WEB Based e-Health System and Services

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ABSTRACT: In today's day to day life everything around us is going for digitization. We have tried to minimize the real-world problem with the help of Web Application domains. The Electronic Health Records provides health care centres and organizations the possibility to improve the management of their patient's health data. Most of the healthcare software development organizations work in island mode which leads to complications with regard to correctness and interoperability among different healthcare systems. Interoperability is the way in which different subsystems access and use the data reliably and quickly from various sources without the occurrence of errors. The interoperability among the healthcare information systems enables these systems to communicate with each other in order to share information, improving its high availability. Healthcare information systems lack standardization, so sharing and integrating information in such systems is quite difficult. Consequently, providing suitable healthcare services is complicated due to the diversity, transparency, heterogeneity, spreading out over multiple locations, and complexity of these healthcare systems. Our proposed system eliminates the consequences and provides optimized healthcare system.

I. INTRODUCTION

The Healthcare System in India doesn't provide complete Transparency, Interoperability and Generalized Services to their Patients, Doctors and Hospitals for efficient management and continuous interaction. We are proposing the solution which will let the healthcare system be more useful and effective among all users. The main goal of our systems is efficient interaction among all users. Valid users are provided with the information they require for their functions without rigid access restrictions.

The systems intend to increase consumer trust by implementing appropriate use and accountability measures. This System provides various features to the user of the system and the Hospital. In case of emergency, the system finds the optimal route for the nearby hospital and blood bank. The system will give nearest route and detail about facilities of a specific hospital so that user has the prior knowledge of the hospital. The system will also maintain health record which store data on cloud and prescription given to the user for hospitals perspective, the system will provide all health related information of patients with prescription to the hospital as a carrier of emergency and healthcare management system. Whenever any new information is updated or any notification has arrived it is automatically synchronized keeping up to date for all users.

Web services provide method of communicating between different software applications running on different platforms and/or frameworks. Unlike traditional Client/Server models, Web services use HTTP/HTTPS as the communication protocol which allows messages interchange. Web services do not provide users with graphical user interface. However, programmer can add Web services into their Web page and provide users with interface which contains the functionalities of the Web services. The website provides latest information and exchange among all users. The patient information is stored on public cloud allowing them to access their data, anytime and anywhere. The central administrator is provided whether it is organization or central authority (govt.) all the management role. The doctor, patient, hospital and laboratory interact with each other forming complete system and management.

II. RELATED WORK

The recent trends and innovations have made us think, why we are unable to have complete digitization in healthcare system. The manual work should be avoided as much as possible. The author [1] proposes an Emergency Medical System (EMS) which is very important approach to emergency medical treatment in medical emergency. In

case of any medical emergency it is necessary that person must know about nearest hospitals for emergency medical treatment. Many of times people are in the unknown area. If they are not able to find hospital quickly then it will be danger for patient. In emergency case a single minute counts, so it is very important that automatic applications must be used for decision making, maintain up to date status of the hospital. Saving the time will lead to save life of the patient. When the doctor or family receives the message, they can immediately take measures to rescue the user. It can also manage the health record of the user. The user can use online website to send their physical condition and then get prescription from doctor who will send the prescription on the user's phone.

The author [2] proposes about cloud computing functionality for managing information data in a distributed and ubiquitous manner supporting several platforms, systems and applications. This work presents the implementation of a mobile system that enables electronic healthcare data storage, update and retrieval using cloud computing. Computing provides the facility to access shared resources and common infrastructure in a ubiquitous and pervasive manner, offering services on demand over the network to perform operations that meet changing needs in electronic healthcare application. In this context health cloud has been developed a pervasive healthcare information management system for mobile devices utilizing cloud computing and android operating system.

The author [4] has proposed about healthcare system in Taiwan. People who live and work in mountainous areas, tourists often visit these areas during the weekend and holidays. People have experienced injury or sudden health conditions in mountainous areas however, because of inconvenient transport or traffic controls, some of the injured people could not reach hospitals promptly, eventually dying. To reduce the time required for people in rural areas to reach emergency care services and prevent the above tragedies, an "Emergency Medical Service Support System for Patients in Rural Areas" was developed. This system is aimed to support the current emergency and rescue command center. During emergency in rural areas, the command center can authorize nearby vehicles with the rights to perform as an ambulance to transport emergency patients to hospitals promptly.

The author [5] [6] prevents treatment delays caused by waiting for an ambulance to arrive from a distant location. As Nearby vehicle can be used for patient transportation but they cannot have fully optimized medical equipments which might be required at the emergency site. The mobile device can have connectivity issue causing delay in patient treatment. Also mobile device comprises of limited battery, screen, and due to high load application might crash and may not work properly. The limitations are solved in the system.

III. PROPOSED ALGORITHM

The below figure explains the user interfaces of architecture and its availability as efficient e-health System. The Patient, Doctor and Hospital interlinked communication is explained. For nearby searching of hospitals and blood bank, A* algorithm is used and the users data are stored on cloud comprising of multiple databases. The integrity and interoperability among data is allowed with for authenticated users. All the data can be review, add and alter by the central administrator. The users are initially validated with their e-mail/sms then only they are allowed to access the system. Patient is provided with all recent updates and medical notifications.

The medical reports are stored allowing doctor to access them without any issues. In the beginning users are provided with limited storage space for storing their information and after that central authority have their own policy for allowing how much space and other requirement for storage. The forum is also provided which will let all users to communicate with each other. The Patient, doctor and hospital interaction is explained with interoperability and transparency. The user can search, view and update their information's.

The cloud service used will be having multiple cloud storage databases from where patients, doctor information can be retrieved. The tie up laboratory can upload all required test reports to users profile/ where required and to other services if any request is made earlier. All information is stored like from first appointment to next appointment, background history, prescription, doctor to doctor interaction digitally. The architecture reduces the paper work and manual work structure providing easy access. The users simply have to use browser for access and communication. Web services are handling all the backend transmission of data. The secure HTTPs connection allows user and administrator all the security, reliability and management of the users' data.
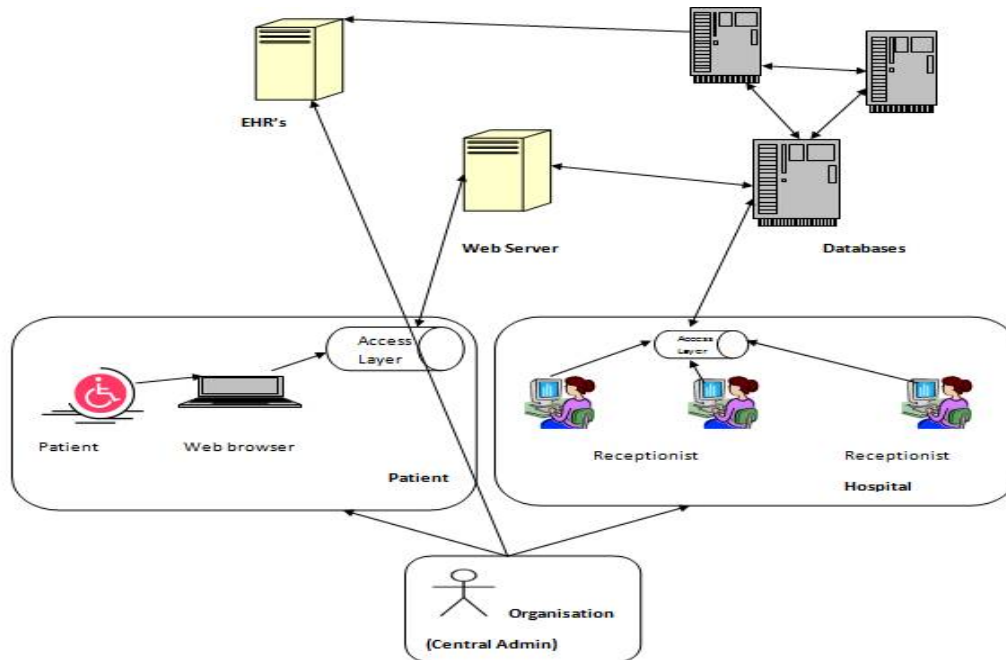
Figure 1: System Architecture

IV. PSEUDO CODE

Let S be the System comprising of set of objects and functions –

S = {s, e, I, O, Shared_memory, DD}
s = Start of the system
e = End of the system, indicating Success or Failure
System S = {S1, I, δ, O}
S1= {GPS, Google Maps}
I = {V, SD}
δ= Function
O = Output
I1 = V - Variables.
I2 = SD - Source and Destination Array.
I1 = {Area, EmergencyType}
δ1= I1-O1
O1 = {H1,H2,H3.,Hn}
H -Hospital in that area which satisfies criteria.
[2] I2 = {Source, Destination}
δ2 - Cal
Cal = {Source, Destination}
R = {R1,R2,R3.,Rn}
R1 = {Source, Node1, Node2, Node3.,Node n}
Source = Distance [Source]+ n
Distance Between [Source, Node i]
i = 1
D = {D1,D2,D3,,Dn}
[R = Routes;D = Distance]

Min Distance = Min (D1,D2,D3,Dn)
O2 = {Minimum Distance}
[3] I3 = {OH1,OH2,OH3..,OHn}
OH - Optimal Hospital
Distance = Sort (OH1,OH2,OH3.,OHn)
O3 = {Optimal Hospital}
Shared_memory: The system work in distributed environment, using multiple databases for information exchange.

DD = Deterministic data, which increases the search time and causes the delay in nearby searches.

V. RESULTS

The profile of all users categories are described here:-

1) Patient Profile:

The users which will be using this product for solving their healthcare issues and remotely accessing information and doctors prescription for them, their family and other activities. Patient need not have to keep in mind all the detailed prescription, the manual paper works like test/reports each time they visit to the doctor need not have to carry.
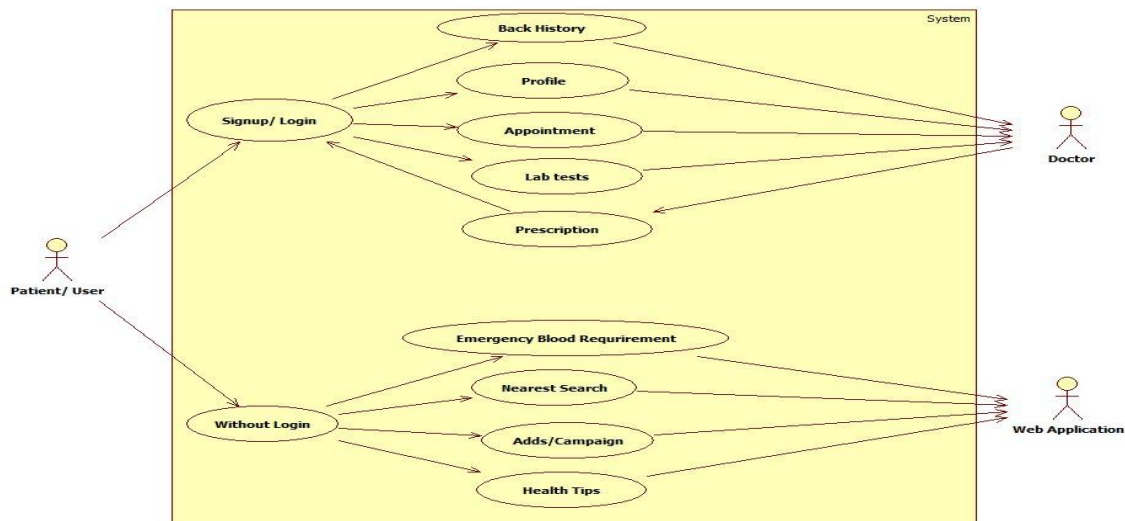

Figure 2: Patient Profile

2) Doctor Profile:

The interaction with doctors is not yet efficiently proposed in India, for efficient healthcare system. The doctor plays crucial role in healthcare design and in management. As the doctor interact with senior doctors for getting detailed knowledge of patient cause's help him to solve their problems.
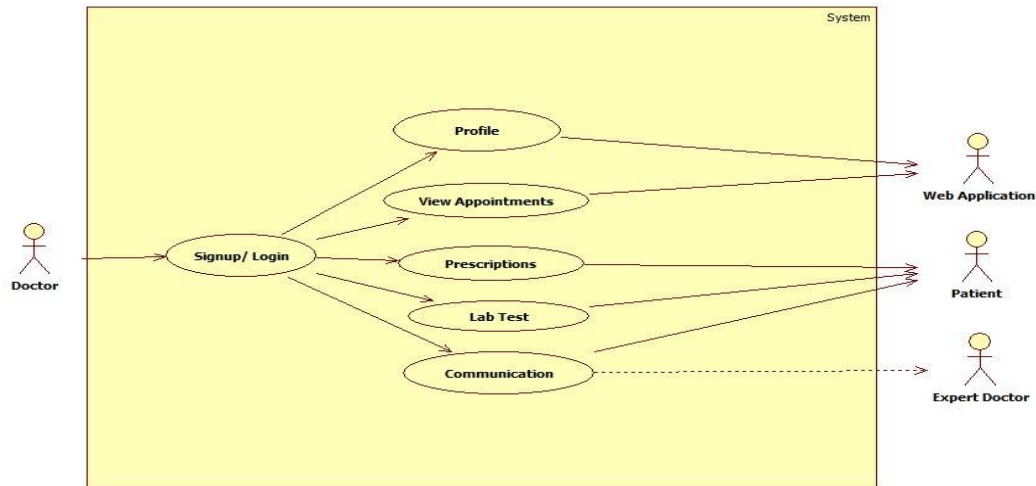
Figure 3: Doctor Profile

3) Hospital Profile:

In emergency hospital services are very much important aspect which tells us the situation of critical people, in case of blood if they don't have then they can have blood from their tie-ups laboratories. The efficient nearby search of hospital is also a crucial task in emergency case.
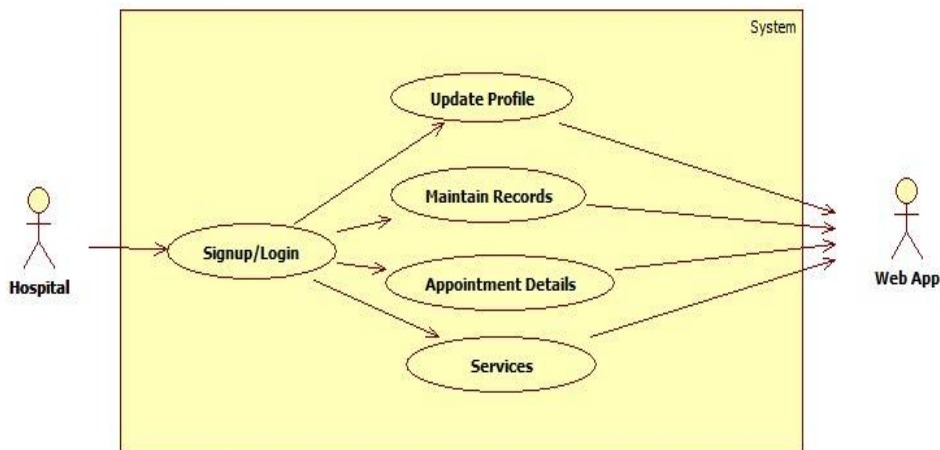

Figure 4: Hospital Profile

VI. CONCLUSION AND FUTURE WORK

The Product can be used to retrieve information which is stored in digital format and searching the nearest hospital for the emergency patients which is much faster and provide accurate results.

The emergency blood bank supports are provided and bloods are issued from different tie ups laboratory. The information like MRI/X-rays/Blood tests are also provided which will let users to access them more easily. Our major aim was storing the information and designing the product keeping medical emergency into mind. Hence we conclude that our project will minimize the use of extra work, increase the transparency and provide better health service to all the users. The application can be designed allowing users to make more flexible and feasible to healthcare systems.

ACKNOWLEDGEMENT

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BIOGRAPHY

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