

EEY4189 Software Design in Group / Bachelor of Software Engineering

SOFTWARE REQUIREMENTS SPECIFICATION

Lab Test Reports Via Online

Version 1.0

2022 / 11 / 01

Department of Electrical and Computer Engineering

Submitted by - GROUP TECHNO (Cluster 8.5)

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2022-11-02

Signature

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1 Introduction

1.1 Purpose

This document lists requirements for get laboratory test report via online. This is an app that can use on mobile and tablet. This app provides all the needed information about medical tests. This is a pocket tool for getting medical laboratory lab test reports. Users can simply download the app and log in with user details. The purpose of this document is to identify the system requirements and obtain sign-off on all requirements before moving into the design phase. The engineering team will use this document as the basis for the system design.

After sign-off, requested changes to requirements will be documented including the effect on the project costs, scope and timelines and presented to user for approval.

These requirements were gathered during extended discussions with members and clients on 2022/10/26 and from documents provided by Group members on 2022/11/03.

1.2 Summary

Ever since the pandemic struck the world, we have to switch digital mode. In this situation we cannot go to the hospital to test our lab reports and consult doctor. This mobile application is a utility for lab executives and helps them to review, monitor and analyze the lab performance metrics on a daily basis such as daily census, average length of patient stay in this app, number of patients checked for a given day, patient details like name, age and phone numbers, diagnosis details like the least and the most common diagnosed diseases and patient demographic distribution like percent of patients coming from each address. Without using paper-based generated reports and mobile app reports, we are developing this app to get the online lab reports and doctor's consultation.

Then we can easily get our lab reports and doctor consult. This app helps to manage our time. This app is user friendly app. anyone can log and booking numbers and consult doctors at time. User can sign up with (register) with the application. By this app we can manage our time. This app is user friendly app any one can log and booking numbers and consult doctors at any time. Within two hours we can download the lab test report in this app after consult doctor within two days. This app provides more features for person. We think this app is most use full for pandemic situation for all peoples. In Future, we will try to add more futures to add this app and hope it will be useful for every people.

The mobile app improve the effort of lab executives by providing lab operational data in probably manner with ease of access and help them in making effective decisions required for improving the quality of person care services.

Selected Laboratory: - Durdans Medical Centre – Kurunegala

About the Laboratory: - Durdans Hospital delivers integrated healthcare across multiple specialties. As a world-recognized JCI accredited hospital, we helm 3 centers of excellence and 18 specialties. Our consultant specialists diagnose, evaluate, and treat patients with skill and compassion to ensure the best outcomes for your medical and surgical needs. Located within the hospital, and in over 100 locations Island-wide, the laboratory & diagnostic is managed by an experienced team of pathologists and laboratory scientists, who handle thousands of samples on a daily basis. Committed to being the finest in the fields such as biochemistry, microbiology and genetics; the laboratory & diagnostic staff work in close collaboration with our clinicians to deliver comprehensive and reliable diagnostic results.

Contact Details:-

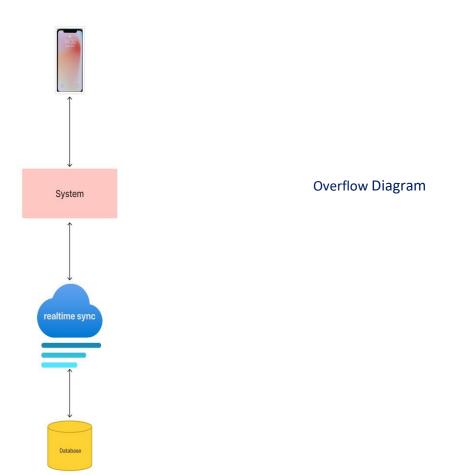
• Phone Numbers: +94(0)112140000 / +94 (0)11 2140 040

• E-mail: contactus@durdans.com

1.3 Project Overview

Goal

The goal of "ONLINE LAB REPORT APP" is to provide a user-friendly, rapid, and cost-effective web application to computerize the management of a diagnostic system. It is concerned with the gathering of patient information, diagnosis data, and so on. Previously, it was done by hand. The system's main job is to register and store patient and staff information, to retrieve that information as needed, and to change that information meaningfully.



4

This is an online lab test reports manager application that brings up various diagnoses working online. Here patients get an option to register on the site and login using registered details. Once registered with their address and contact details, the patients may now see a variety of tests conducted by the lab along with their costs. The system allows patients to do the bookings for various tests like CBC, Blood Glucose, KFT, and LFT. The tests also consist of parameters like Hemoglobin, WBC, etc. The system allows users to book any test needed and after successful booking, system not calculates costs and allows users to pay online. As soon as enter the details, the patient test is booked and the lab may now collect samples from patients. After successful testing, the patient or the user gets a notification of test result through an email. The system allows admin to attach a copy of the report into the system and automatically email it to intended patient.

Advantages

- The system allows automate diagnosis system.
- Allows for faster service.
- Allows increased sales and profits for diagnostic labs.
- Easy, user friendly GUI.

Disadvantages

• It reduces employment as the human efforts are being automated by this system.

1.4 Scope

The purpose of the online laboratory system is easy to laboratory app management system and to create a convenient and easy-to-use for patients and download Lab report. The app system is based on a relational data base with its laboratory management and reservation Function. We will have a database server supporting hundreds of cities around the world. The most important feature of this app is can download the lab report from home according to this development of technologies people try to do their needs easily as they wish.

This app has many features and functions. It's easy to logging app and if you are the new user you can create new account. if you are the old user You can login app using your user name and password. After login app search doctors details and booking doctor and console doctor and after that admins search patient's details and doctor details. And Doctors sending report checking and upload as a pdf format and admin send notification like that your lab report has submitted in our app and u can download. After patients download report can logout the system. Our app is user friendly and any one can use because our app haven't complex's features

So we think our app is useful for future. We think we developed many features in our app above all we hope provide a Comfortable user experience along with best features available.

1.5 Definitions, Acronyms and Terminology

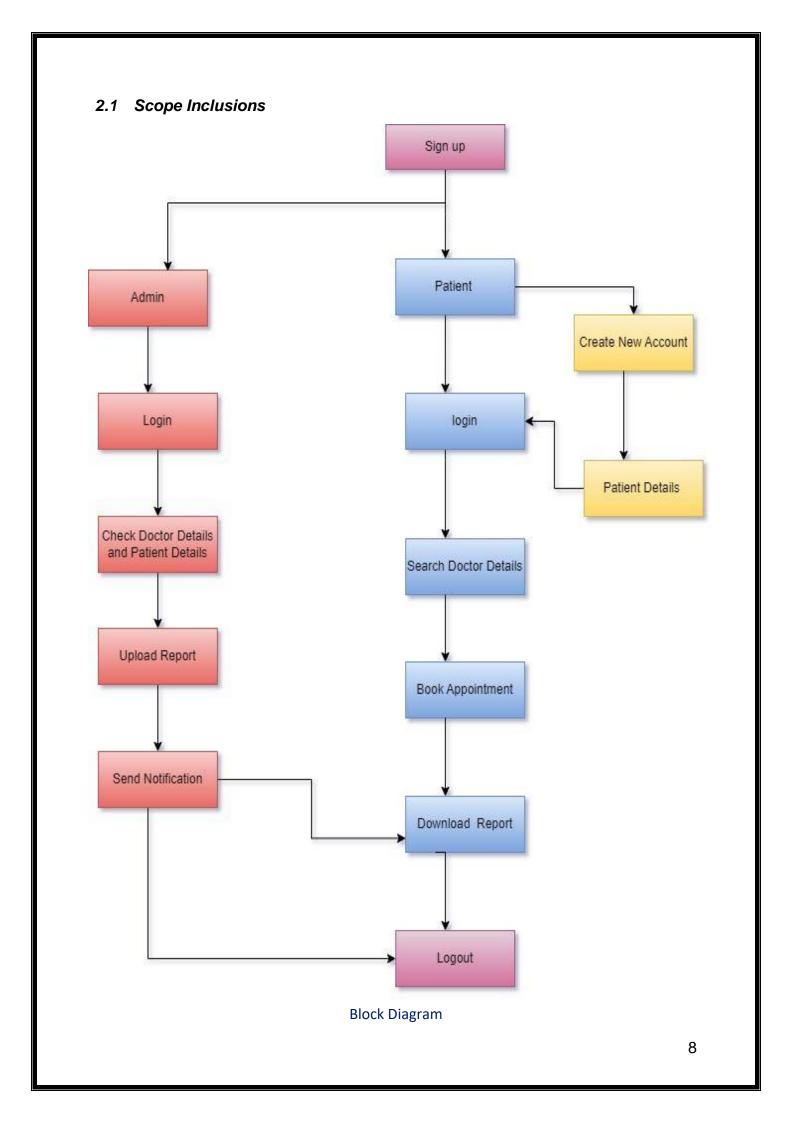
Acronyms and Terminology	Definitions
CBC	Complete Blood Count
WBC	White Blood Cells
RBC	Red Blood Cells
KFT	Kidney Function Test
LFT	Liver Function Test
T&S	Type & Screen
T&C	Type & Cross
CLIA	Clinical Laboratory Improvement Amendments
FBS	Forex Trading Broker
API	Application Program Interface
IM	Instant Massaging
FS	Features Selection
PO	Parameter Optimization
CL	Classification

1.6 References

- Worldometer. COVID-19 Coronavirus pandemic. https://www.worldometers.info/coronavirus/. Accessed October 6, 2020.
- American Association of Clinical Chemistry. What does turnaround time say about your lab. https://www.aacc.org/cln/articles/2014/july/turnaround-time Accessed October 6, 2020.
- Johnson AJ, Easterling D, Nelson R, Chen MY, Frankel RM. Access to radiologic reports via a patient portal: clinical simulations to investigate patient preferences. J Am Coll Radiol. 2012.
- Christensen K, Sue VM. Viewing laboratory test results online: patients' actions and reactions. J Particip Med. 2013

2 Project Scope and Impact

- As the world becomes a global village together interconnected with each nation, the
 corona pandemic has not stopped at the national borders. It has so badly effect
 affected on international trading, occupations, education, traveling and health as
 well as for the day to day normal lifestyle.
- As a result we have planned to develop an app to receive an online lab report of every patient through this app. Through this app every patient can register with their details and search their doctor and download their lab report with this app after the checking of the doctor. Then they can download the pdf file. Our main expectation through this app is that saving the time and helping peoples to get the lab report at home in pandemic seasons through this app. this is the main theme of our app development project.



2.2 Scope Exclusions

- There is no proper way to get the medicines through this app.
- Also should go to laboratory to get the lab test.
- There is no way to do the payments through the online.
- Can't get the details of the medicines through this app.

3 Functional Requirements

Introduction

Users who registered as a patient can get their laboratory reports by using this application. When a user needs to book a doctor or laboratory appointment, the application will provide all information about doctors and the laboratory, which is stored in the database. A knowledge user can use the lab test video galley that will provide various lab test information. The user will be able to create their account and edit some user details. As an extra feature, users can update daily medical news provided by the application.

3.1.1 Function 1

- ♦ Common function for the user.
 - Sign-up function for new users.

Users can register using email and password with the given validation field that is necessary to access the application.

Priority: high.

Login and log out function for registered users.

Registered users can log out from the application and when a user needs to log in back user can use the email and password used to register in the application.

Priority: high.

User details function for users.

Users can fill in some important private information about users who need to operate the main functions. Later, users have access to edit users some details.

Priority: high.

- Main functions for users.
 - Generate Lab report function.

Users are able to receive completed laboratory reports and viewed. Users can download or share the laboratory report with a third with the user acknowledged.

Priority: *medium*.

o Book a lab and doctor function.

Users are able to choose to edit and remove appointments.

Priority: *medium*.

Create an appointment function.

Select laboratory and doctor functions.

Users are able to select laboratories and doctors available in the given drop list. Users can select any of the laboratories shown in the list.

Priority: normal.

Select date and time functions.

Users are able to select dates and times for appointment booking. Data and time will provide depending on the availability of the laboratory.

Priority: normal.

Show and delete appointment functions.

Users are able to see created appointments and delete the appointment that was created.

Priority: normal.

o Lab test video gallery function.

Users are able to play given videos that connect to the YouTube platform and read the brief description under the lab test name. Users can choose videos by clicking the given arrow functions.

Priority: *medium*.

o Medical news function.

Users are able to read the latest news and important news using this function.

Priority: *medium*.

3.1.1.1 Use Case table & Diagram

Use case	description
Name	Register in the application.
Description	Users using email and password will get registered in the application.
Actors	User, system administrator
Viewpoints	system management
Primary scenario	1. get the user's email and password.
	2. manage the user details.
	3. collect user details.
Includes	Get user details.
NFRs	Security, privacy

Use case	description
Name	Check the lab report.
Description	Users check the necessary laboratory report and share the
	document.
Actors	User, system administrator
Viewpoints	system management
Primary scenario	1. get details about lab tests.
	2. check the diagnosis.
Includes	Download and share the lab report.
NFRs	Security, privacy, performance

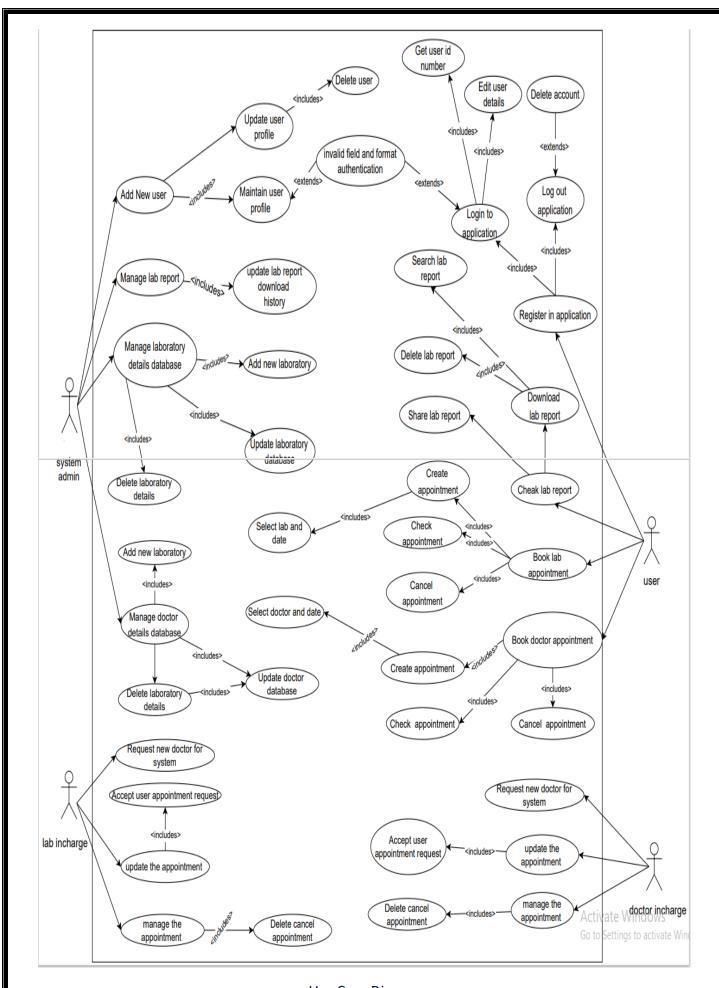
Use case	description
Name	Create Book lab appointment
Description	Users can create appointments and users can choose laboratory,
	date and time.
Actors	User, lab in charge.
Viewpoints	Laboratory system department
Primary scenario	1. choose a laboratory.
	2. chose date and time slot.
Includes	3. message confirmation appointment
NFRs	Performance, Privacy

Use case	description
Name	show Book lab appointment
Description	Users can check details about past and present booking
	appointments.
Actors	User, lab in charge, system administrator.
Viewpoints	Application system management.
Primary scenario	1. check past appointment details.
	2. collect appointment information.
Includes	
NFRs	Performance, Privacy
Use case	description
Name	Cancel Book lab appointment
Description	Users can cancel the created appointment.
Actors	User, lab in charge, system administrator.
Viewpoints	Application system management.
Primary scenario	1. cancel the appointment.
Includes	
NFRs	Performance, Privacy

Use case	description
Name	Create Book doctor appointment
Description	Users can create appointments and users can choose doctor, date
	and time.
Actors	User, doctor in charge.
Viewpoints	Hospital system department
Primary scenario	1. choose a doctor.
	2. chose date and time slot.
Includes	3. message confirmation appointment
NFRs	Performance, Privacy

Use case	description
Name	show Book doctor appointment
Description	Users can check details about past and present booking appointments.
Actors	User, doctor in charge, system administrator.
Viewpoints	Application system management.
Primary scenario	1. check past appointment details.
	2. collect appointment information.
Includes	
NFRs	Performance, Privacy

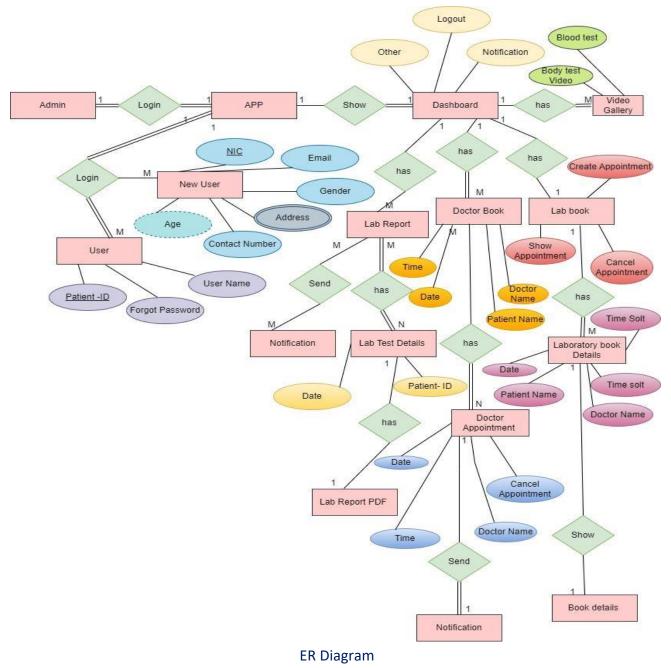
Use case	description	
Name	Cancel Book doctor appointment	
Description	Users can cancel the created appointment.	
Actors	User, doctor in charge, system administrator.	
Viewpoints	Application system management.	
Primary scenario	1. cancel the appointment.	
Includes		
NFRs	Performance, Privacy	

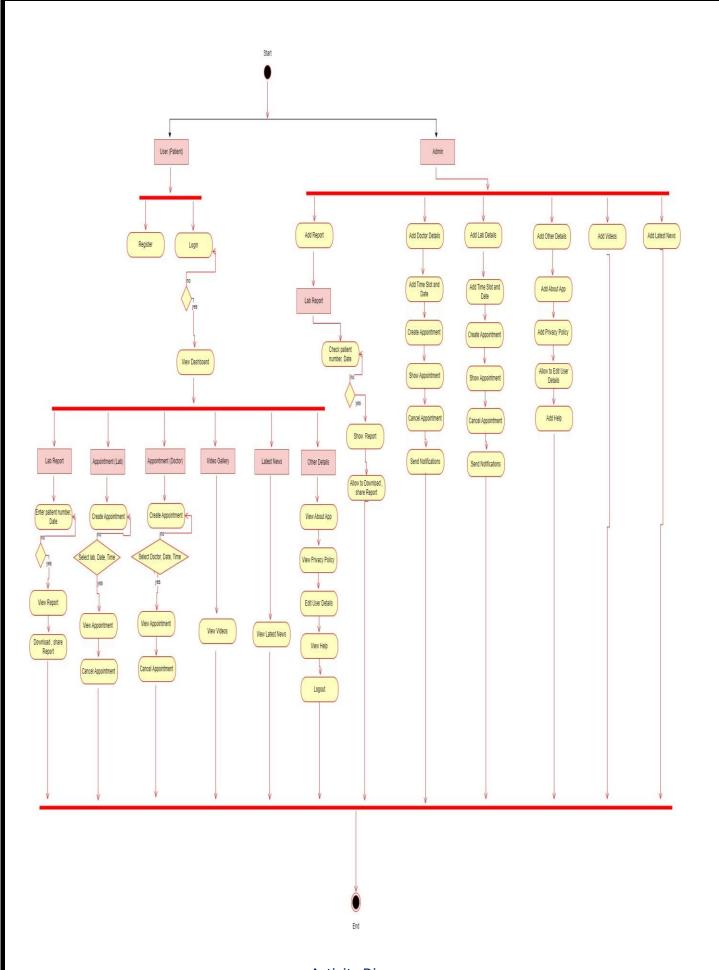


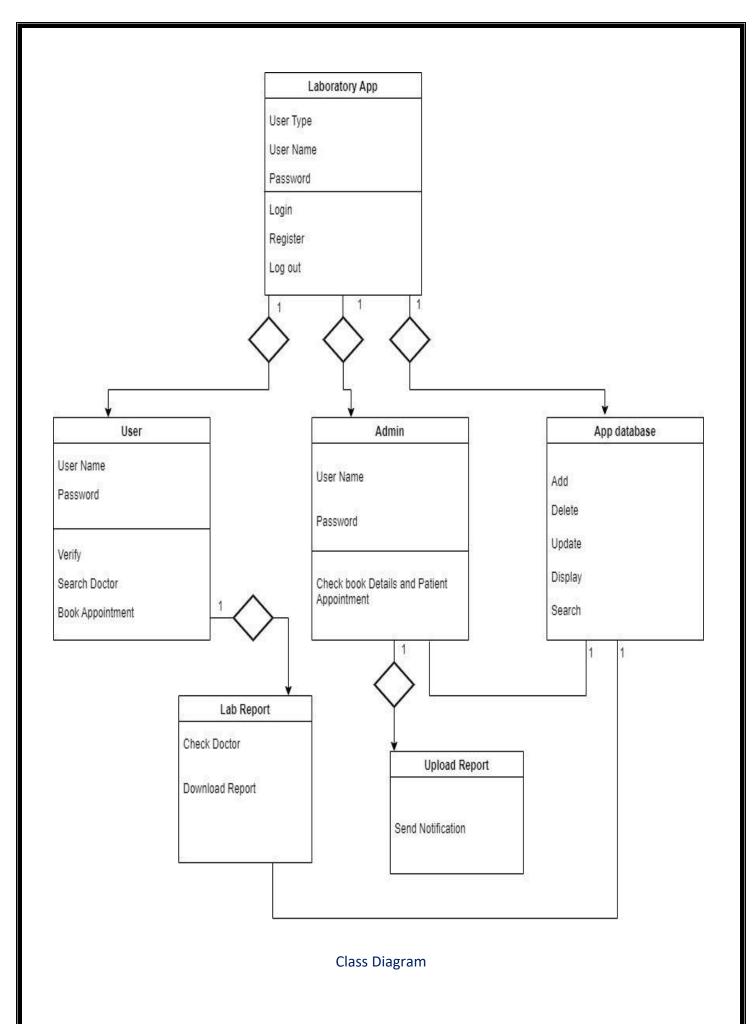
Use Case Diagram

3.1.2 Data Archival and Retention

- Database firebase real time data base.
- The mobile application will be connected to the real-time hosting service database using Cloud hosted no SQL database. It will offer content, social authentication (Google, Facebook, Twitter) and notifications, or services, such as a real-time communication server.
- The user system and backend servers never display a user's password. And will present special characters for security reasons.
- The system's back-end servers shall only be accessible to authenticated administrators.
- The system's back-end databases will use the REST API to connect with mobile application development software.







3.1.3 User Profiles, Roles and Privileges

♦ Definition

An individual authorized person can download his own and install the application and create his account to use the application. Users can log in and log out and a new user can register in the application by authorizing their details. User can customize user details as he needs.

♦ Roles, and Privileges

The user will lead the main role in the application when come to use user does not have the access to use all functions. But The application will be granted to user access to the main features given in the application. Users also can customize user details and profiles as needed. Users can get know about the application and any other information need to know about security and privacy. The user does not have access to the database and back-end servers.

4 Non-Functional Requirements

4.1.1 Performance and Load Requirements

- The mobile application will be developed using Android Studio which will, thanks to the good algorithms that will be used, guarantee a high execution speed and a minimized response time.
- The application should load and be usable within 3 seconds.
- The application should update the interface on interaction within 2 seconds.
- The database should be normalized to prevent redundant data and improve performance.
- The database should be distributed to prevent outages.

4.1.2 Compatibility Requirements

- Firebase version (v11.2.0)
- communication protocol http and rest API
- android studio version 2021.2.1
- Firebase backend java version 8 or higher
- android OS android 12.0 or higher

Software Quality Attributes

Availability: The system must be always available for use. Except for special cases (in case of backup), it will announce beforehand through push notifications.

Correctness: The application should never allow anyone to read messages or discussions not intended for that person.

Maintainability: The application should use continuous integration so that features and bug fixes can be deployed quickly without downtime.

Usability: The interface should be easy to learn without a tutorial and allow users to accomplish their goals without errors.

4.1.3 External Interface Requirements

4.1.3.1 User Interfaces

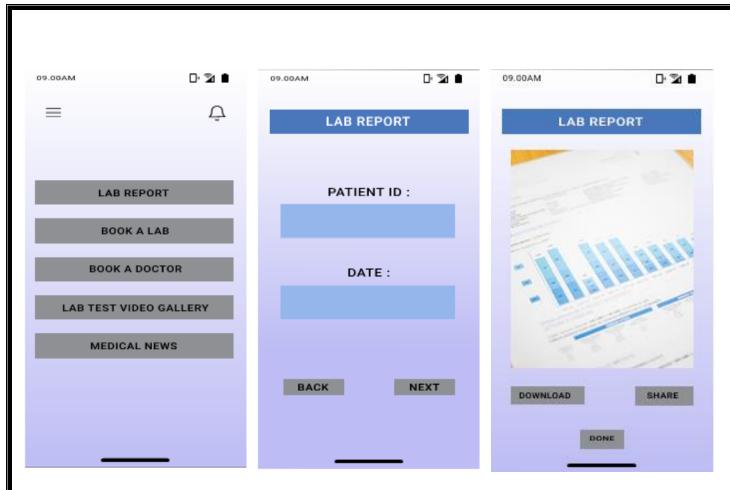
The user interface is friendly which is easy to use. And having attractive frame structure which is prepared in assumption with other related systems. The mobile application will be developed using Android Studio and we used wire frame designs.

1. Login and registration screen 09.00AM 09.00AM D 🔁 🗎 09.00AM D 24 1 ONLINE FORGOT ONLINE LAB REPORT LAB REPORT PASSWORD LOG IN Gmail User Name Password Remember Me REGISTER LOG IN Forgot Password? REGISTER

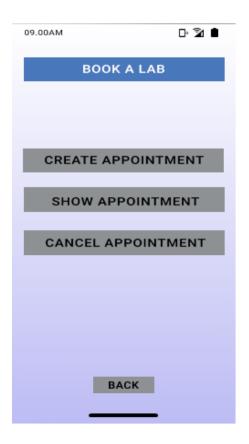
As a new user, enter this app process is simple. First user wants to register this app using their username, password and confirm password. Then user can login giving username and password. If user forgotten their password, they can use "forget password "option to enter Gmail and change their password

2. Dashboard and lab report screen

After the login page, we can go to the dashboard of the application. In that dashboard, we can see lab report, book a lab, book a doctor, lab test video gallery and medical news, which we can select them and go to the related windows. After selecting the lab report tab, we can go to lab report window. In that window, we can select get our lab reports. First, in that tab we want to enter the patient id and date and click next button. After, we can see our lab report and we can download and share our lab report.

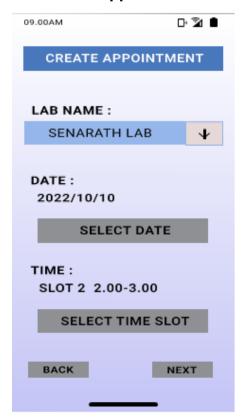


3. Book a Lab screen



Selecting the book a lab option at the dashboard, patients are redirected to the 'Appointment' screen, where the patient has three options: 'Create Appointments', 'Show Appointments' and Cancel Appointments'.

3.1 Create Appointment screen





Patient can choose a lab name. In the same screen the patient selects a date for the appointment and selects a time slot from the list of free slots on that specific date. After, create appointment we can see appointment details and we can confirm that details.

3.2 Show Appointment screen





4. Book a Doctor screen



After selecting the book a doctor option at the dashboard, patients are redirected to the 'Appointment' screen, where the patient has three options: 'Create Appointments', 'Show Appointments' and Cancel Appointments'.

4.1 Create Appointment screen





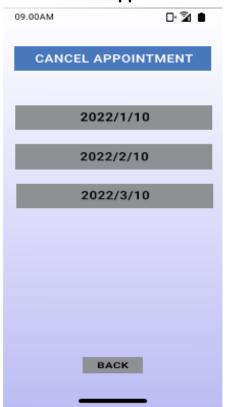
Patient can choose a doctor name. In the same screen the patient selects a date for the appointment and selects a time slot from the list of free slots on that specific date. After, create appointment we can see appointment details and we can confirm that details.

4.2 Show Appointment screen



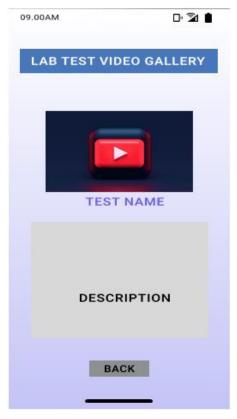
After selecting the book a doctor option at the dashboard, patients are redirected to the 'Appointment' screen, where the patient has three options: 'Create Appointments', 'Show Appointments' and Cancel Appointments'.

4.3 Cancel Appointment



Appointment, then patient must select the specific date from Appointments, which one he /she wants to cancel. After selecting, it shows the detail information about the appointment. Patient can check the detail appointment information before canceling. If patient select Cancel option, then the appointment will be deleted from the appointments table.

5. Lab Test video gallery and Medical News screen





- Lab Test Video Gallery: In that tab we can see some YouTube videos about lab test and we can see the description also.
- Medical News: In that tab we can see some recent medical news.

4.1.3.2 Hardware Interfaces

• Mobile phones use Android OS personal computer for database

4.1.3.3 Software Interfaces

- Latest version of Android
- Database firebase real time data base
- Front end android studio
- Back end xml and java
- Operating systems android

4.1.3.4 Communications Interfaces

The system shall use the HTTP protocol for communication over the internet and for the intranet communication will be through TCP/IP protocol suite.

4.1.4 Security and Authentication requirements

The application must be very secure because it deals with the private information of the users. This should be performed using the right encryption of data only accessed by the administrator. More than that, the system must follow these main security rules:

- Confidentiality: Only the admin has access to user personal info and orders.
- Integrity: Only the users can modify their personal info.
- Authenticity: No one can access, modify, or delete other accounts' information.

4.1.4.1 Data Storage Security

- The mobile app shall never display a user's password. It shall always be echoed with special characters representing typed characters.
- The mobile app's back-end servers shall never display a user's password. The user's password may be reset but never shown.
- The mobile app's back-end servers shall only be accessible to authenticated administrators.
- The mobile app's back-end databases shall be encrypted.

4.1.4.2 Data Communication Security

- The mobile app shall use secure sockets in all transactions that include any confidential user information.
- The mobile app shall confirm all transactions with the user's app.
- The system shall not leave any cookies on the customer's computer containing the user's password.
- The system shall not leave any cookies on the customer's computer containing any of the user's confidential information.

4.1.5 Quality Assurance Requirements

4.1.5.1 QA Test Scope

- The online lab report application will test mainly security, privacy, performance, and other main function of an application. In developing time this application will be tested on a few levels.
- Integrated test to keep users and other parties' data safe first needed to confirm connection and security of database and application. At this level developer will check all connection root files bugs and other problems.
- Individual component test on the end of function and features will test each of the components and features that are created. The connection between function. Userfriendliness. Component screen size. Time is taken after click. Availability of functions. Smoothness. Bugs, user's device compatibility and support and user load management will be tested.
- Final system test after being developed complete test developers will check the overall system including the database and application. Speed privacy and security

connection protocols, system compatibility device compatibility user compatibility on all sides will be tested.

4.1.5.2 QA Environment

- User can configure their testing environment in different ways. Therefore, note the following general scope limitations:
- Don't trigger orders. Stop testing before the end of the checkout process.
- Don't submit data or content, e.g. support requests, product reviews, or comments.
 Submitting data will otherwise require clean-ups by our customers or it will even be visible to real users of their products.
- Don't interact with our customers, e.g. via support chat, phone, or email.
- Omit testing any of such functionalities unless stated differently in the test instructions.

4.1.6 Development Requirements

4.1.6.1 Development Environment

- In this thesis we will focus the development of secure online lab test report mobile application on Android Platform. Android is one of the most famous mobile phone OS that has come to the second position within the ten years of its invention. Android is an open source and free mobile platform. It has its own application security features. The Android applications are developed using APIs the same as Java which are developed by Google and Open Handset Alliance. Android developers don't have any costly barrier for using this application. There are many Eclipse programs available in integrated development environment (IDE) for Android application developers. These applications are written in Java.
- Firebase is a set of hosting services for any type of application. It offers NoSQL and real-time hosting of databases, content, social authentication, and notifications, or services, such as a real-time communication server.
- Hardware android mobile phone

4.1.6.2 Coding Standards

- Java is one of the mostly used popular programming languages.
- It is a class based, Object oriented platform independent programming language.
- It has lot of build-in security features. So developer gets some extra benefit by using Java from build-in support for multithreading to developing application. It is free to download software.
- Java is simple, easy to design, compile debug and easy to write code. This application is developed for Android platform.
- This application is written by Java programming language.

4.1.6.3 Deployment Requirements

Once an update has been fully tested, it can be deployed to the live environment. Developers may run a set of scripts to update relevant databases before changes can go live. The final step is to check for bugs or errors that occur on the live server to ensure the best possible customer experience for users interacting with the new update.

4.1.6.4 Applicable Standards

- Legal and regulatory FDA
- Communication stands- TCP/IP
- Platform android

4.1.7 Usability Requirements

- Accessibility: The system shall provide handicap access. The system will provide offline access.
- The book a lab and book a doctor should satisfy a patient's needs.

5 Appendix

INTERVIEW SHEET

- Interviewer:- B.F.Faseeha
 Interview Date:- 2022/10/30
- 3) Interviewee
 - Name:- Mr. S.M. Al Saneej
 - Position:- Senior Medical Laboratory Technologist
 - > Email:- saneejmohamed1997@gmail.com
 - > Contact Number:- 0773488500
 - > Lab Address:- No: 142/A Colombo road, kurunegala

Interview Questions and Answers

Question	Answer
What is your laboratory name? What is your position and job there?	Durdans Medical Laboratory (Senior Medical Laboratory Technologist)
What kind of test can take in your lab?	All kind of laboratory testing with blood, urine, fecal, body fluid or any other specimens.
What type of information patient must have before coming to the test?	A prescription or History of the relative test
What kind of Method do you currently use for the delivery of lab reports?	Email, Whatsapp , link via lab system or hard copy.
If you have any system to deliver reports via online. Tell us about that.	Yes, A link will send as a message for the patient mobile number. Through this link patient can view the report via our lab system.
What kind of problems do you have faced to deliver reports?	system errors, Email not work properly
If not, what do you think about having something like that mobile app to deliver reports via online? Is that easy?	Yes, it's easy. I think It will be very helpful for the future. Because there are lot of advantages, The system allows automate diagnosis system. Allows for faster service. Allows increased sales and profits for diagnostic labs. Easy, user friendly GUI.

Is there any chance to a person didn't visit even they booked for the test?	Yes, it's not compulsory to book a number.
Tell us, the most important details about a patient that need to a test?	Patient's age, sex, mobile number, name, any other relative clinical histories and the prescriptions.
Who is the responsible person to maintain the lab reports?	Medical laboratory technologist (M.L.T), Quality Control Supervisor.
How do you identify the correct person lab reports? Is there any ID numbers in the report?	There is a specimen number. That specimen number generate through a barcode system and each one specimen belongs to each patient.
We are expecting to give user a reference number when they registered to the app. Do you think using that make easy to deliver lab report?	Yes, maybe it useful. Patient can use the reference number to take the reports.

Sancej

Interviewee Signature:-