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Efficient Platform for Emergency Healthcare Services II

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Abstract: Emergency healthcare services are the most time crucial services in which people operate, as the survival of the patient depends on how the service is operated. As discussed in the previous paper, the weakest link of the healthcare emergency service is the initiation of the emergency services. We had discussed main methodologies in previous paper and a basic generalized system architecture. This paper discusses the core architecture of the sever and with the help of a sequence diagram we will depict how the server will process requests.

I. INTRODUCTION

As we have discussed in the previous paper, the problem of accidents in India is far serious then we consider it in the current situation. We really recommend to please go through the previous paper to get a hold of the methodologies of the project. Some of the points we would like to bring up from our previous paper(Efficient platform for emergency healthcare services) are

1) The weakest link in the emergency services is the initiation of service.
2) This weakest link is then followed by mismanagement issues, which again are discussed in detail in the previous paper[10].

In this paper we will discuss the core architecture as well as the sequence diagrams. All of which is described in detail and the respective results are also specified.

II. ARCHITECTURE

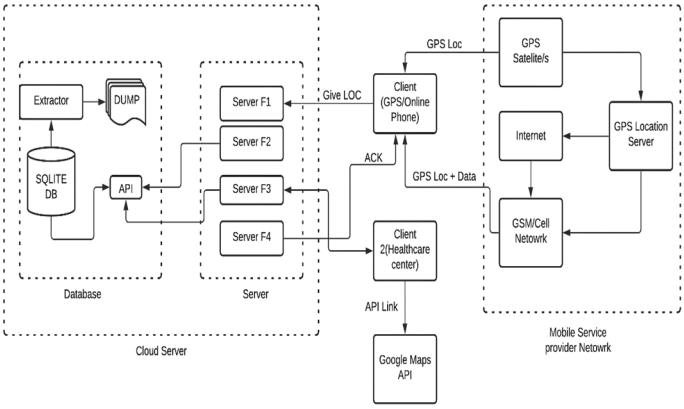

Fig: architecture Diagram

The system consists of three components.

1) *The android app*: Android Studio is the official integrated development environment for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development. The android app is the front end and that is what the user is going to interact with.
2) *Python server*: The app is connected with the python server and different services are provided by the server.
3) *SQLlite Database*: SQLite is a relational database management system contained in a C library. In contrast to many other database management systems, SQLite is not a client–server database engine. Rather, it is embedded into the end program. SQLite generally follows PostgreSQL syntax. Python in-built SQLlite relational database is used for storing the data.

These three components are integrated and optimized to work together seamlessly.

a) Input

- User details(including location whenever necessary)
- Official hospital details
- Ambulance driver details(personal and vehicle).

b) Output

- Ambulance request to all the nearby acceptable hospitals
- Acknowledgement to the user with sending necessary information.

4) Mathematical Model: The mathematical model is used to calculate the nearest healthcare centre by using the latitude and longitude of the user and performing certain calculations with the latitude and longitude of the hospital.

The nearest available healthcare centre is calculated by:

$$D = \sqrt{(D1 - L1)^2 + (D2 - L2)^2}$$

$$fd = D \times 100$$

Where $L1$, $L2$ are latitude and longitude of the affected person and,
$D1$, $D2$ are latitude and longitude of the healthcare centre.

III. DATA FLOW DIAGRAM

independent units and also can be accessed remotely. It is built and accessed via cloud platform.

A cloud server is basically used to refer to several servers connected to the internet. The applications of cloud computing would include web hosting, data hosting and sharing and software or application use. This can also be explained in terms of load sharing many processors can be distrusted to share the complex things. Here in our application too we have used a cloud server which in turn helps us in connecting the accident victim with the nearest hospital

Lets understand the working of this application. So if any new user or health care center or hospital approaches, they have to first register in the application and if they have already registered then they can directly login. Hereafter, when the person/user meets with an accident, the only thing they have to do is open the application and send the notification saying “Help/Service Request” while send the request, they will even send What is Data flow diagram?

Data flow diagram is a data flow diagram which is simple in nature. It is used to basically depict the flow of how the application works. It is regardless of control flow, no decision rules and no loops.

A. Level 0 Data Flow Diagram:

The following fig shows the level 0 data flow diagram.

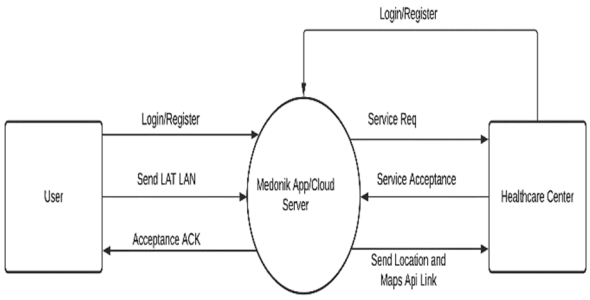

Fig. Level 0 Data flow diagram

We have developed an android application whose server is cloud based.

1) What is cloud server?

A cloud server is a virtual server running in a cloud computing environment. They can be run as their longitude and latitude.

Once our server gets the notification that one of the user needs an emergency service i.e. an ambulance then the server will send the server request to all the nearest healthcare centers saying one of the victim needs the service/help. Then, whichever health care center or hospital has its ambulance available, it will accept the service request hence the server will came to know that one of the healthcare centers or hospital has accepted the request. Hereafter the server will send the users location i.e. longitude and latitude to the hospital which has accepted the service request or will take the help of google maps API link. Then the hospital will provide the ambulance to the user and thereafter the server will notify the user/person saying that your service has been accepted and shows the message "HELP IS ON THE WAY".

B. Level 1 Data Flow Diagram:

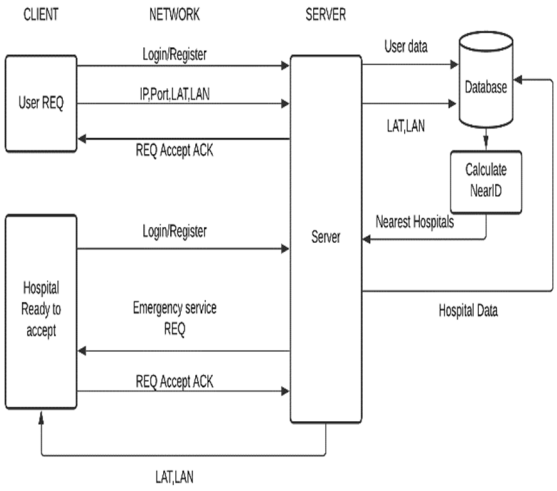

Fig. Level 1 Data flow diagram

In level 0 data flow diagram we have explained the working of android application. In this level 1 data flow diagram, we are going to see the how database is handled and also how the nearest hospital or healthcare center are calculated from the victim/person location. So, if the user and the hospital or healthcare center are new they first have to register on the application. Then the users and the hospital/healthcare center data which has been save in the database. Already registered user and hospital/healthcare center have just to login in application. At the time of login the server checks the user/person is registered or not through database. If the user/person is not found then they have to register as a new user/person.

Unfortunately when an accident takes place, the user/victim will send the help/emergency request through the application and latitude, longitude and IP along with it will be sent. Once the server gets message that the user needs help, so it will have to calculate the distance from the accidents location to the nearest hospital. Then the location i.e. latitude and longitude will be send to the database. Once this gets stored in the database we use this formula to calculate the distance from the accident spot to the nearest hospital registered. In the database hospital/healthcare centers location i.e. latitude and longitude are stored.

After this it will map the all the nearest hospital within the default radius and make the list. The default radius is 20KM but it can be changed by users/person requirement. The default radius starting point is the victim/users location. After the created list will go to the server. Once the server gets list of the nearest hospitals/healthcare center, then the server will send an emergency request to all those hospitals which are in the list stating that there is an emergency service required. Then the hospital/healthcare center which has its ambulance available it will accept the service request and it send this acknowledgment to the server. Once the server gets the acknowledgment from the hospital/healthcare center the server will the victims/users location i.e. latitude and longitude to the hospital/healthcare center. The latitude and longitude are send by an google maps API link. After receiving the location the hospital/healthcare center dispatches the ambulance., and the server sends the message to the user/victim that you request has been accepted and help is on the way.

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IV. SEQUENCE DIAGRAMS

A. What is Sequence Diagram?

A sequence diagram is a type of iteration diagram as it deals with how and in what order a group of objects work. They are also known as event diagrams. The type of these are UML and code based diagram.

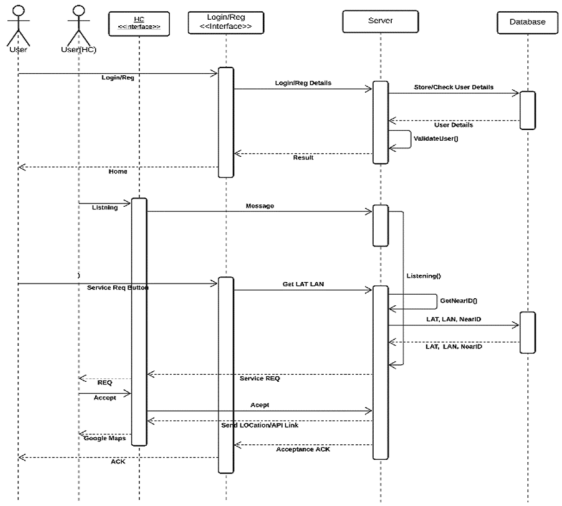

Fig. Sequence Diagram

This fig is the sequence diagram of the application. Now, in the upper half of the diagram it depicts that both users i.e. victim/person and hospital/healthcare center will register or login through the login/register interface. If the user is new then the users details will be stored in database but if the user has registered already then the server will check in database if that user has already registered or not. If yes, then its details will sent to the server. Then the server validate the user and the final result send to both users i.e person/victim and hospital/healthcare centers home screen through login/register interface. Both user i.e person/victim and hospital/healthcare centers will see their details on screen.

Now in the next half of the diagram the hospital/healthcare center will always be in listening modes i.e. always ready to accept the request, by continuously notifying server that I am ready to accept the request through healthcare interface. Whenever an accident takes place and user/victim will send a service/emergency request to the server along with their location i.e. latitude and longitude and this request is send through login/register interface. Then the server will calculate nearest hospitals/healthcare center ID's with the formula. The formula is explained the level 1 data flow diagram. After finding the nearest ID's of hospitals/healthcare center the nearest ID is send to the database along with latitude and longitude. With the help of nearest ID's of hospital/healthcare center we find the latitude & longitude of those hospitals/healthcare center. Those latitude and longitude of hospital/healthcare center is send back to server from database with their ID's. Hospital/healthcare center will be more than one so it will be sent as a list.

So, the server will pick those hospital/healthcare center from that list which is listening mode and hence will send request to those hospital through healthcare interface. Then the hospital/healthcare center which has its ambulance available will accept the request and send the accepted request acknowledgment to the server through healthcare interface. Once the server receives the accepted request acknowledgment from one of the hospital then server will send the location i.e. latitude and longitude of the victim/user to hospital/healthcare center through healthcare care interface. After receiving the location from the server the hospital/healthcare center dispatches the ambulance to that location. Hereafter the server will sends a message to the user/victim through login/register interface that your request is accepted and help is on the way.

V. CONCLUSION

As discussed in the previous paper the implementation process is explained in details in this paper. The implementation is shown by detailed data flow diagram level 0 and level 1. The sequence diagram is also described for showing the correct sequence of the system. The project is completed and all core functionalities are implemented and an efficient platform is created for initialization of emergency healthcare services. The minimum time to initiate service being 10 seconds(error of 2 sec approx) .All that remains is connecting with the hospitals and linking the chain of different hospitals.

VI. ACKNOWLEDGEMENT

We like to share our sincere gratitude to all those who are helping us in the completion of this project. During the work, we faced many challenges due to our lack of knowledge and experience but these people have always helped us to get over all the difficulties and will help us with their valuable guidance in the completion of this project.

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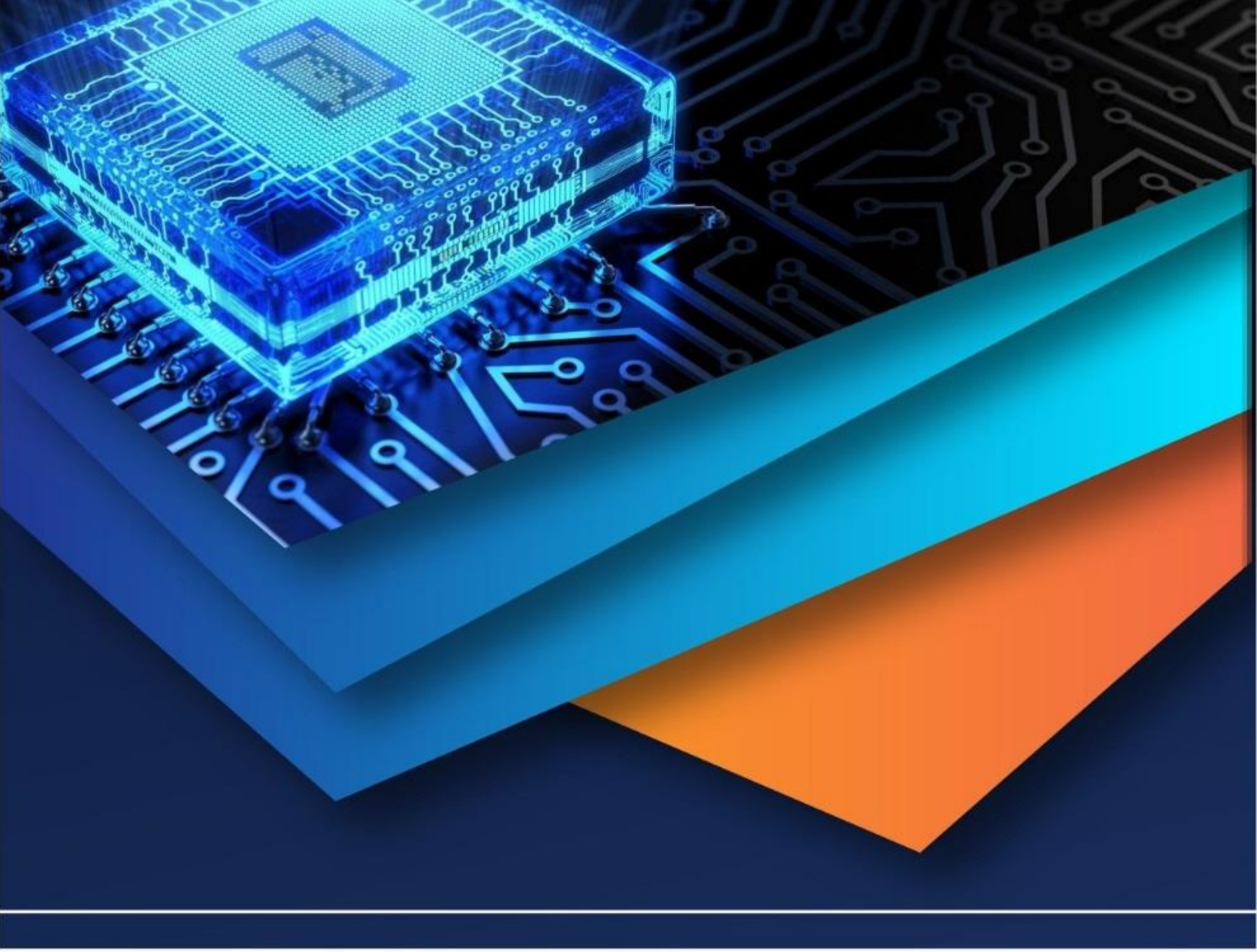

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