmetric encryption with shared key
Dkey[]	Symmetric decryption with shared key
B	Consumer's generated nonce
H(.)	1-way cryptographic hash function
(+)	XOR function
||	Concatenation function

4.1.1 **Register Phase**

In this stage, the user (consumer) primarily needs to register with the access node.

1. Consumer takes *IDi* & *PWi* and submits to the *A* node via protected channel.
2. upon getting consumer's *IDi* & *PWi*, the *A* node computes follow:
   a. C= EX [(IDi||IDa)]
   b. Ni= h (IDi (+) *PWi* (+) *Y)*

Later, the *A* node issues an distinctive ID to the consumer with constraint *{h(.), C, Ni, Y}*. At this point, *Y* is a long-term *A* secret that is securely stored in database. Each time the node *A* is assign in database for new entry.

4.1.2 Log In & Authentication Phase

This stage is call down when the doctor roam into patients ward & wants to access the patient's information. The doctor checks this on his/her android device. Upon receiving the log in request app will do the consumer's local verification with prestored values & execute procedure, as below:

i. Ni*=h (IDi (+) PWi (+) Y)
ii. Compare: Ni*=Ni
iii. Calculate: h (IDi) and CIDi=EK [h (IDi) ||B||Sn)]
iv. Create message <CIDi, C, and T> & sends to a node.

At this point, B is randomly generated by doctor's system & used to establish the secure session key [11].

4.2 JSON Parsing

JSON (Java Script Object Notation) is a lightweight data-interchange composition. It is effortless for individuals to read and write. It is smooth for machines to resolve and generate. It is part of a subdivision of the JavaScript Programming Language, ECMA-262 with 3rd publication Standard in December 1999. JSON is a context format that is absolutely language independent but uses conventions that are familiar to programmers of the C-family of languages, including JavaScript, C, python C++, Perl and bountiful others. These characteristics make JSON an ideal data-interchange language [7], [18].

4.3 Random Generation Algorithm

Random numbers are useful for variation purposes, such as developing data encryption keys, resembling and modeling complex structure and for selecting random samples from vast input sets. When dealing with single number, a random number is peaked from a set of desirable values, each value is equally possible number, i.e., an ordered distribution. While discussing a sequence of irregular numbers, each number drawn must be numerically independent of the other random numbers. With the arrival of computer server, programmers perceived the urgency for a means of introducing randomness into a computer code. However, it may seem surprising as it look; it is difficult to get a computer to plagiarize object number by chance. A computer pursues its information blindly and is therefore absolutely unpredictable. There are two fundamental paths to generating random numbers using a computer: True Random Number Generators (TRNGs) and Pseudo-Random Number Generators (PRNGs). The approaches have quite different characteristics and each has its pros and cons [10].

4.4 Gentry FHE scheme

This technique is used for data transmission by using homomorphic secret scripting over network. It is used to distribute the storage protocol while data transmission via web services. Fully Homomorphic Encryption (FHE) provides the security and privacy during data transmission that executes the application on each mobile device for every user. It prevents data on cloud for long period. For Android, Google is one of the cloud computing resources for effective data transmission and this technique is being implemented in last year. There are mainly three phases are introduce for data transmission such as Acquisition, Storage and Computation [15], [16].

5. Implementation

The following compartments are implemented efficiently and elaborated as follows

5.1 User Authentication

Client side:

At the client side special user authentication is applied. It involves log in screen for patient in application. For this principle, standard graphical interface (GUI) is implemented as Text box, Drop down list and Button with input field. The button performs action upon text field with input parameter enter into the database server over internet.

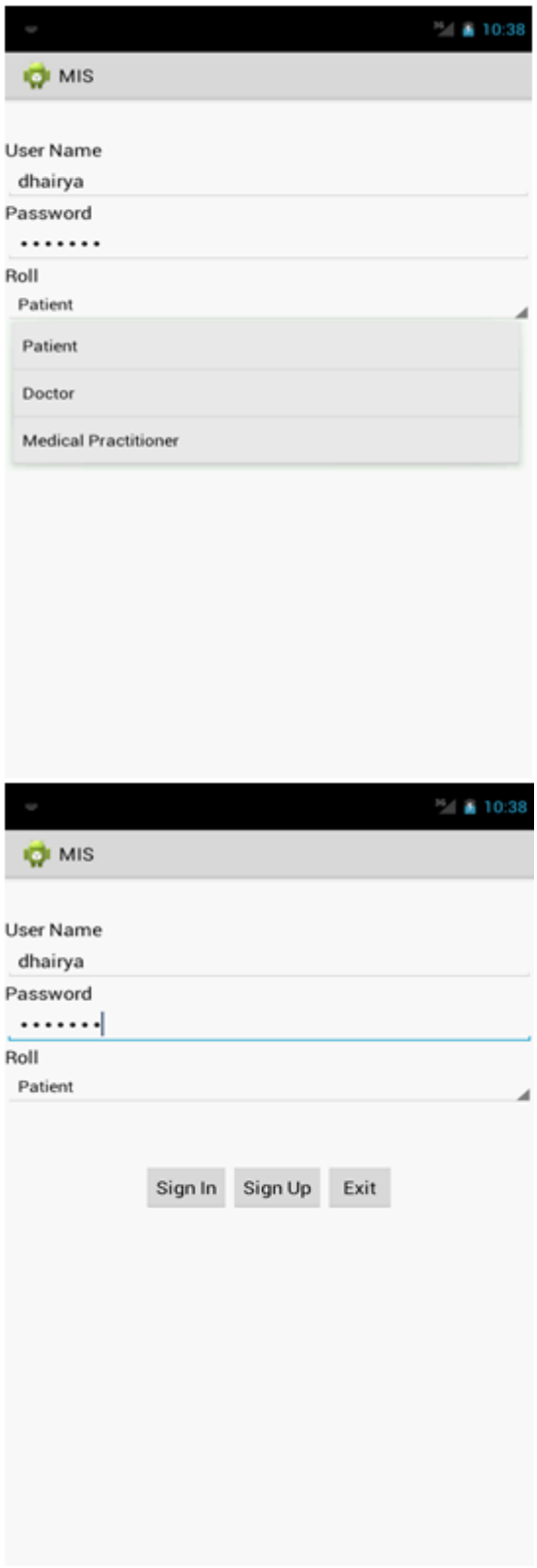

Figure 3: Client side log in screen with Authentication

Server side:

When the doctor runs the application for the first time, a login GUI is prompt to the doctor with user name and

password for pattern recognition for doctor and then final password is assign to the doctor with initial integrity. This aids the doctor and patient to keep track of the records of the respective database. Since the database for medicine is convenient, medicine alarm can also be easily provoke.

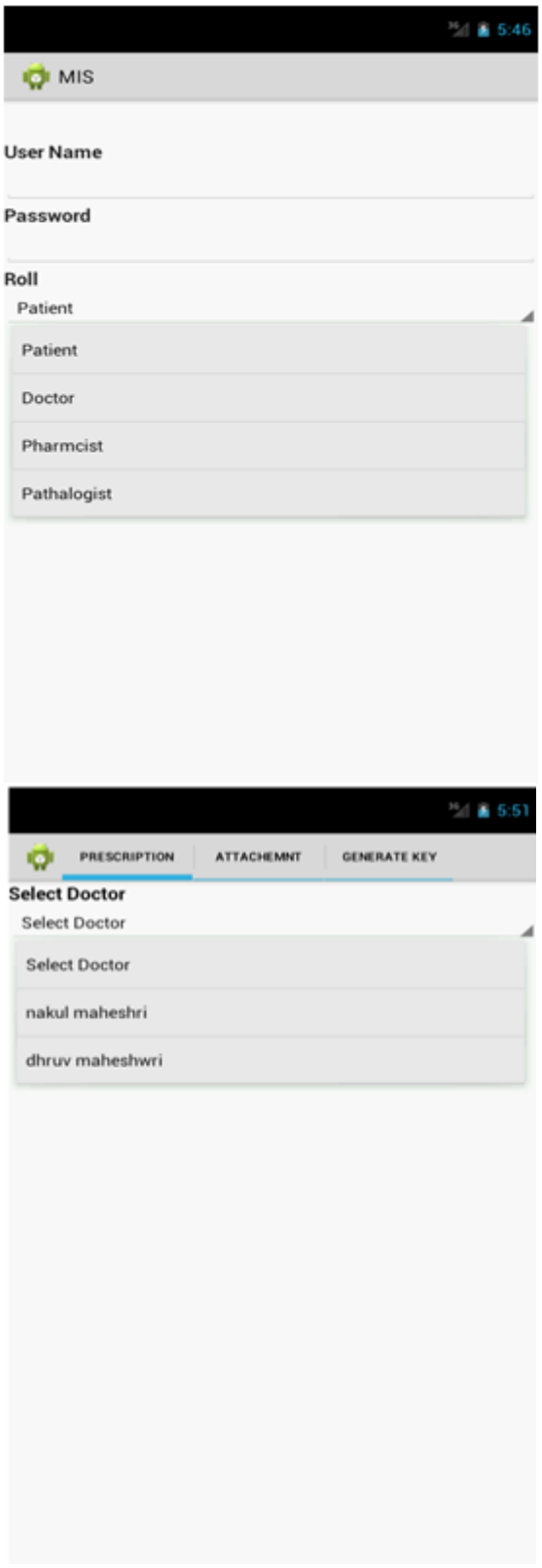

Figure 4: Server side screen with prescription details

5.2 Patient Accessibility

The patient only needs to do the registration for the member of the "Health-Dr." application. In registration procedure, the user is mandatory to fill small but required information on the fence of application screen. After completion of the registration form random key is generated for active user and this key is with user for life time until user want to update it. The key is validation for each user in the organization.

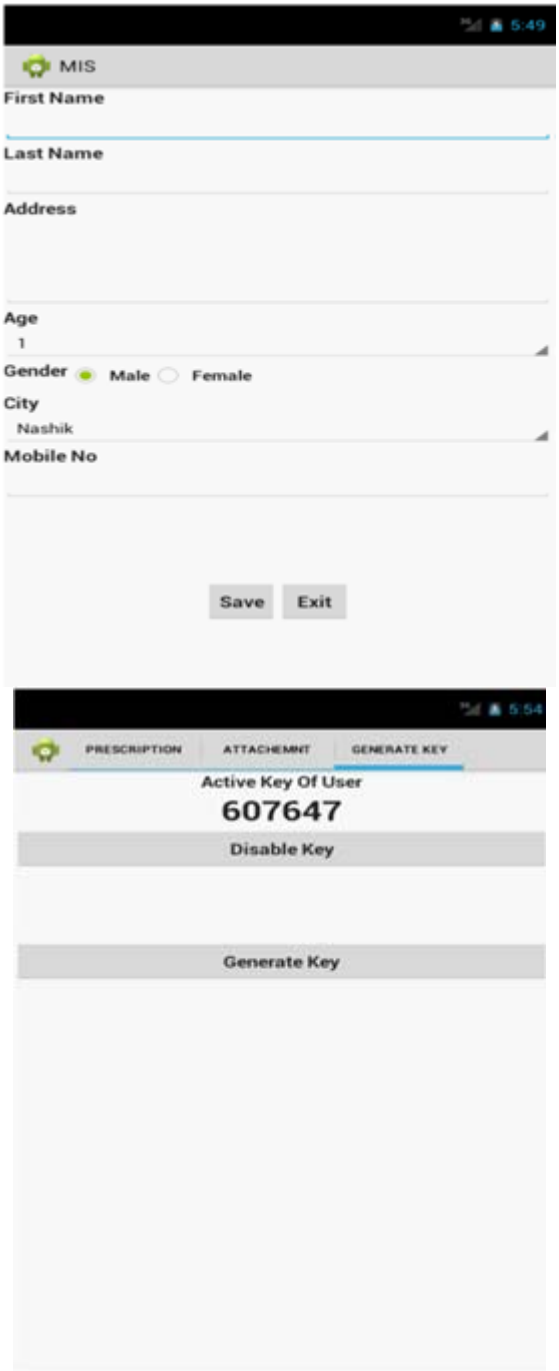

Figure 5: Patient registration task

5.3 Doctor Accessibility

Doctor information is already present in the database and with running application. By selecting his own identity present in the database doctor can allocate prescription schedule with respective patient and assign appointment alert. This list consists of the doctors which are registered and are authorized to use this application. This helps to minimize the chances of fake or unauthorized doctors to

prescribe medicines through this application, hence providing a secure medium between doctor and patient.

5.4 Medical Prescription

This module consists of digital prescription which is generated by doctor when the respective patient is consulted by the doctor. The prescription is then simultaneously sent to the pharmacist where the patient can get the prescribed medicines. This helps the doctor and patient to keep the record of the medicines prescribed till date.

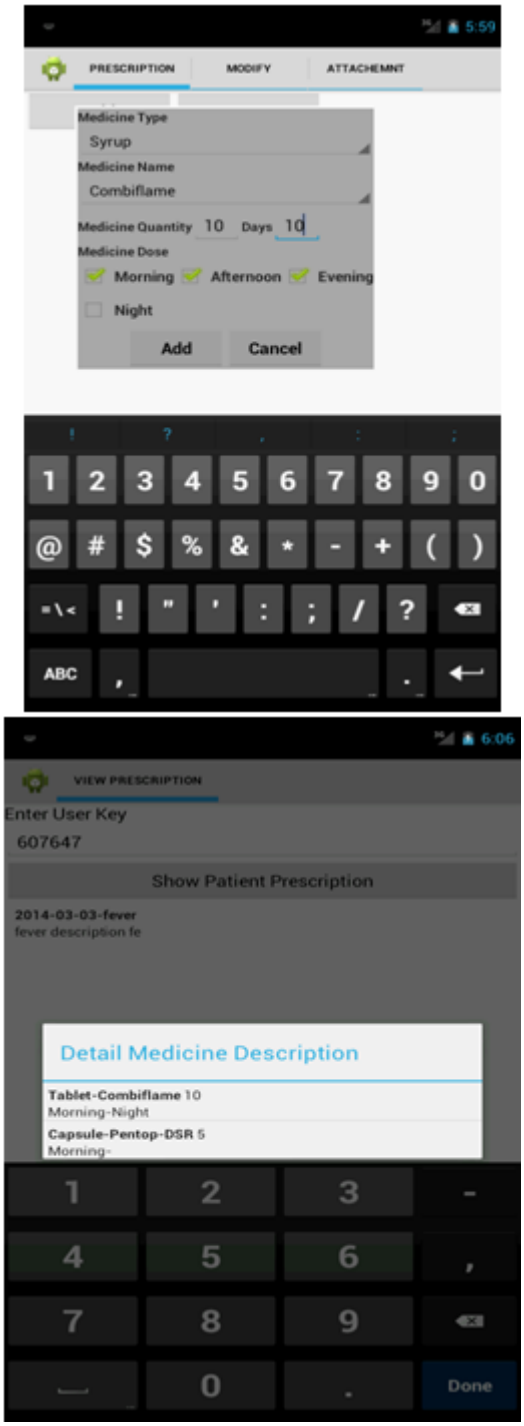

Figure 7: Prescription Mechanism

5.4 Alert Mechanism

This module is used as a reminder for the patient i.e reminder regarding the timings when the patient has to take his medicines, when the medicines are about to get over and when the next appointment is being scheduled.

Figure 8: Alert Mechanism

6. Future Scope

Now days this application is available only on single platform i.e. Android, in future we'll try to cover the all available platforms such as Apple iOS, Windows phone, Sailfish OS, Blackberry, Firefox OS. With various upcoming technologies we will try to make it feasible over the cloud to

fast data communication. As per new algorithm will have invented the version of this application will be appear and up to date on the next level.

On the beginning level, this application is paid one because of the maintenances and services. To make it world wide as per scope we will make it freeware. This application is made for local system i.e. for single organization; later on we will give the global exposure to the application with centralized management system.

7. Conclusion

By using this application, we are proposing a unique idea which is suitable for doctors, patients, insurance agents and pharmacist. This application will provide vital connection between patient and doctor via pop up alerts using short messaging services channels and e-mails. Thus, it provides a user-friendly interface in critical situation at ubiquitous scenario with any condition.

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