DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
THE UNIVERSITY OF TEXAS AT ARLINGTON

DETAILED DESIGN SPECIFICATION
CSE 4317: SENIOR DESIGN II
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LIFESAVERS
DONORS

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REVISION HISTORY

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1 INTRODUCTION

"Donors" is an android application that provides a platform for the people who actively donate their blood to the donation centers or hospitals. Also, it helps blood banks or hospitals to request for specific blood types to the donors. Any hospitals or organizations needing blood for their patients request blood donations through this application. On the other side, users get the notification/message on their phone. When the users acknowledge the message, they can either accept or deny it. They can accept it by scheduling for the donation at the locations where they find it easy, or they can deny it if they do not want to donate for the time being. After donating blood, users' records will be recorded in the database. Later, hospitals can go through each donor's profile to check their information, like the number of times the donors donated blood. Scheduling will be a lot easier because time and place where the donation is taking place will be explicitly shown to the users and they can just simply view and schedule. At any time they can cancel it too. Another feature is that the user can search the blood donation centers on their own and schedule instead of waiting for the requests.

2 SYSTEM OVERVIEW

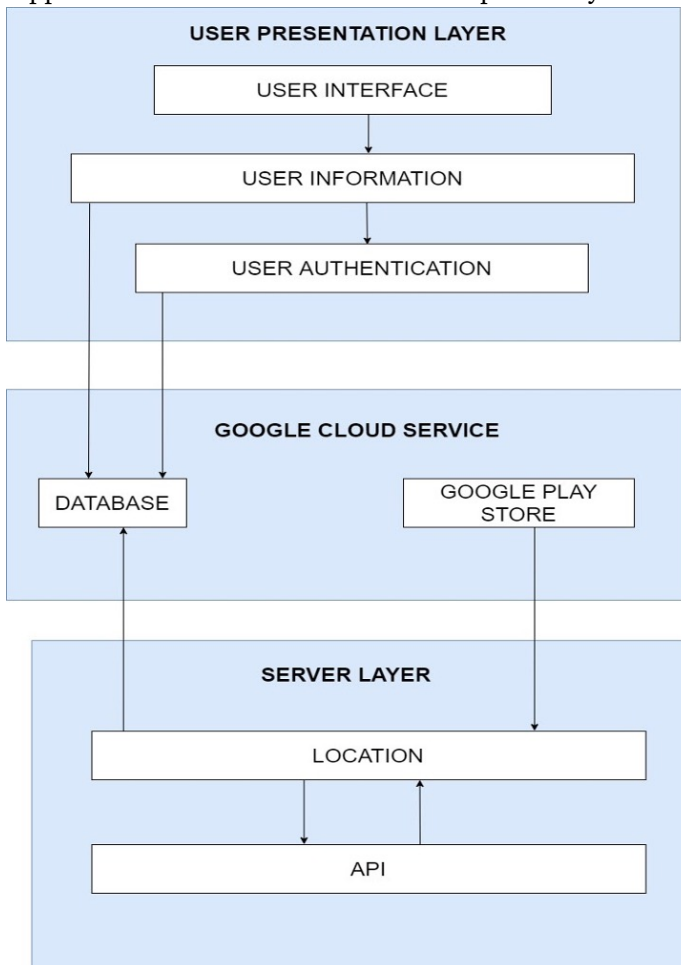The application cab be divided into three specific layers:

Figure 1: System Overview Flowchart

2.1 USER PRESENTATION LAYER

User presentation layer provides a user interface to the user which serves as the data translator for the network. It responds to the server request from the application layer and makes the information readable to the application layer. Also it makes sure the information is displayed properly on the receiving side.

2.2 SERVER LAYER

Server layer helps to communicate between the user layer and the cloud service layer (also known as the database layer). So, it acts as a bridge or an interface between these two layers. This layer can be considered as the heart of the application since the whole application is dependent and controlled by this layer. All the system APIs, and location API(google map) are the parts of the Server Layer.

2.3 CLOUD SERVICE LAYER

Cloud Service Layer serves as storing all the information of the users like username, password, blood type, blood pressure etc. as well as locations of different blood donation centers in a database as well allowing users to download the application from the Google Play Store.

3 USER PRESENTATION LAYER

This layer represents the user interface part of the application. This layer is responsible for taking the input from the user and displaying the output on the screen accordingly. There are various UI templates in this layer: start screen, login, register, list of donors and hospitals, and schedule appointments, navigation to name a few. There are three subsystems in this layer. They are user interface, user information and user authentication.
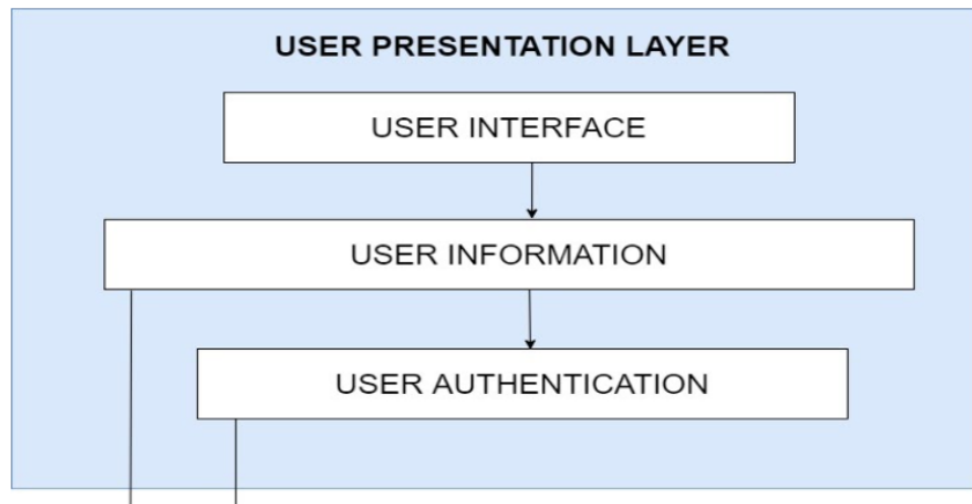
Figure 2: User Presentation Layer

3.1 Layer Hardware

Our software will work on any device that runs on Android. It is not available for iOS at this moment. No hardware is designed or used since it is purely a software based application.

3.2 Layer Opertaing System

This layer will use the Android operating system in order to run the application. It is a mobile application targeted for smartphones. Currently, there is no website that hosts this application.

3.3 Layer Software Dependencies

Android studio version 4.2.1 is used to develop this software. This part of the layer will use Google Firebase for authentication purposes and Firestone for database for back-end support. In development, an emulator is used that needs SDK tools 26.1.1. or higher which is installed by AVD manager. We mostly use Pixel XL API 30.

3.4 User Interface Subsystem

This is the subsystem where all the user interaction with the application takes place. This subsystem is responsible for handling various UI templates such as the start screen, login, display blood groups required, schedule appointment, appointment confirmation screen among others.
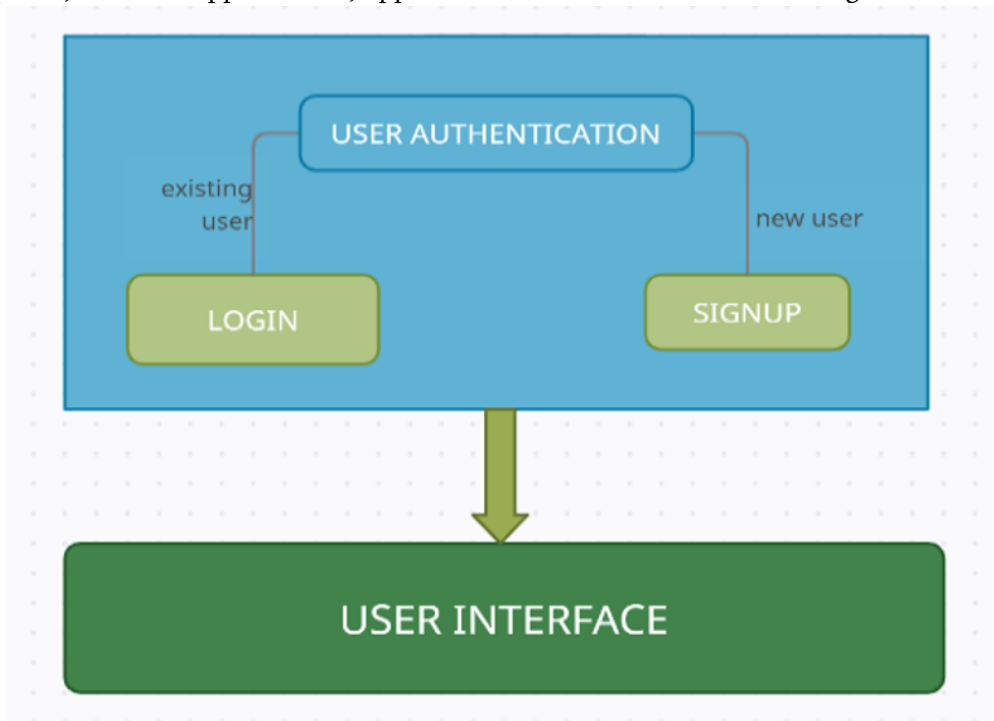
Figure 3: User Interface Subsystem

3.4.1 Subsystem Hardware

There are no hardware components to this subsystem.

3.4.2 Subsystem Operating System

Stated in the user presentation layer.

3.4.3 Subsystem Software Dependencies

Android Studio version 4.2.1 is being used to develop the whole application which includes the user interface and the emulator to help us visualize the final design in mobile devices.

3.4.4 Subsystem Programming Languages

Java is used as the programming language.

3.4.5 Subsystem Data Structures

The users and the hospitals are stored in the databas using a map.

3.4.6 System Data Processing

The system does not have any subsystem data processing.

3.5 User Authentication Subsystem

This subsystem allows the user to enter the username and password. The subsystem authenticates whether the provided user credentials are valid by interacting with the database layer and server layer. It will give the user access to the application only if the credentials are valid. This layer also checks if the user is a hospital or a donor and then displays the interface accordingly.
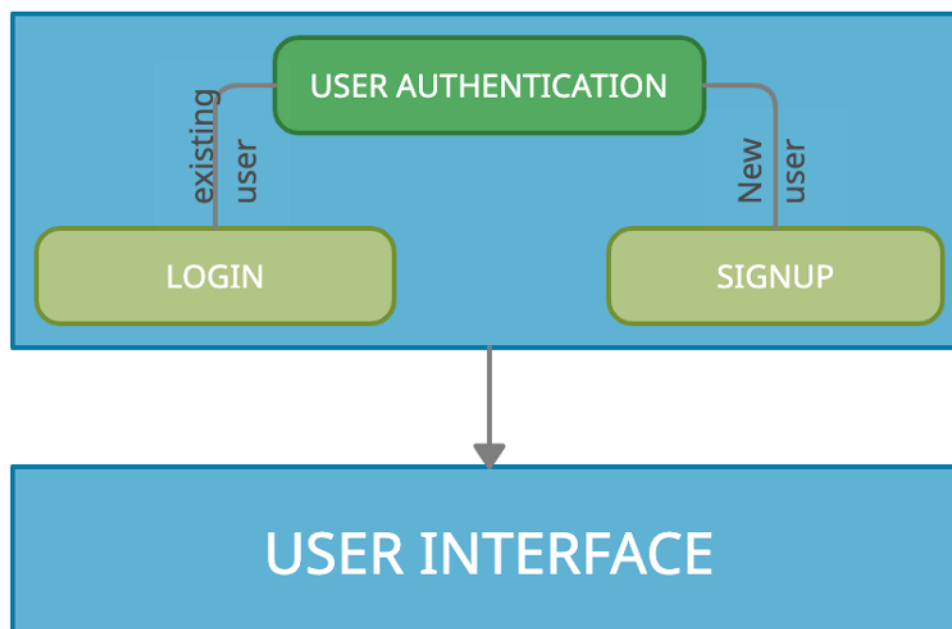

Figure 4: User Authentication Subsystem

3.5.1 Subsystem Hardware

There are no hardware components to this subsystem.

3.5.2 Subsystem Operating System

Stated in the user presentation layer.

3.5.3 Subsystem Software dependencies

Google Firebase is used for the user authentication process.

3.5.4 Subsystem Programming Language

Java is used as the programming language.

3.5.5 System Data Structures

The users and the hospitals are stored in the database using a map.

3.5.6 Subsystem Data Processing

The system does not have nay subsystem data processing.

3.6 User Information Subsystem

This subsystem takes the input from the user to gather information which will be required in the user authentication process.
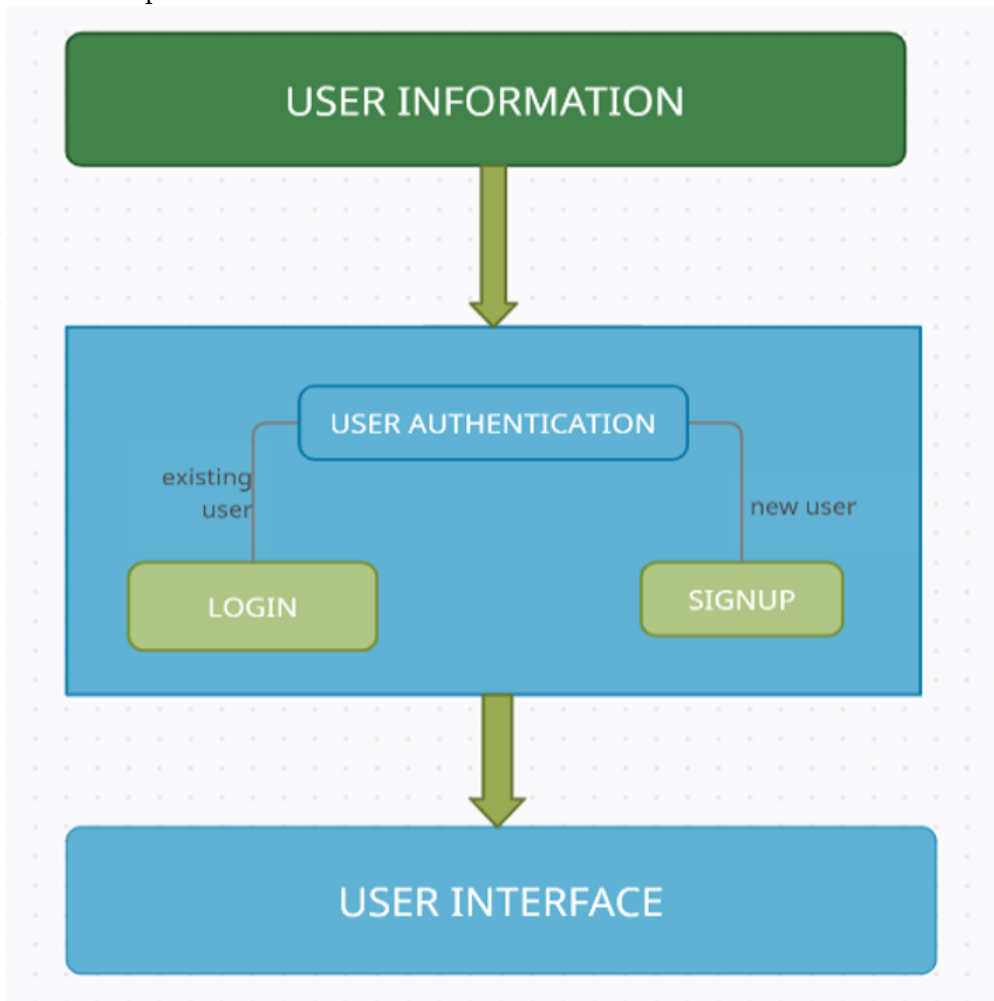

Figure 4: User Information Subsystem

3.6.1 Subsystem Hardware

There are no hardware components to this subsystem.

3.6.2 Subsystem Operating System

Stated in the user presentation layer.

3.6.3 SUBSYSTEM SOFTWARE DEPENDENCIES

For this application, Firebase is used for data storage and retrieval process.

3.6.4 SUBSYSTEM PROGRAMMING LANGUAGE

Java is used as the programming language.

3.6.5 SYSTEM DATA STRUCTURES

The users and the hospitals are stored in the database using a map.

3.6.6 SUBSYSTEM DATA PROCESSING

The system does not have nay subsystem data processing.

4 SERVER LAYER

A server layer is a layer which is in between the user interface and the database layer. It defines the application boundaries. It consists of services such as communication services, identity management. Google Maps is one example of it.

4.1 LAYER HARDWARE

We are using an API which is based on the cloud service so we are not using any hardware for this project.

4.2 LAYER OPERATING SYSTEM

This software can run only on Android OS.

4.3 LAYER SOFTWARE DEPENDENCIES

Locations of hospitals are shown on maps, so correct API's are required.

4.4 SUBSYSTEM 1

For the map layer subsystem, it gets the userâs input for the hospitals and obtains the location by communicating with the map controller. It also uses Google Firestore to handle the userâs and destination location.
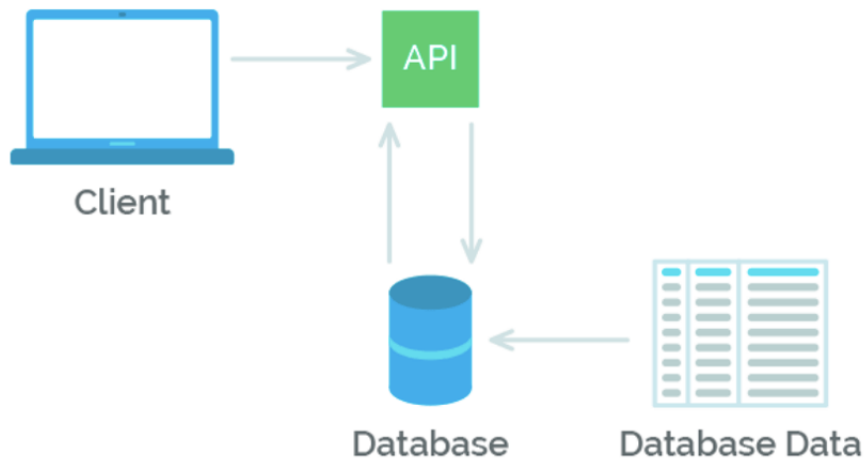

Figure 6: Subsystem 1 diagram

4.4.1 Subsystem Hardware

An android device.

4.4.2 Subsystem Operating System

Any Android OS is able to perform it. Versions after Android 5.0 are preferred.

4.4.3 System Software Dependencies

Google Maps Libraries and API are required.

4.4.4 Subsystem Programming Language

Java is used in Android Studio.

5 Cloud Service Layer

The Cloud Service Layer in this application stores all the information of the donors like username, blood type, blood pressure, age, weight etc. and information of hospitals like its location in the database(google firestone) Also, users will be able to download the application from the Google Play Store.
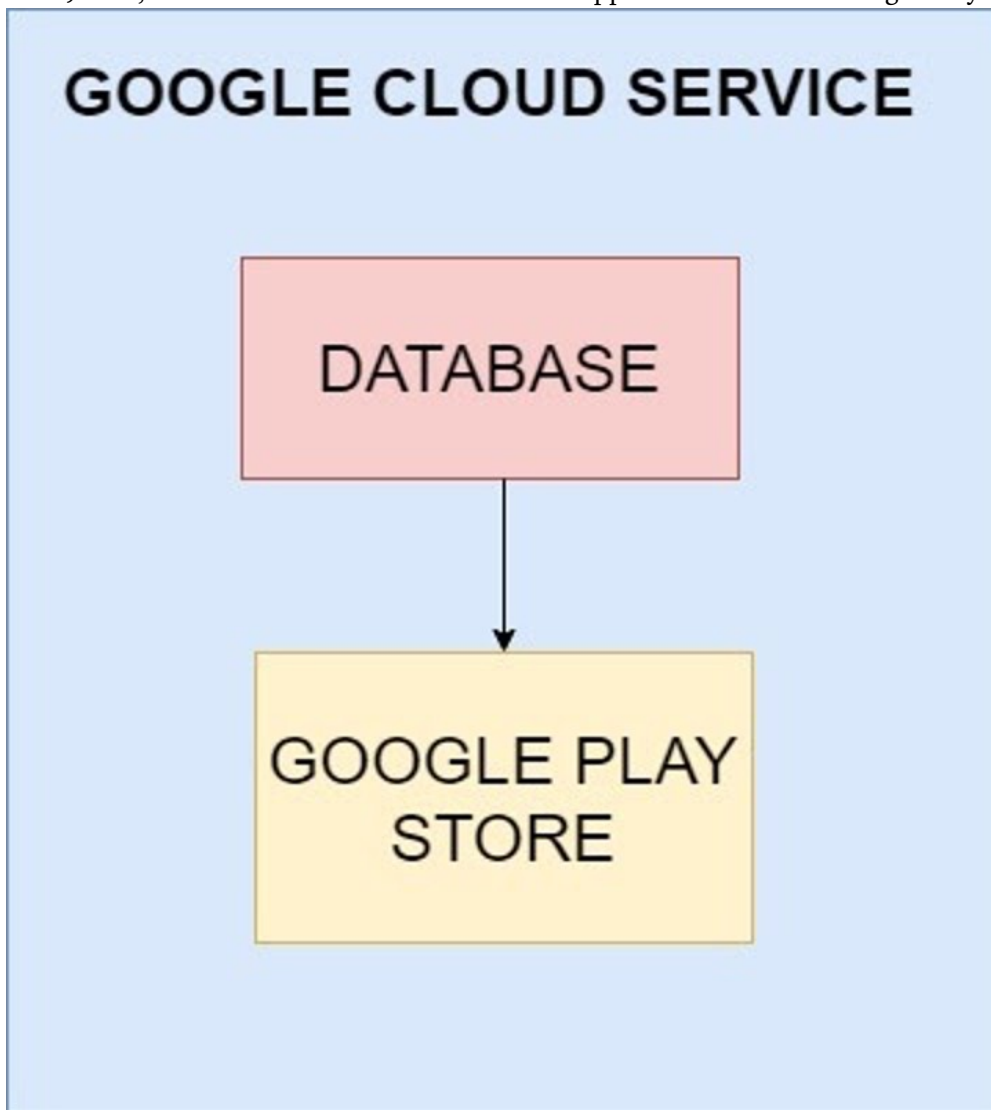

Figure 7: Google Cloud Service

5.1 LAYER HARDWARE

No external device is required except an android emulator for testing the application while in development and a real android device to use the application because everything is available in a cloud service.

5.2 LAYER OPERATING SYSTEM

It can be run in any Android OS or Android phone, but the versions after Android 5.0 are preferred.

5.3 LAYER SOFTWARE DEPENDENCIES

Google Firebase is used for authentication after the user or a hospital registers their account respectively, and their information is retrieved and stored using Google Firestone.

5.4 SUBSYSTEM DATABASE

The donorâs information throughout the application is stored in a database. Whenever the user registers his/her account, the login information is saved in a database including username and password. It is connected with the user information and user authentication subsystems in the User Presentation Layer and with the Location subsystem in the Server Layer. Hospitalâs information is also saved.

5.4.1 SYSTEM HARDWARE

No external device is required except any android device to use the application.

5.4.2 SUBSYSTEM OPERATING SYSTEM

Google play store is found in every android device.

5.4.3 SYSTEM SOFTWARE DEPENDENCIES

Google play store is found on every android device so it needs an Android OS. Versions after Android 5.0 are preferred.

5.4.4 SUBSYSTEM PROGRAMMING LANGUAGE

Java is used to upload and retrieve information to and from the database.

5.4.5 SUBSYSTEM DATA STRUCTURES

Information is save by using mad data structures.

5.4.6 SUBSYSTEM DATA PROCESSING

After the user registers his/her account, the information is saved in map structure and saved in Google firebase. Same operation is performed on the hospital's information.

5.5 SUBSYSTEM GOOGLE PLAY STORE

After the application is complete, users will be able to download it from the google play store.

5.5.1 SUBSYSTEM HARDWARE

No external device is required except for the android device to use the application.

5.5.2 SUBSYSTEM OPERATING SYSTEM

Google play store is found on every android device.

5.5.3 SYSTEM SOFTWARE DEPENDENCIES

Google play store is found on every android device so it needs an Android OS. Versions after Android 5.0 are preferred.

5.5.4 SUBSYSTEM PROGRAMMING LANGUAGE

No programming language is required.

5.5.5 SUBSYSTEM DATA STRUCTURES

No data structure is required.

5.5.6 SUBSYSTEM DATA PROCESSING

No data processing is involved.

6 APPENDIX

N/A

REFERENCES