International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169
Volume: 6 Issue: 4 307 - 310

E-Healthcare Android Application based On Cloud Computing

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Abstract— The Online Healthcare System can be enhanced significantly by including most recent Information technology. The use of smartphones is increasing every day and is available with the people spread across different demographics. People can access health records online by just one click. This paper proposes a model of designing flexible e-healthcare management system based on Cloud Computing. The elastic nature of cloud permits infinite number of users to access the cloud simultaneously without any limitations. The Healthcare System is implemented in two interfaces: the patient interface and the doctor interface. The patient's interface allows patients to create, manage, control and share their health information with respective doctors. Finally, the system proposed is efficient as it improves cost management, time, storing patients profile, and provides security to patient's medical records, book appointments and consult the right doctor online.

Keywords—*Application Development; Realtime Data Storage; Cloud computing.*

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I. INTRODUCTION

In Recent years, Healthcare information systems have changed dramatically and a lot of healthcare data have been accumulated. Sharing these healthcare data among different doctors can bring in significant benefits for both medical treatment and maintaining patient's history. The efficiency with which doctors interact with patients could be greatly improved and the cost could be reduced by using and sharing electronic healthcare data. [1] Cloud computing can also be made applicable for administrative tasks of a healthcare. Patient admission, scheduling, monitoring and diagnosing are performed remotely. [8]

The goal of the E-Healthcare system is to switch to electronic health records from the traditional files of health records using the power of cloud computing. It also aims at providing system which is efficient and takes up less computational time by storing images and prescriptions in compressed form and provide security for the documents stored on the cloud. Computational time is being reduced by using android image compression library for storing compressed patient prescription images. Patients can share their records with doctors via Android Application and they can easily get information regarding patient's health history and doctors can give emergency suggestions if needed. Health Records are stored in a third-party cloud service provider such as Google's Firebase.

The widely usage and sharing of healthcare data have bring in many concerns, the most concerned issue being privacy violations. [2] Use of Firebase Authentication Services are being suggested to provide security and privacy for the system proposed.

II. BACKGROUND AND EXISTING SYSTEMS

Some projects are being funded by governments all over the world for improving healthcare services. Currently, the cloud technology has evolved to provide solutions for healthcare organizations for achieving a balance between improving operations and low-cost IT applications.

Current systems use cloud-based technology to store data of patients only. However, it is implemented at hospital level only. Each hospital uses this system to store data of it's patients only and reports of patients which were made in that particular hospital. There is no global data of all patients and doctors in one system. [3][4]

Also, there are no applications which connect the doctor and patients using a communication network between them which is combined with the storage of data. There are some applications where the doctor can consult the patient based on the symptoms but those applications charges are very high.

 ISSN: 2321-8169
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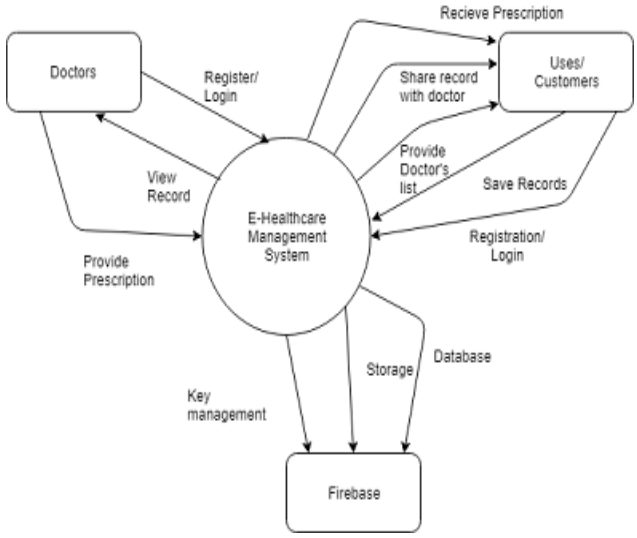
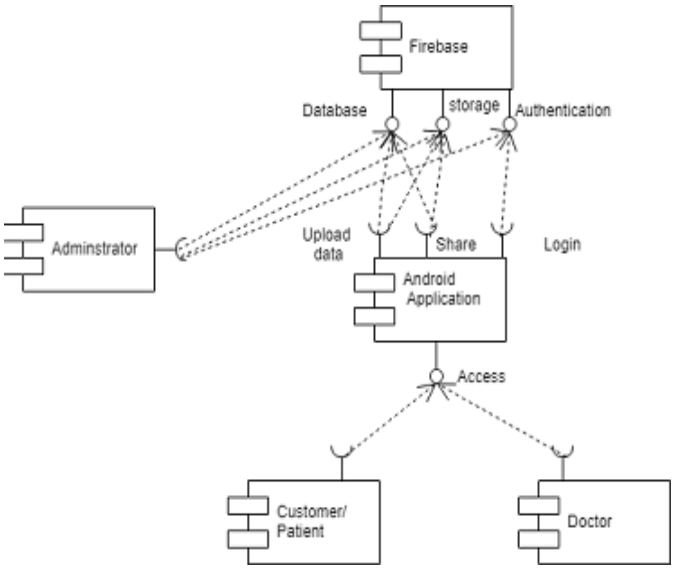
III. PROPOSED SYSTEM ARCHITECTURE

Figure 1 shows the proposed E-healthcare cloud-based system. The system connects patients and doctors via cloud-based server for accessing database through Android Application.
The patients have an access to Android Application with Strong UI which allows them to register to the system and get authenticated using Firebase Authentication after which they can request a list of Doctors and can send request to doctor for consultation. Doctors receive requests from patients and they can either accept or reject the request. If accepted, communication takes place between the doctor and the patient which includes documents sharing and messages. The cloud server is clarified which manages the database through Google's Firebase Realtime Database and stores patient's documents and prescriptions using Firebase Storage Systems.



1. Proposed E-health management system



2. Component level diagram for proposed system

Doctors and Patients login into the Android Application. Using firebase, Users are authenticated and patient's vital documents and prescriptions are stored using Firebase Storage services.

After login, the patient gets a list of doctors which are available in that area. The patient can send a request to the doctor and that request goes in the firebase database through which the doctor receives the request. The doctor has an option to accept or decline the request. If the doctor accepts the request, data of patient and doctor are added in the connected user's database. However, if the doctor rejects the request, the request sent from the patient is deleted and the patient again gets an option to send a connect request to the respective doctor.

User's Module (Patient): -

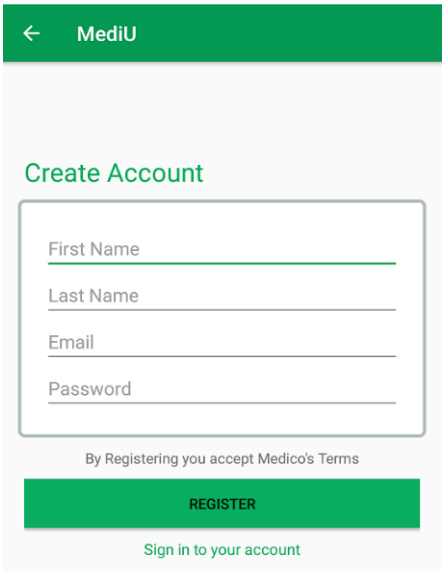
- View appointment list and status with doctors
- View prescription details
- View health feed from doctor
- View doctor list
- Chat with Doctor
- View operation history
- Manage own profile
- Locate Doctor

User's Module(Doctor): -

- Create, manage appointment with patient
- View Patient history.
- Create prescription for patient
- Provide medication for patients
- Manage own profile
- Post Health Feed

IV. IMPLEMENTATION OF THE PROPOSED SYSTEM

The proposed system can be schematically shown as below:

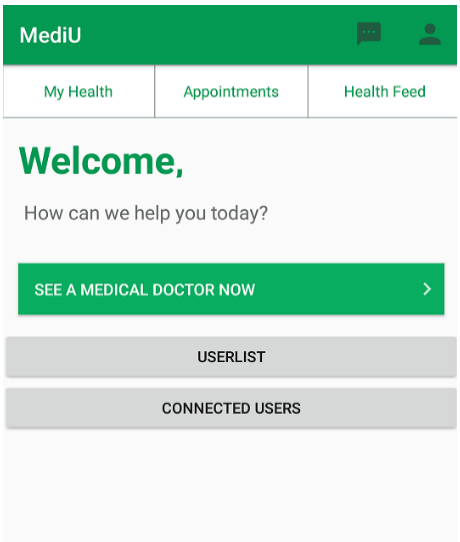


3. Registration page

When the patient/doctor (additional details are required for doctor login such as their registration number and documents /certificates claiming their identity) login after authentication of username and password, they can view the main page of e-health management system as shown in Figure 4.

4. Patient Home page

The User List consists of the List of the various doctor to



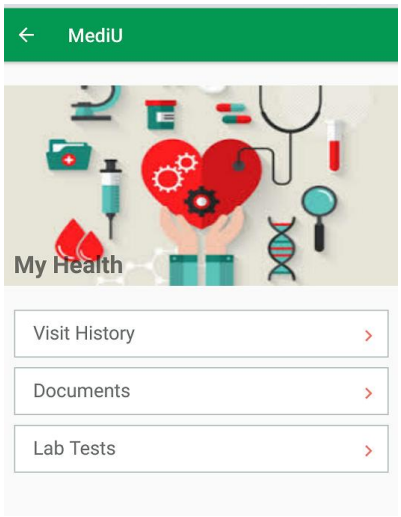
whom the patients can send request.

Connected Users show all the Doctors (accepted patients request) to which patient is connected and can use chat system to contact them 24/7. Doctors can send prescriptions to patients via Chat system during emergency cases. Also, there is a Health Feed where doctors can post useful articles regarding health and patients can read them.

There is a My Health page which consists of Patients Health reports which are stored on cloud using Firebase Storage. These reports can be viewed, shared (with doctors), downloaded by patients. Firebase Realtime database is used to store and update patient/doctor profile. Patients can store Medical History of their family members too.

The patients can keep track of their scheduled appointments via Android App. When the patient clicks on Add Appointment it can add a reminder on Google Calendar (Using Open APIs which allows access to Google Calendar) and can even use location-based search to locate nearby doctors. Also, Patient reviews provided for doctor help other patients using the Application make the right doctor decision. Notifications sent to the users regarding their scheduled appointments are implemented using Firebase Cloud Messaging.

5. Patient MyHealth Page



V. CONCLUSION

This paper presents a design of e-Healthcare managementbased on Cloud computing, all the patient information is stored on Firebase Database. The proposed system is based on cloud services. With this concept there will be an improved efficiency in exchange of health reports and at the same time reducing Healthcare costs. Also, it increases quality of care. This system helps to organize records like prescription and reports such as X-ray results in cloud. In addition, it eliminates maintaining separate records. In Future works, this app can be incorporated with the third-party services like GPS, map and be even used to connect patients to NGOs to avail easy loan facility. Also, it can be used to connect patients to pharmacies and order medicines online.

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