

Developing Secure Social Healthcare System over the Cloud

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Abstract: *Healthcare application is a social media application which is developed over the cloud. Now a day we hear two cutting edge technologies most social media and cloud computing. Developing and maintaining a healthcare system with self infrastructure well cost more. Many small hospitals save hard copies of patient's records. This healthcare application will provide web service which is developed over the cloud so it well reduces the cost and they need not be worried about infrastructure. Cloud providers well provide up to date software so, software well be up to date. Since data is present in the cloud most of them worry about security. By using role based access control healthcare system is secured.*

Keywords: Cloud computing, IaaS, PaaS, SaaS.

1. Introduction

When you submit your paper print it in two-column format, including figures and tables. In addition, designate one author as the "corresponding author". This is the author to whom proofs of the paper will be sent. Proofs are sent to the corresponding author only.

Day by day health issues and health problem concerns are increasing. So many people are facing health problems and are getting admitted in to the health care centers. So to maintain the details of all the patients in a hospital is a difficult task. Hospitals have to maintain the records of each and every inpatient. In some cases patients may even have to wait for long time to consult the doctor. Also in the existing scenario if the concerned doctor is not available in the hospital then the nurses have to call him and ask the related queries according to the inpatients condition. Our proposed system is a web based hospital management system by using cloud computing. In our proposed system, nurses will send the records about the inpatients condition in each hour and doctor will check the details and gives prescription according to the patient condition. In any emergency situation a mail will be send to the concerned doctor. Since we are using cloud computing there is no need for the hospitals to maintain their own large databases. Respective doctor when logs into his profile can view the details of all patients under his specialization where the patients are categorized based on disease and can post suggestions according to patient condition.

With the help of this system, other doctors and nurses who are concerned of a particular patient will come to know about all patient details. In any emergency situations nurse has to call the concerned doctor and inform about the inpatients condition. If the same information has to be passed to so many doctors it will be a tedious task. In case of any system failure it is difficult to get back the data. In order to overcome the above difficulty we use a centralized cloud server for storing and retrieving of large amount of data.

Cloud computing is delivered as a service than as a product, by which the shared resources, software's and the information's are made available to the computers and also for other devices as a utility over a particular network. To maintain application and data in central remote servers we use cloud computing with the help of internet. Without installation consumers and businesses use application in cloud computing. By using this we can make available a centralized storage of data, security, easy maintenance of data, etc to our data.

The Cloud computing is frequently used as a service across the internet in the form of SaaS, IaaS, PaaS. Cloud computing customers have to pay only for what they are using. By using mobile app or basic desktop or web browser an end user can access cloud computing services from a remote place. Some cloud computing providers are Amazon web services, Microsoft, Rock space, VMware, IBM etc. To data stored in the cloud we can provide security measures. So we can access data fast and data will be secure. Since we

are using cloud computing the entire data is stored in cloud so there will be low system maintenance cost and high performance.

2. Literature Review

Many web applications and web services are present related to healthcare. To maintain all the patient records is a tedious task. Hospitals have to maintain each and every patient record. And if the concerned doctor is not available in the hospital then the nurse has to call the doctor and ask for related queries according to the patient's condition. But in cloud based health monitoring system nurses will update patient's information every hour to doctor through mail [14].

The medical call center is a interface between medical staffs, telehealth is the delivery of personal or group health-related services and information via telecommunications technologies[14]. This model is responsible for providing 24-hour health services for large amount of patients, receiving the increased amount of biometric data and interpret them, safely preserving the important private data for the customers.

Emergency medical system accesses health records of patients and provide medical information in case of emergency. There are three different groups of users in the EMS: i) Ambulance Paramedics who have access to data regarding paramedic activities occurred at an incident site, they can read and write data. ii) Emergency department physicians who have access to their respective authorized portions of medical data and physicians can use the data to evaluate medical history, patient allergies and other critical health factors; iii) Nurses who can access their authorized portion of the data and make available the required medication to the patients[1].

DICOM-based system is based on Digital Imaging and Communications in Medicine to deal with the huge amount of diagnostic imaging procedure and medical images. Health care industry struggles with growing long-term cost of managing an onsite medical imaging archive has been a subject struggling with. Digital Imaging and Communications in Medicine (DICOM) is included in Microsoft Windows Azure server which handles standard store/query/retrieve requests. A DICOM image indexer that parses the metadata and store them in a SQL Azure database, and a web UI for searching and viewing archived images based on image and patient attributes [4]. DICOM consists of three major components: DICOM server, DICOM file indexer, and Web User Interface. A user can browse, search and upload images via the Web User Interface. The DICOM file indexer parses the header of DICOM image files as they are uploaded from the user through the Web User Interface or DICOM server [4].

HealthATM are developed for patients to manage their own personal health data. Google's cloud computing environment is integrates services with healthATM. It provides timely access to patients' relevant health data to patients and improves patients' communication with their care providers. Individuals can review personal account information and

make transactions to manage their health care online. Particularly for patients who need to monitors there health on a daily basis this functionality is helpful.

3. Our Approach

In our approach we present our social healthcare networking over the cloud's system architecture and also access control technique. Fig.1 shows system architecture how peers communicate with the other peers via a connection to a secure server located in the cloud. We call it as Husky Healthcare Social Cloud.

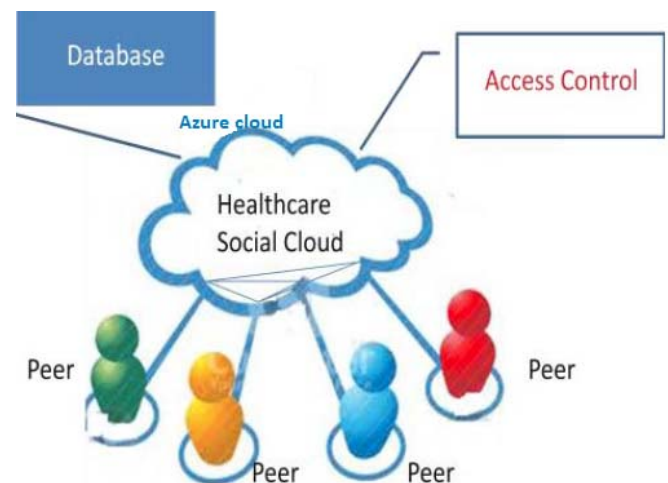


Figure 1: Architecture of Husky Healthcare Social Cloud

There are many types of access control techniques, Role-based Access Control, Discretionary Access Control, and Mandatory Access Control. Out of these three in web applications, role-based access control has been regularly used form of access control [10]. In the healthcare industry, as different organizations including clinics, pharmacies, hospitals, and insurance companies access the system, the information related must only be provided to the authorized users. Cloud-based healthcare application must have data access control in order to ensure that data is secured while using the services efficiency and cost effectiveness of the cloud.

4. Prototype Implementation

Figure 2 shows diagram of three different users with different actions, not all actions are same. Each user has different actions based on their role. Patient can take appointment by selecting doctor type and specific doctor in that department. Any patient or user can enter Queries after that they well get replay by email or by phone.

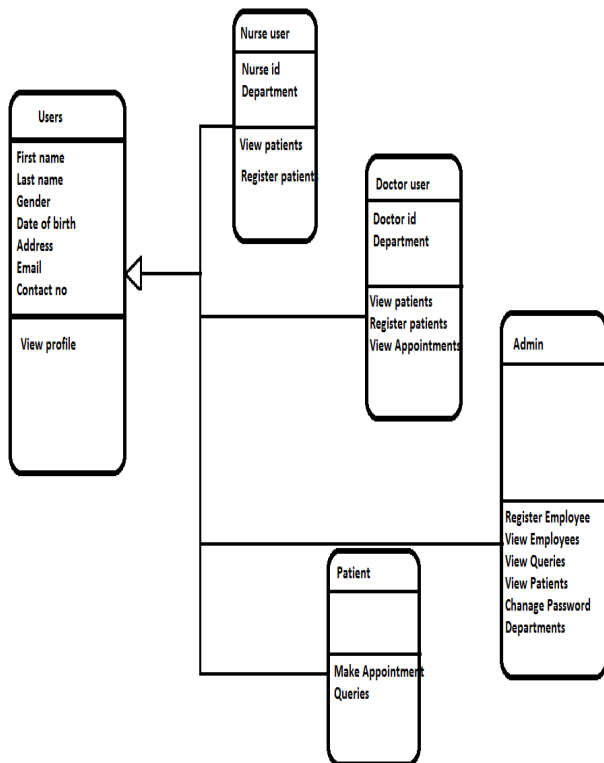


Figure 2: Actions with role

As shown in fig:3 not all users have same functionalities Patient can make appointment and enter his/her queries. Nurses have different actions, they can view there profile, they can register patients and view patients in ther department. Every nurse is identified by there nurse id. And nurses can access patient information only from there department patients.

Every Doctors have a unique doctor id and doctors are divided by there department.doctors can

- View there profile.
- View patients information who are treated by them, and they can view and edit prescription of those patients.
- They can register patients under his.
- They can view patients appointment.
- Admin user have different accctions. Admin can
- Register employes such as, doctor, nurse or another admin.
- He can view of all employe details in that hospital.
- He can view queries which are entered by different users.
- He can view registered patients details.
- He can change the password of different useres on behalf of there request.
- He can view different departments in that hospital.

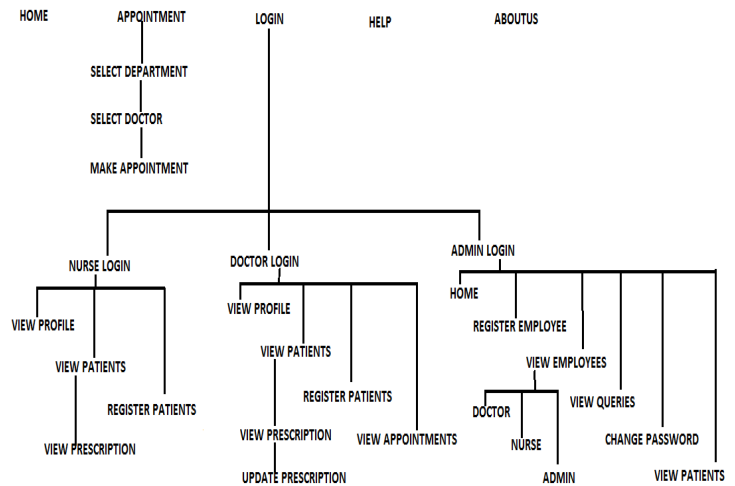


Figure 3: Workflow diagram

Figure 3 shows workflow of the system. In each user login what information he can access is shown in this workflow diagram.in appointment page patient can make appointment by selecting department that he want. And selecting doctors in that department then patient can make a appointment by entering his details.

Figure 4 shows Pseudo code for user access permissions when user logins. Code verifies that logged in user have permissions if the user don't have permissions user is redirected to home page. This code verifies if the user is logged in logged out, if the user is logged out he is redirected to home page.

```

if (Session["userId"] == null ||
Session["userId"].ToString() == "" )
{
    Response.Redirect("Home_Page.aspx")
}
Else
{
    userId = Session["userId"].ToString();
    if (Session["Role"].ToString() == "DOCTOR")
    {
        ((Label)Master.FindControl("lblWelcome")).Text
        = "Welcome " + Session["FName"].ToString() + "
        " + Session["LName"].ToString();
        ((HyperLink)Master.FindControl("lnkViewAppointm
        ents")).Visible = true; loadProfile();
    }
}
    
```

```

else if (Session["Role"].ToString() ==
"NURSE")
{
((Label)Master.FindControl("lblWelcome")
).Text = "Welcome " +
Session["FName"].ToString() + " " +
Session["LName"].ToString();

((HyperLink)Master.FindControl("lnkViewA
ppointments")).Visible =
false;loadProfile();
}
else if (Session["Role"].ToString()
== "ADMIN")
{
Response.Redirect("AdminHome_Page.aspx")
;
}
else
{
Response.Redirect("Home_Page.aspx");
}
}
}

```

Figure 4: Pseudo code for user access

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5. Conclusion

A cloud based social healthcare system is developed. In this system in patients get the good services. Nurses can send the records about the inpatients condition to doctors and doctors can view this and gives prescription according to inpatients condition. Nurses can access the inpatient's health history and the types of medicines which are already prescribed to a particular patient by the concerned doctor. Also in any emergency situations nurses can mail and inform doctors about the patient's condition. We can provide security to data that is stored in the cloud database. Since we use cloud computing the entire data is stored in cloud. It leads to low system maintenance cost and also high performance.

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