Mobile Cloud Computing For Emergency Healthcare Model:Framework

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***Abstract*— There has been recently acceptance of traditional emergency, although there are weaknesses like an wasting time for serving emergency cases and this may threaten a patient's life, information and communication technologies (ICT) have become more important in human life after its development for more than half a century with the great advantages of computing system like scalability of resources and reliability it is avoiding the system being a down if the server had issues or any bug, this paper will present Mobile cloud computing for emergency health care model (MCCEH) model using a cloud computing server, MCCEH model providing services related to healthcare in emergency cases and aim to reduce response time to save the patient's life. When a person is exposed to a health problem or a traffic accident is occurs, MCCEH model will allow users to search for the nearest medical center or nearest specialists related to specific specialization and the results will show the availability timetable for every specialist and whether he is available at this time or not, the user will be able to choose specialist / medical center based on previous experiences may able to read previous feedback and opinions.**

Keywords— emergency healthcare, cloud computing, cross-platform, Mobile cloud computing for emergency healthcare model (MCCEH)

I. INTRODUCTION

Globally, Ministries of Health are always searching for the best ways to improve the quality, efficiency, effectiveness, and responsiveness speed of their health care systems. In recent years there has been an acceptance of the traditional emergency process while wasting time is the most disadvantages of traditional emergency management, because Emergency refers to an immediate risk posed to life.

Information and communication technologies (ICT) have become more important in human life and the moving from traditional healthcare to new technologies will reduce the response time, with using the latest advantages of mobile, it's will allow to user to manage his self in the health care system and will reduce the pressure from healthcare centers[1].

Recently the internet has played major role in connecting the people In various fields, whether social media, E-learning, videos community, etc..., also in health care it's will help the community like doctors/nurses to organize the work and raise the performance of healthcare works and will help the patients to get the needed information in quick time [2].

The cloud computing server based on virtual machine resources and the data in the cloud will be accessible through the internet from any location in the world. Recently it has been used in most fields; the cloud computing aims to manage the complexity in simple ways like utilization of new capabilities will enable innovation as the mobile and portable devices being a part of daily human life using it as communication tools not bounded any time or any location [3].

The goal of a paper is to design MCCEH model that eases the emergency process and save the time for user who is looking for the emergency help, and implement searching process for nearest specialist or emergency center by selected location, make outcall appointment in the patient's place or normal appointment in the medical center.

II. RELATED WORK

In this section will have some discussion and comparison between four of papers with the limitations points for each one:

[4] This paper presented a health care novel system that allows mobile to users to have access to healthcare services in the case of emergencies the limitation of this paper. There is no notification system implemented yet while it will help the specialist to get any request or message in real time while in MCCEH model will implement the notification system to notify the user with any update or message in inbox. [5] This study has followed same previous existing emergency system with focusing to reduce Time of arrival emergency to accident location the limitation of this study In some cases the system won't be useful for the user when the users haven't enough balance to do call or send SMS message to make emergency request, while in MCCEH model will implement chat system between the users using cloud computing system. [6] This paper have proposed the E-Ambulance framework, which is a smart ambulance system model that provides health monitoring of patients for remote medical professionals, the limitation of this work is the security, The system proposed the data will be store in database and hosted in dedicated server the security will be issue for this important data it can be hacked or misused as the dedicate server is physically accessible, instead of being hosted on physical hardware the MCCEH model will override this issue by using cloud computing server "virtualized" environment that's managed by your cloud hosting provider. [7] The paper presented a PHR-based EMS in a cloud computing platform focusing on an Android application, the limitation of this work, In the proposed system architecture proposed the development directed for android so the application will be linked to one singular

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environment only, while in these days there are a lot of various mobile operating systems users this paper will override this weakness by using cross platform (build one application and deploy in different several mobile operating systems) proposed solution - MCCEH model and design goals

A. MCCEH model architecture

The main goal of this paper is to reduce the wasted time during the traditional way of requesting an ambulance, and help the emergencies health cases to request the nearest specialist from patient's location to maintain his life, the specialist could be in the same neighborhood or the same region.

In the technological era some efforts should be made in the field of healthcare and emergency cases, this paper will present the model design of latest technologies to help patient people and emergency cases.

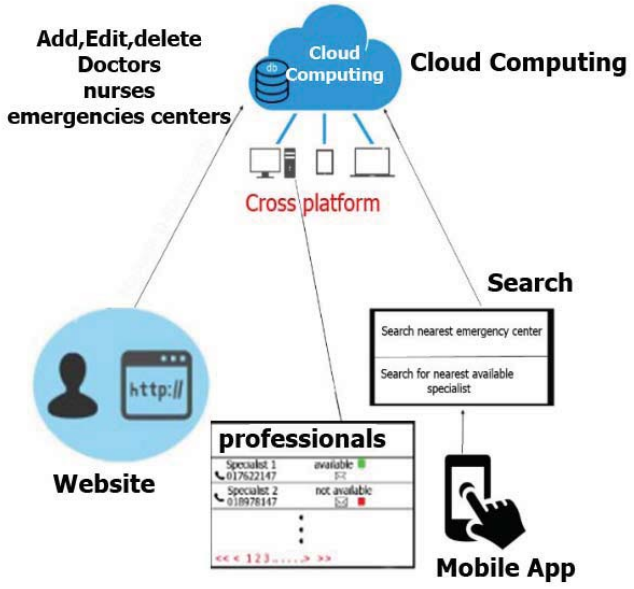

Figure 1. MCCEH model architecture.

The Figure 1 shown MCCEH model architecture, it consists mainly: web application, mobile application connected to cloud server.

- Cloud computing server

Cloud computing is known to be a promising solution for mobile computing due for many reasons (e.g., mobility, communication, and portability [8, 9]).

The study proposed to store whole the data in the cloud server instead of dedicate server because:

1) Reliability:

It is the most important feature of cloud server instead of dedicated server since the data is stored and retrieved from multiple different devices (website, tablet, mobiles), if one server crash down the system won't be down, maybe just the system will be slower unlike dedicated server the system immediately will be stopped.

2) Scalability of resources:

Increase or decrease of any resources like memory or storage, as per workloads, it could be very simple in cloud computing server, this will help to boost up any website's performance.

When compared with dedicated server scaling of resources is not easy and need time and some effort.

3) Privacy and security challenges:

always the health care system data should have own privacy and have good security in hosting side to prevent the data from misuse or hacking techniques as the data very important , it could be exposed to malware as the dedicated server is physically accessible while the cloud is virtual machine and more secure[10].

Figure 2 shown cloud databases hosted in cloud server and different mobile devices and web application calling from the cloud.

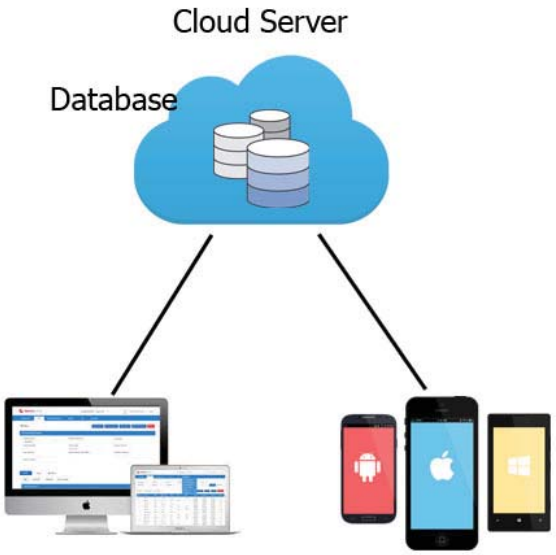

Figure 2. Cloud server.

- Mobile application and website application

Usually in the mobile developments, the developers use a specific programming language and specific platform for a target mobile operating system this will be same for others mobile operating systems, then the application will linked to one singular environment alone [11], this paper proposed for mobile application to use cross platform mobile application instead of mobile native development.

Cross platform development refers to mobile development of different operating systems IOS, Android, windows ...etc, it could be develop one code in one platform and deploy it for multiple mobile operating systems, As shown in Figure 3 while in native development have to do separate project and different code for any type of mobile application system

this will cause wasting cost, time and efforts as shown in Figure 4.

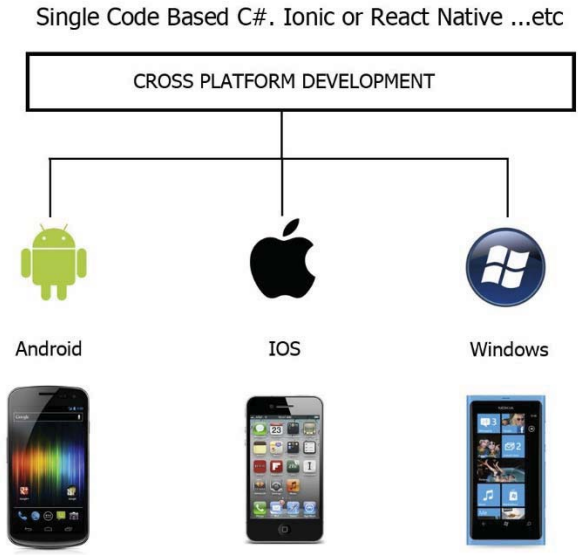

Figure 3. Cross Platform development.

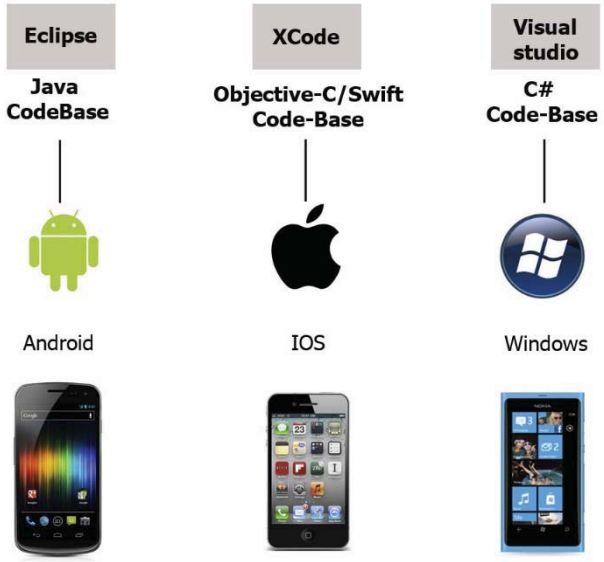

Figure 4. Native platforms developments.

III. MCCEH MODEL MAIN FUNCTION

The MCCEH model consists:

1) Database contain all required data tables (emergencies canters, specialists, nurses...etc.) hosted in a cloud server.

2) Develop website to manage the model system
-insert/edit/delete emergency center details.
-insert/edit/delete nurses.
-send notification or message to any determined specialist.

3) Develop mobile application to emergency cases.

The MCCEH model involve to most important medical systems as it starts with login interface to know the user is specialist or normal user, if the user is a normal user then redirect to search interface and other services but if is a specialist then will redirect the user to login/registration with his own account as shown in Figure 6.

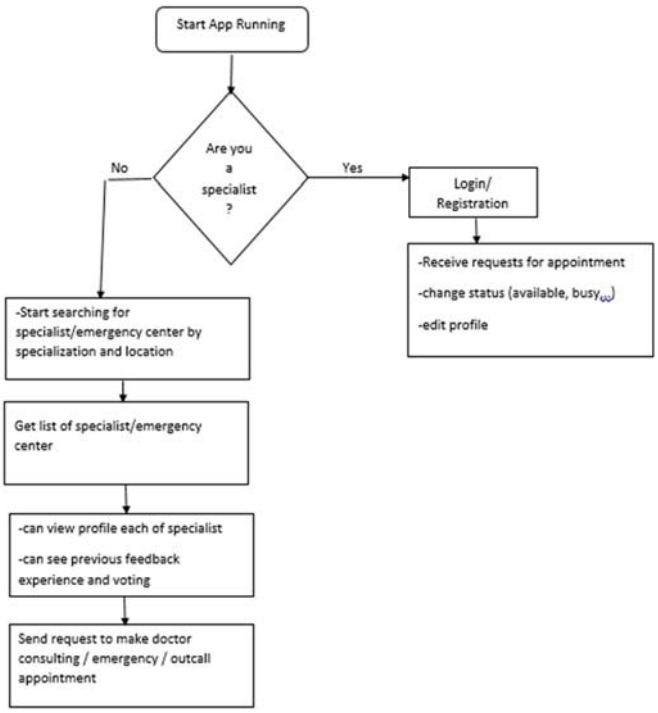

Figure 5. Flowchart of mobile application architecture.

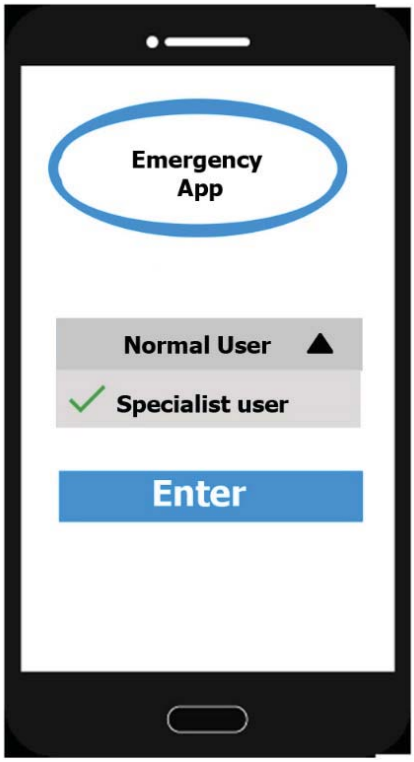

Figure 6. First default interface in the app.

- **Login/registration for specialists**

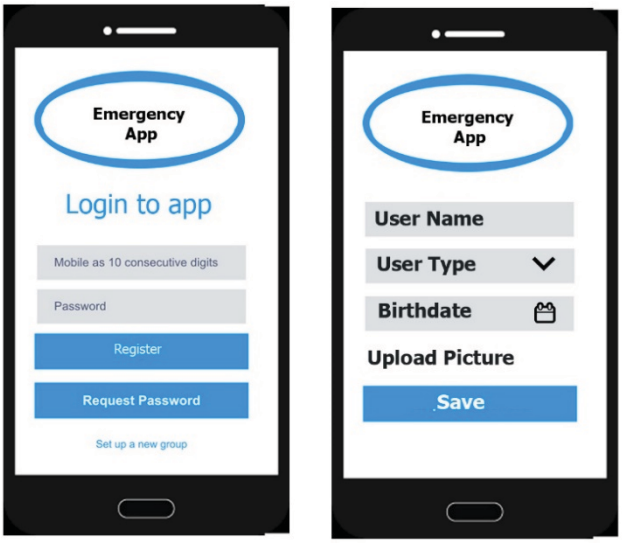

Figure 7. Login and registration interfaces.

When a specialist uses the application will be asked to registration if he is a new user or login for exist users as shown in Figure 8.
In the specialist registration interface there are mandatory fields have to fill like a personal information, address details and some documents required for verification purposes and activation the specialist.
When normal user uses the application will see in the first interface two options

- Healthcare info
- Search & book as shown in Figure 8.

After click on healthcare info will display general information in healthcare and some instructions.

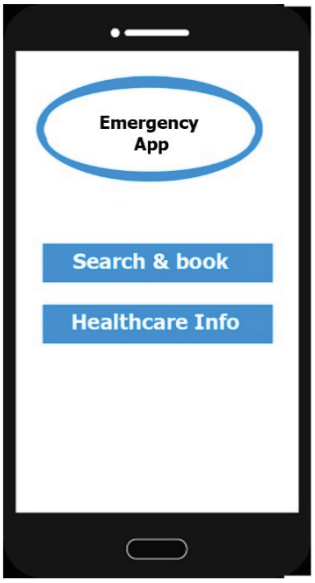

Figure 8. Main interface after login.

After click on second button (Search and book) will redirect to another interface allowing the user to search by (date , current location ,specialists and will show list of categories like (ambulance , dentist ,24 clinic ,general doctor ,...etc.) as shown in Figure 9.

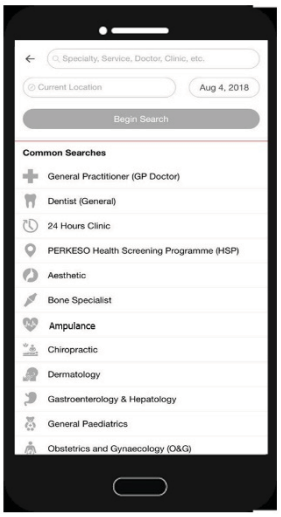

Figure 9. Search interface.

After click search button will get the all related results as shown in Figure 10,

In these interface will see a lot of helpful information for each specialist:

1) previous voting rates and feedback these will be grateful and very helpful to choose the best specialist.
2) will show the status of each specialist whether is available for outcall or not, and specialist's schedule.
3) book button allowing to contact the specialist and making an appointment.

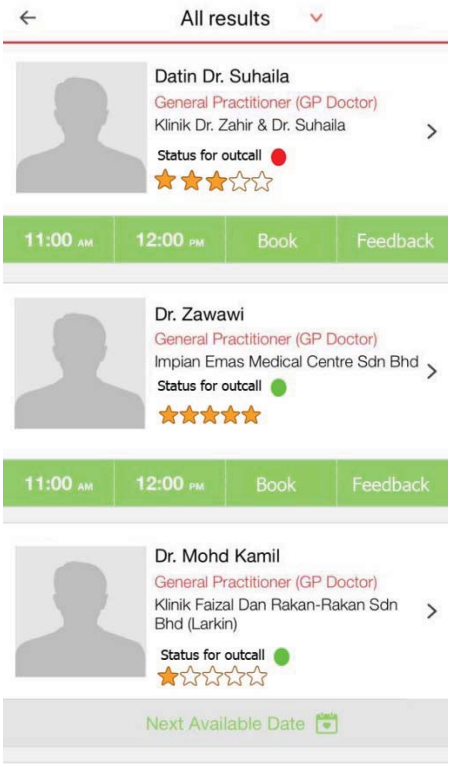

Figure 10. Results interface.

IV. Conclusion

Day by day utilization of cloud computing technologies is increasing in every part of the world; very few studies have focused on its impact on.

This paper presented a mobile cloud computing for emergency health care (MCCEH) model.

In this paper, reduce the responding time of emergency health care and ensure that the model won't be interrupted for any reasons are proposed.

The process will start from mobile application with searching for nearest medical center or specialist; will get the data from cloud server. In addition, the user could be able to sort the results by availability time, specialization category or previous feedback and voting rates it could help the user to choose the better experience specialist.

MCCEH model architecture consists database hosted in cloud server, mobile and web application.

The paper focused to manage healthcare model and reduce responding time using cloud computing and cross platform.

This paper can be developed for future work:

- Add video streaming call, it may help to get Initial diagnosis and give some tips may help the patient.
- Build the system for other kind of mobile system with more advanced advantages as the article proposed the MCCEH model using cross platform then it will be able to build it for any mobile system.

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