COMSATS University Islamabad,

Sahiwal Campus.

Online Diagnosis Lab System

(Web Application)

By

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Bachelor of Science in Software Engineering (2019-2023)

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Online Diagnostic Lab System

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Bachelor of Science in Software Engineering (2019-2023)

By

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_____	_____	_____

CERTIFICATE OF APPROVAL

It is to certify that the final year project of BS (SE) "Online Diagnostic Lab System" was developed by Bushra Jabeen (CIIT/SP19-BSE-003/SWL), Fahad Haider (CIIT/SP19-BSE-004/SWL) and Muhammad Saif-Ullah (CIIT/SP19-BSE-015/SWL) under the supervision of "Dr. Javed Ferzund" and that in his opinion; it is fully adequate, in scope and quality for the degree of Bachelor of Science in Software Engineering.

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Executive Summary

The Online Diagnostic Lab system started as a system to keep a record of test samples, their results and all other particulars of donor and patient's sample.

The Online Diagnostic Lab System today is so reliable that once a test sample is collected in lab or patients house, it is taken to a pathology laboratory and given a tag, it is almost impossible to lose track of it. The Online Diagnostic Lab software can manage and update the progress in tests and can also update the result of the tests to the database in real-time.

An Online Diagnostic Lab System is used to help lab employees in collecting samples, processing, and delivering reports to patients. It acts as an interface between the lab faculties and the database where all the information and essential details are stored.

Patients can register on the website and log in with their username and password. In the system patients can now examine a variety of tests performed by the lab, as well as their fees, after registering with their address and contact information. Patients can use the system to schedule tests such as CBC, Blood Glucose, KFT, and LFT. Hemoglobin, WBC, and other markers are included in the testing.

The main thing in our system is to take reviews by patients because of the best performance lab and our system recommends the best lab to the customers by using customers reviews. The history of all tests is available at portal. Patient can download and view reports.

Acknowledgement

All praise is to Almighty Allah who bestowed upon us a minute portion of His boundless knowledge by virtue of which we were able to accomplish this challenging task.

We are greatly indebted to our project supervisor “Dr. Javed Ferzund” that without his personal supervision, advice and valuable guidance, completion of this project would have been doubtful. We are deeply indebted to him for his encouragement and continual help during this work.

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Bushra Jabeen Fahad Haider Muhammad Saif-Ullah

Abbreviation

GUI	Graphical User Interface
UCD	Use Case Diagram
API	Application Programming Interface
DFD	Data Flow Diagram
FR	Functional Requirement
SD	Sequence Diagram
SRS	System Requirement Specification
SDD	Software Design Development
NFR	Non-Functional Requirement
App	Application
JSON	Java Script Object Notation
UML	Unified Modeling Language
FYP	Final Year Project

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CHAPTER 1

INRODUCTION

1. INTRODUCTION

In this chapter we will discuss the detailed introduction of the project. Online Diagnostic Lab System is designed for Any Diagnostic Center to replace their existing manual paper-based system. This system involves; patient personal information, staff information, and test information including schedules and results, and payment history these services are to be provided in an efficient, cost-effective manner, to reduce the time and resources currently required for such tasks. A significant part of the operation of any diagnostic center involves the acquisition, management, and timely retrieval of great volumes of information. Online Diagnostic Lab Reporting System will automate the management of the diagnostic center making it more efficient and error-free. It aims at standardizing data, consolidating data, ensuring data integrity, and reducing data consistencies.

1.1 Brief

The Online Diagnostic Lab system started as a system to keep a record of test samples, their results and all other particulars of donor and patients sample the main purpose of the proposed project are that the online system simply automates diagnosis lab system. It is faster and reliable, provides better services as compared to a manual system. This system may increase the profit for diagnosis labs. The user friendly and interactive interface makes using this application easy for everyone. There is almost zero percent chance of report swapping or missing which has quite fair chances in manual system.

The Online Diagnostic Lab System today is so reliable that once a test sample is collected in lab or patients house, it is taken to a pathology laboratory and given a tag, it is almost impossible to lose track of it. The Online Diagnostic Lab system can manage and update the progress in tests and can also update the result of the tests to the database in real-time.

An Online Diagnostic Lab System is used to help lab employees in collecting samples, processing, and delivering reports to patients. It acts as an interface between the lab faculties and the database where all the information and essential details are stored.

Patients can register on the website and log in with their username and password. In the system patients can now examine a variety of tests performed by the lab, as well as their fees, after registering with their address and contact information. Patients can use the system to schedule tests such as CBC, Blood Glucose, KFT, and LFT. Hemoglobin, WBC, and other markers are included in the testing.

The system is located near the lab. The client can book certain needed test online. After successful booking the system calculates the estimated cost and the user must pay online. After the test is conducted and samples are examined the patient gets reports results of their test with the help of notification. The users can immediately view their reports and can collect hard copies of reports from diagnostic center later. The proposed system is built by using the framework Laravel.

The main thing in our system is to take reviews by patients based on best performance lab and our system recommends the best lab to the customers by using customers reviews [1].

1.1.1 Programming Languages

- CSS
- HTML
- JAVASCRIPT
- MDBOOTSTRAP
- PHP

1.1.2 Programming Frameworks

- Laravel

1.1.3 Tools and technologies

- Sublime
- Laragon
- PhpStorm
- MS Project
- MS PowerPoint
- MS word 2019
- My SQL

1.2 Relevance to Course Modules

We use the basic concepts that we have learned in our different courses. As we have studied the course database, we have applied all the concepts of the database in this project. We have used many queries i.e., retrieve, insert, update and delete records in the database. Software engineering, I and II concepts are also used to select the methodology approach for this project, and software project management is applied for managing this project. We have implemented website development concepts which we have studied in our degree. Also, we have implemented Introduction to programming for logic. The work breaks down structure and the Gantt chart for this project has been developed using software project management. To help design and prototype HCI was the subject we had studied that gave us lots of information about what an interface should look like.

1.3 Project Background

Online Diagnostic Lab System is designed for Any Diagnostic Center to replace their existing manual paper-based system. Technology has facilitated human beings in almost every field of life. They turn manual tasks automatic to save recourses. Automatic work is considered more trustful, reliable, accurate etc. Technology is the main reason which successfully manages many processes. It was very difficult to save whole data manually. To overcome this problem, we proposed the "Online Diagnostic Lab System". It is faster and reliable, provides better services as compared to a manual system. There is almost zero percent chance of report swapping or missing which has quite fair chances in manual system. The patients are easily finding out the best performance lab because our system is to take reviews by patients based on best performances of labs and our system recommends the best lab to the customers by using customers reviews.

1.4 Literature Review

Table 1 : Literature Review

Application Name	Weaknesses	Purposed solutions
"Online Diagnostic Lab System"	• Weaknesses may include limited features, low quality functionality and processes. • Not include recommendation feature using customers reviews. • Previous report cannot access	• This system is no more effective. • Download previous reports any time from portal. • The history of all tests is available at portal.

1.5 Analysis from Literature Reviews

As you can see the mentioned limitations of projects. We want to work on those limitations. Patients or people face a lot of problems due to manual system; applications of Online Diagnostic Lab are built to help users involved in the system, but they have so many restrictions.

This Online Diagnostic Lab System has the following benefits:

- The sole purpose of this system is to minimize the human effort in basic diagnosis procedures like patient's information, test schedule, test information etc.
- Due to this System, there is almost zero percent chance of report swapping or missing which has quite fair chances in manual system.
- The patients are easily finding out the best performance lab because our system is to take reviews by patients based on performances of labs.

1.6 Methodology and Software Lifecycle for the Project

For the development of this system, incremental models will be used. The incremental model divides the requirements into smaller increments. These increments are easy to handle, and documentation done easily. While developing Diagnostic Lab System firstly requirement will be

gathered. These requirements are divided into increments. Division will be done based on how many major modules system required.

1.6.1 Incremental Model

For the development of this system, incremental models will be used. The incremental model divides the requirements into smaller increments, and we do not need to do long term planning and documentation changes will be made during the development of the project. These increments are easy to handle, and documentation done easily. While developing Diagnostic Lab System firstly requirement will be gathered. Then these requirements are divided into increments. Division will be done based on how many major modules system required [2].

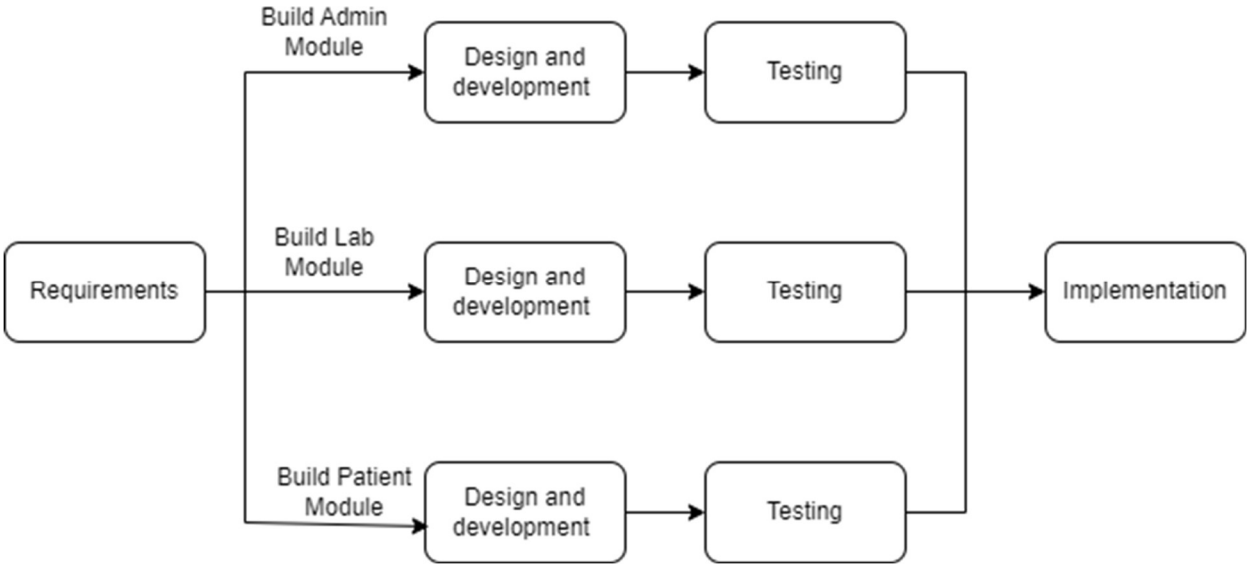

Figure 1 : Incremental Model

1.7 Rationale behind Selected Methodology

The methodology which is used in this development is the Incremental Model. The incremental model divides the requirements into smaller increments, and we do not need to do long term planning and documentation changes will be made during the development of the project. The rationale behind this selected strategy is, incremental model is a process where requirements are broken down into independent modules of software development cycle. In this way we have completed our project.

CHAPTER 2

PROBLEM DEFINITION

2. PROBLEM DEFINITION

This proposed Web based Diagnostic Lab System is to replace the current manual system. The manual system is messy and time consuming with lack of efficiency. The sole purpose of our Online Diagnostic Lab Reporting System is to minimize human effort in the basic diagnosis procedure like patient's information, test schedule, test information etc. The main function of the system is to register and store test details and retrieve these details as and when required and to manipulate these details meaningfully. System input contains patient details, diagnosis details while system output is to get these details on the computer screen. The main thing in our system is to take reviews by patients because of the best performance lab and our system recommends the best lab to the customers by using customer's reviews. The history of all tests is available at portal. Patients can download and view reports.

2.1 Problem Statement

The problem is that there is no specific platform that includes several labs at the same place. There is no comparison of prices of tests of different labs. Customers can only get a specific report of test and no system can access their recent reports and no report tracking system. It also does not contain the best lab recommendation using customer feedback. Online payments are secure with stripes.

2.2 Deliverable and Development Requirements

The main objective of the application is to reduce the workload of users.

- Provide easy way to Sign Up and Sign In
- It can also make the data organized.
- It can save time for the patients because patients can examine their report from home.
- The patients can easily find out the best performance lab because our system is to take reviews by patients based on best performances of labs.

Patients can register on the website and log in with their username and password. In the system patients can now examine a variety of tests performed by the lab, as well as their fees, after registering with their address and contact information. Patients can use the system to schedule

tests such as CBC, Blood Glucose, KFT, and LFT. Hemoglobin, WBC, and other markers are included in the testing.

The client can book certain needed test online. After successful booking the system calculates the estimated cost and the user must pay online. After the test is conducted and samples are examined the patient gets reports results of their test with the help of notification. The users can immediately view their reports and can collect hard copies of reports from diagnostic center later.

System requires an internet connection to maintain customer profile. This system will be responsive and can be used on any device.

The platform to run and build this app are as follows:

- PhpStorm
- Laragon
- Nginix
- Sublime

2.3 Current System

The current system only includes report tracking, when you book an appointment and give blood sample you can only track your report status, you can no send money online and never get previous reports.

CHAPTER 3

REQUIREMENT ANALYSIS

3. REQUIREMENT ANALYSIS

3.1 Use Cases Diagram

A use case diagram is the primary form of system/software requirements for a new software program underdeveloped. Use cases specify the expected behavior (what), and not the exact method of making it happen (how). Use cases once specified can be denoted both textual and visual representation (i.e., use case diagram). A key concept of use case modeling is that it helps us design a system from the end user's perspective. It is an effective technique for communicating system behavior in the user's terms by specifying all externally visible system behavior [3].

Figure 2 : Use Case Diagram

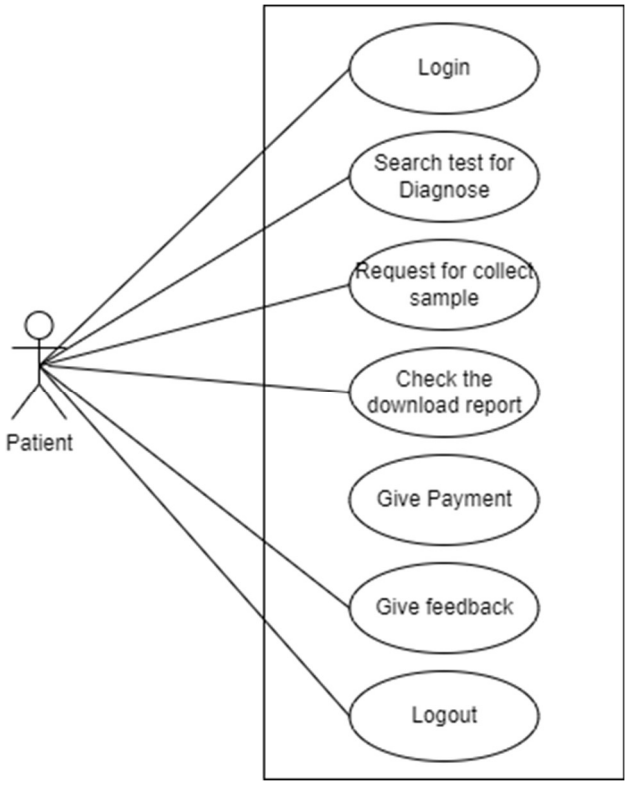

Figure 3 : Use Case Diagram of Patient

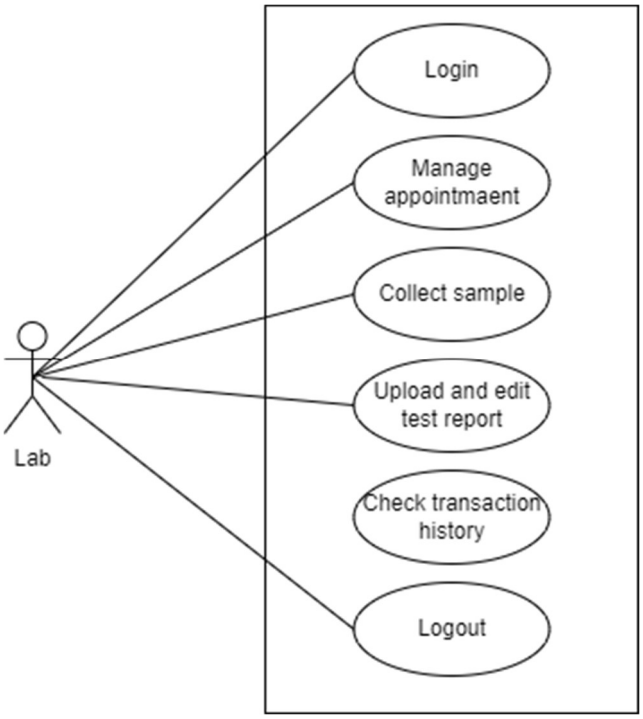

Figure 4 : Use Case Diagram of Lab

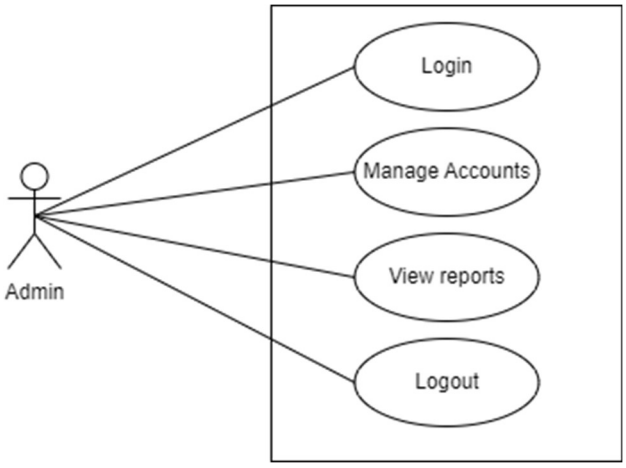

Figure 5 : Use Case Diagram of Admin

3.2 Use Case Description

The table below indicates a comprehensive use case template filled in with an example drawn from the ONLINE DIAGNOSTIC LAB SYSTEM [4].

Table 2 : Use Case Description 1

Use Case ID:	ODLS-1
Use Case Name:	**Login**
Actors:	Primary Actor: Admin, Patient, Lab.
Description:	Any user login to system using its user id and password if user id not found or password not matched with user's actual password than user cannot access the system
Trigger:	Users' login the system for performed all functionalities as book appointment, download report, etc.
Preconditions:	Internet is mandatory
Post conditions:	After login the system user accesses all the functionalities.
Normal Flow:	First user searches the website (online diagnostic lab system) click the link than click the login button if he/she has login account otherwise he/she click the singing up button.
Exceptions:	When the user id or password is correct then open the dashboard of the system otherwise show the message of invalid password or user id.

Table 3 : Use Case description 2

Use Case ID:	ODLS-2
Use Case Name:	**Search test for diagnose**
Actors:	Primary Actor: Patient.
Description:	The patients are first allowed to register on the site and login using registered details. Once registered with their address and contact details. The system allows for CBC, Blood glucose, KFT, LFT etc. These tests to be booked by patient.
Trigger:	When patient login the system than he/she write the tests name in the search bar and then select lab as he/she like.
Preconditions:	Internet is mandatory and patient must login the system.
Post conditions:	Patient must be giving his correct details to proceed the diagnoses.
Normal Flow:	First user searches the website (online diagnostic lab system) click the link then click the login button if he/she has login account otherwise he/she click the signing up button. after this dashboard is open patient search the test and select tests for diagnoses.
Exceptions:	Request for collect sample after search or select the tests.

Table 4 : Use Case description 3

Use Case ID:	ODLS-3
Use Case Name:	**Request for collect sample**
Actors:	Primary Actor: Patient.
Description:	The patients are first allowed to register on the site and login using registered details. Once registered with their address and contact details. The system allows for CBC, Blood glucose, KFT, LFT etc. These tests to be booked by patient.
Trigger:	When a patient login the system than he/she write the tests name in the search bar and then select lab as he/she like. patients select the test and click the button for collect samples of blood.
Preconditions:	The Internet is mandatory. patient must login the system.
Post conditions:	Patient must be giving his correct details to proceed the diagnoses.

Normal Flow:	First user searches the website (online diagnostic lab system) click the link than click the login button if he/she has login account otherwise he/she click the singing up button. after this, dashboard is open patient search the test and select tests for diagnoses, add the details (name address) and request for collect sample.
Exceptions:	Show the message

Table 5 : Use Case description 4

Use Case ID:	ODLS-4
Use Case Name:	**View and download report**
Actors:	Primary Actor: Patient.
Description:	The patient is first allowed to register on the site and login using registered details. Once registered with their address and contact details. The system allows for CBC, Blood glucose, KFT, LFT etc. These tests are to be booked by the patient lab. request for collect sample After successful testing the user now gets a notification and get download his/her report from user portal.
Trigger:	When a patient login the system than he/she write the tests name in the search bar and then select lab as he/she like. patients select the test and click the button to collect samples of blood. patient can view and download the report from his portal.
Preconditions:	The Internet is mandatory. patient must login the system.
Post conditions:	Patient must be giving his correct details to proceed the diagnoses.
Normal Flow:	The patient is first allowed to register on the site and login using registered details. Once registered with their address and contact details. The system allows for CBC, Blood glucose, KFT, LFT etc. These tests are to be booked by the patient lab. request for collect sample After successful testing the user now gets a notification and get download his/her report from user portal by click on download option.
Exceptions:	Show the message successful download.

Table 6 : Use Case description 5

Use Case ID:	ODLS-5
Use Case Name:	**Give payment**
Actors:	Primary Actor: Patient.
Description:	The patients are first allowed to register on the site and login using registered details. Once registered with their address and contact details. The system allows for CBC, Blood glucose, KFT, LFT etc. These tests to be booked by patient Now the system allows users to pay online.
Trigger:	When a patient login the system than he/she write the tests name in the search bar and then select lab as he/she like. patients select the test, add and click the button for collect samples of blood. Now the system allows users to pay online or cash on delivery.
Preconditions:	The Internet is mandatory. patient must login the system.
Post conditions:	Patient must be giving his correct details to proceed the diagnoses.
Normal Flow:	First user searches the website (online diagnostic lab system) click the link then click the login button if he/she has login account otherwise he/she click the signing up button. After this, dashboard is open patient search the test and select tests for diagnoses, add the details (name address) and request for collect sample. pay cash through online.
Exceptions:	Show the message thank you for using our site.

Table 7 : Use Case Description 6

Use Case ID:	ODLS-6
Use Case Name:	**Upload and edit test report**
Actors:	Primary Actor: Lab.
Description:	The lab is first allowed to register on the site and login using registered details. Once registered with their address and contact details. The system allows to lab upload and edit test reports.
Trigger:	The lab is first allowed to register on the site and login using registered details. Once registered with their address and contact details. The system allows to lab upload and edit test reports that is accessible by customer.

Preconditions:	The Internet is mandatory. Lab (diagnose center) must login the system.
Post conditions:	Patient request for sample.
Normal Flow:	The lab is first allowed to register on the site and login using registered details. The system allows to lab upload and edit test reports that is accessible by customer.

3.3 Functional Requirements

Functional Requirements are defined as the requirements which are essential for the system. The requirement is mentioned by the end-user and the market requirements. Such requirements describe system behavior under specific conditions and include the product features and functions which web & app developers must add to the solution. Such requirements should be precise both for the development team and stakeholders [5].

This system will have following modules:

- Module 1: Admin module
- Module 2: Patient module
- Module 3: Lab module

3.3.1 Admin Module

1. Admin will login using his own profile.
2. Can view reports.
3. Can manage accounts.

3.3.2 Patient Module

1. User will login using his own profile.
2. Can search test for diagnose.
3. Can request for collect sample.
4. Can see and download reports.
5. Pay charges for tests
6. Give feedback.

3.3.3 Lab Module

1. User will login using his own profile.
2. Users will collect samples.
3. Users can upload and edit test reports.
4. Can check transactions reports.

3.4 Non-Functional Requirements

Non-Functional Requirements are the requirements that specify criteria that can be used to judge the operation of a system. Those constraints under which the system will be operated are called non-functional requirements. For example, run time environment, operating environment performance requirements, usability requirements etc. These are all those requirements whose are not belonged to functional requirements, but they affect overall on the system. We can say some extra conditional requirements that are not included in the use cases. These are usually called non-functional requirements.

Usability
In our system usability does not a specify part of the requirements but discussed relation between the user and system interfaces. It is about the ease with which a user can learn to start using the solution and the ease with which the user can use the system.

Performance
Our application will have a very good response time. It performs all the tasks very correctly and provides all the results quickly and accurately. How fast does it need to operate?

Security
There should have login option for authorized member. The System must have a strong security to protect itself from any external threats
System wouldn't allow any unauthorized user to enter in the system; this action will maintain and improve the security level of the system.

Portability
"Online Diagnostic Lab System" is web application that will run on different versions of browsers i.e. Chrome, Firefox.

Modifiability
"Online Diagnostic Lab System" refers to the ease with which a solution or its component can be fixed, enhanced to meet business needs, or increase efficiency, or adapted to a changing environment.

CHAPTER 4

DESIGN AND ARCHITECTURE

4. DESIGN AND ARCHITECTURE

The following parts of the Software Design Description (SDD) report should be included in this chapter.

4.1 System Architecture

The structure of the system explains its core components, their relationships, and how they deal with each other. Software architecture and design includes several factors such as business strategy, quality attributes, human dynamics, design, and IT environment. In Architecture, nonfunctional decisions are cast and separated by the functional requirements. In Design, functional requirements are accomplished. A combination of modules makes up the system. We can use flowcharts to represent and illustrate the architecture [6].

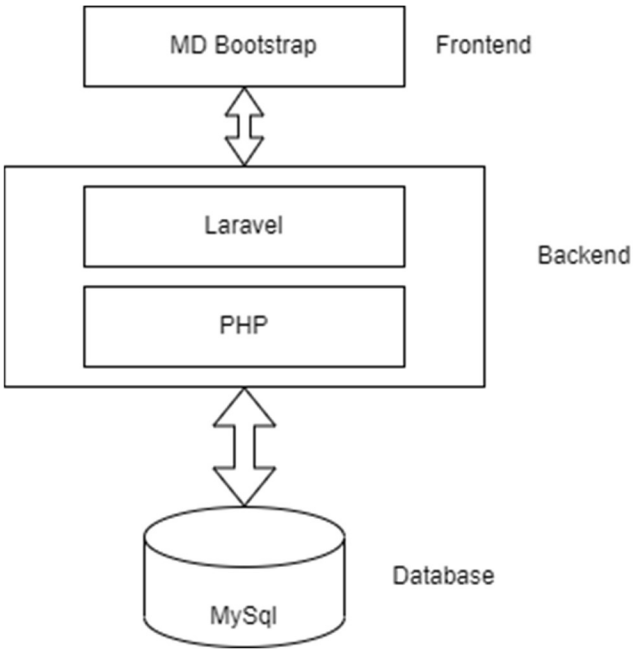

Figure 6 : System Architecture

4.2 Data Representation

During this process, databases have been made related to three modules for this system which are patient, admin, and Lab. It is basically designed to define the relation between different modules with each other. The database will be made on Laravel and will be managed through XAMMP server.

4.3 Data Description

During this process, databases have been made related to three modules for this system which is patient, admin, and Lab. It is basically designed to define the relation between different modules with each other. The database will be made on Laravel and will be managed through XAMMP server.

4.4 Data Dictionary

- Online Diagnosis Lab System–ODLS
- Multiple Accounts–MA
- Data Flow Diagram – DFD
- Graphic User Interface –GUI
- Database–DB
- Final year project–FYP

4.5 Data Flow Diagram

This diagram represents the flow of data or process of the system. It gives complete information about the outputs and generated after providing user's inputs of each module and process itself [7].

4.5.1 LEVEL-0

- DFD level-0 is also called context level diagram.
- Here we have three External entities Patient, Lab, and Admin.
- DFD level-0 has only one process, that is the whole system of Online Diagnostic Lab.

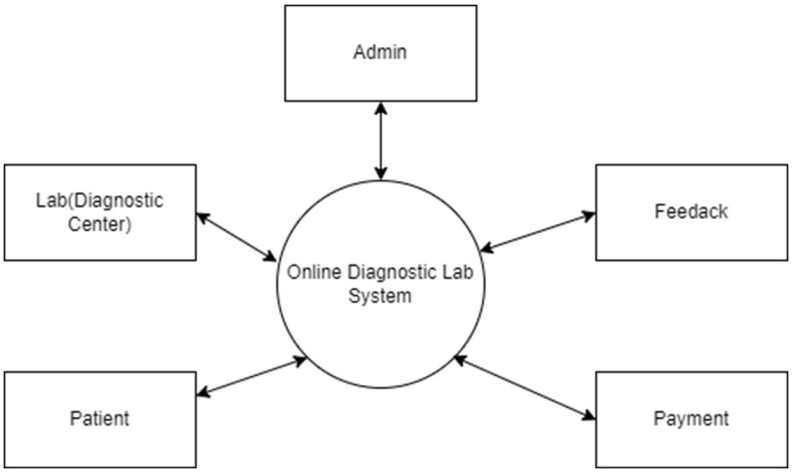

Figure 7 : DFD Level-0

4.5.2 Level-1

- DFD level-1 has three external entities Customers, Lab and Admin.
- In DFD level-1 a main process has been sub divided into sub processes.
- Search test, Appointment, Manage Account, Manage Transaction Report, View/Download test report, Upload/edit test report and feedback are the sub processes.

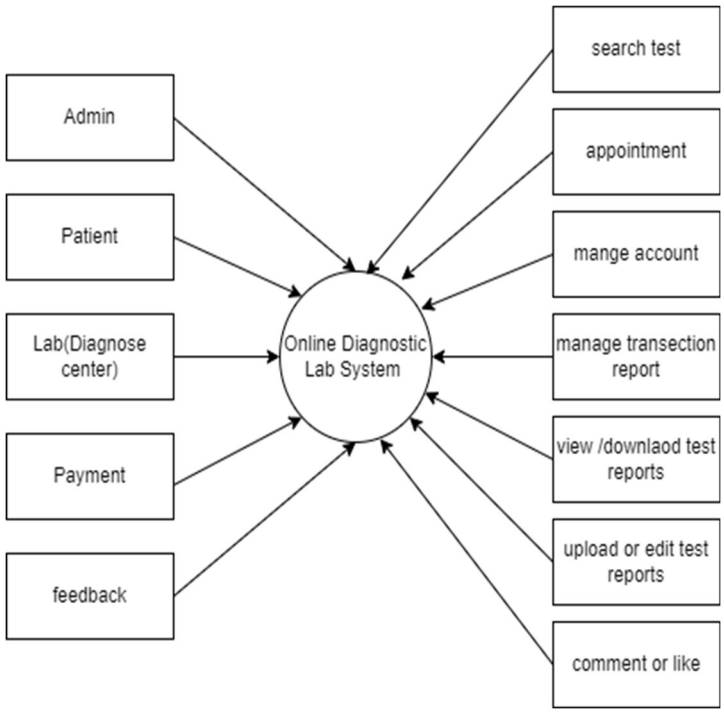

Figure 8 : DFD Level-1

4.5.3 LEVEL-2

- In DFD level-2 highlight the main functions of the system and breakdown the high-level process of 0-level DFD into subprocesses.
- DFD level-2 goes one step deeper into parts of DFD level-1.
- It can be used to plan or record the specific details about the system's functioning.

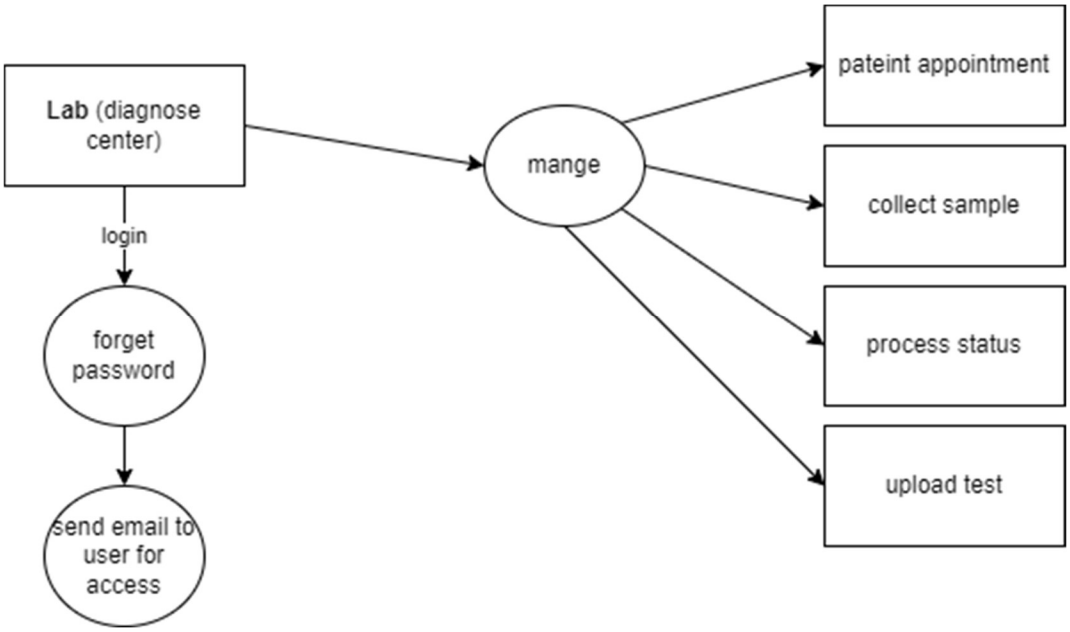

Figure 9 : DFD Level-2

4.6 Process Flow/Representation

4.6.1 Flowchart

The flow of the project is to generate the test reports and notify the patient as soon as it is made. There are three participating members in the system one is the-Super admin, Lab admin, and Patient. The patients search for tests here and number of nearby labs list below with price that provide this test facility and show recommended labs based on their previous customer reviews. The patients are first allowed to register on the site and login using registered details. Once registered with their address and contact details. The system allows for CBC, Blood glucose, KFT, LFT etc. These tests are to be booked by a patient. Now the system allows users to pay online. After payment the patient test is booked and notified. The lab employee collects samples from patients registered address on the mentioned sample collection date. After successful testing the user now gets a notification and get download his/her report from user portal. Previous test history is also available at patient portal [8].

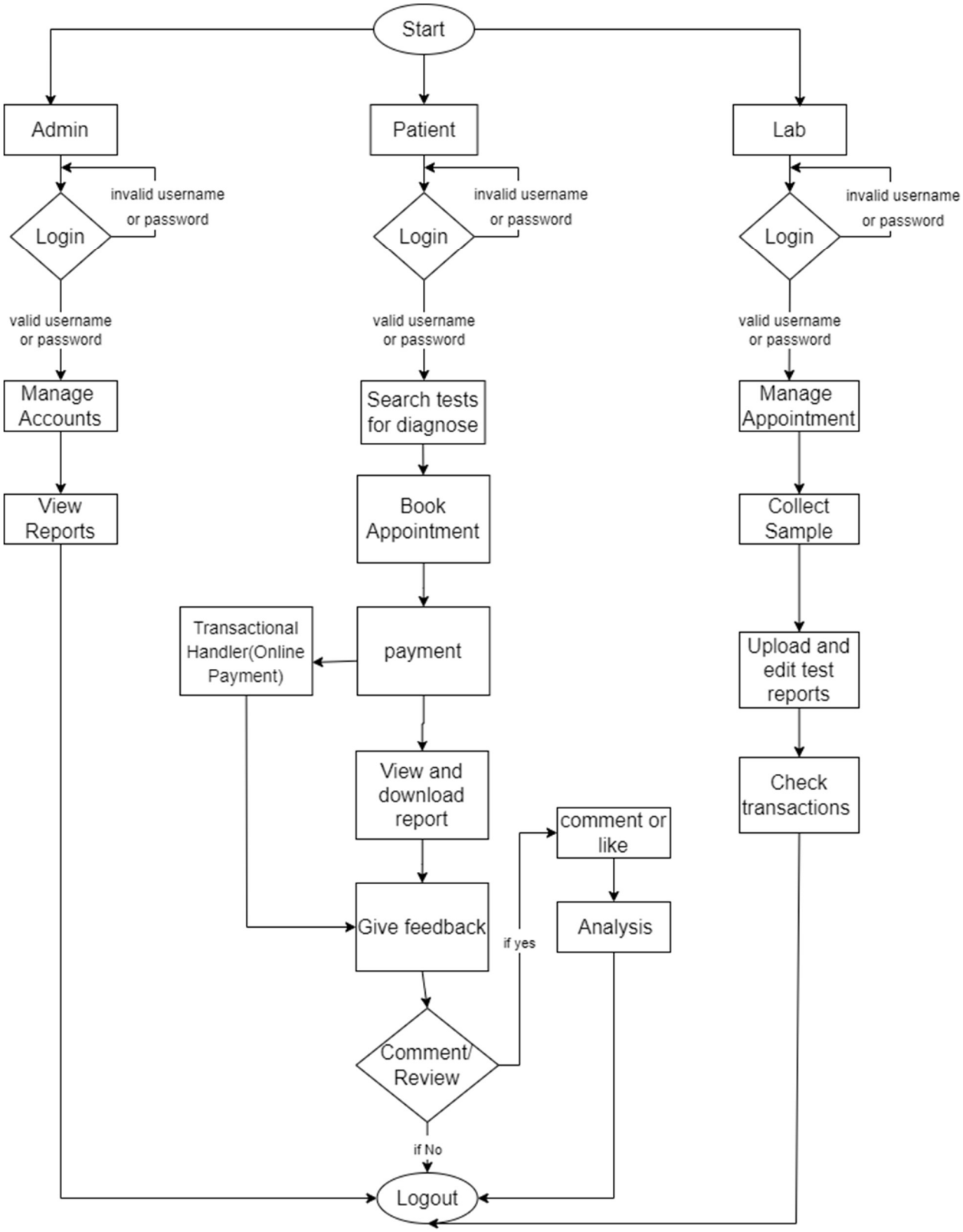

Figure 10 : Flow Chart

4.7 Design Models

4.7.1 Sequence Diagram of Admin:

A sequence diagram is a Unified Modeling Language (UML) diagram that illustrates the sequence of messages between objects in an interaction. A sequence diagram consists of a group of objects that are represented by lifelines, and the messages that they exchange over time during the interaction.

The admin first enters username or valid password for login and then he performs his work. He can manage the accounts i.e. patient account or lab account and admin can also view the reports. Admin also log out from the system.

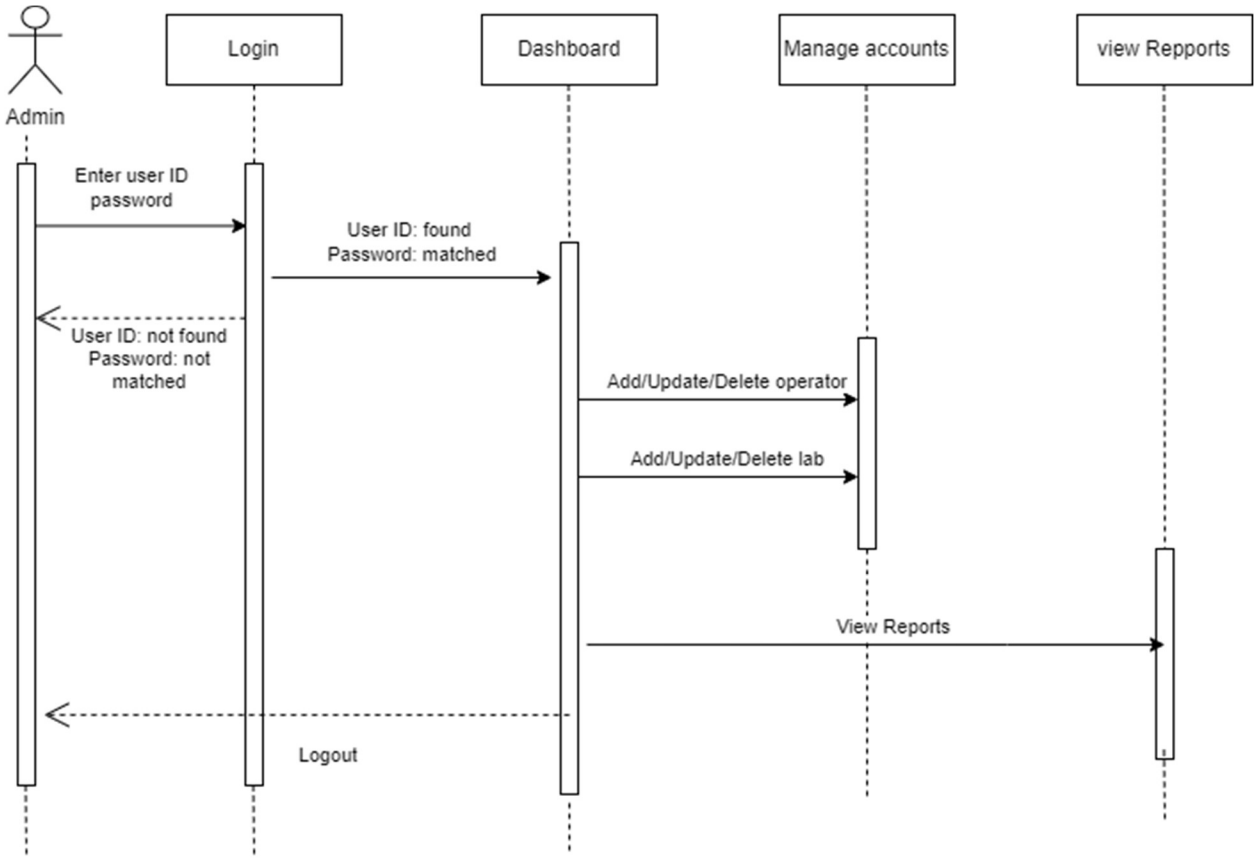

Figure 11 : Sequence Diagram of Admin

4.7.2 Sequence diagram of lab (diagnose center):

In this UML lab or diagnose center first login by enter valid username or password to perform his functionality. Diagnose center can manage appointments according to the patient. The lab also uploads the report or edits the test report he/she can also check the transactions report [9].

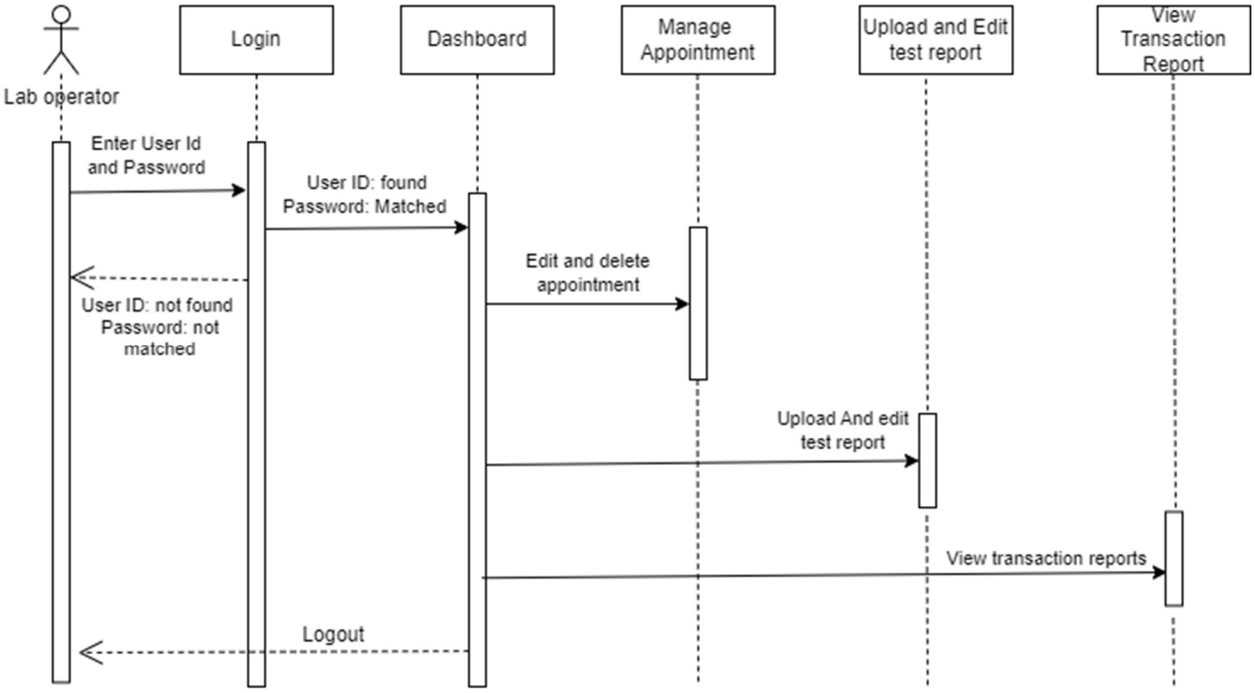

Figure 12 : Sequence Diagram of Lab

4.7.3 Sequence diagram of patient:

Patients also can login to the system to interact with the system. Patients can search the test and select the lab by comparing the payments or ratings. Patient can check or download the reports and give money through the online payment. Patients can also give feedback if he/she wants. Patients also log out from the system.

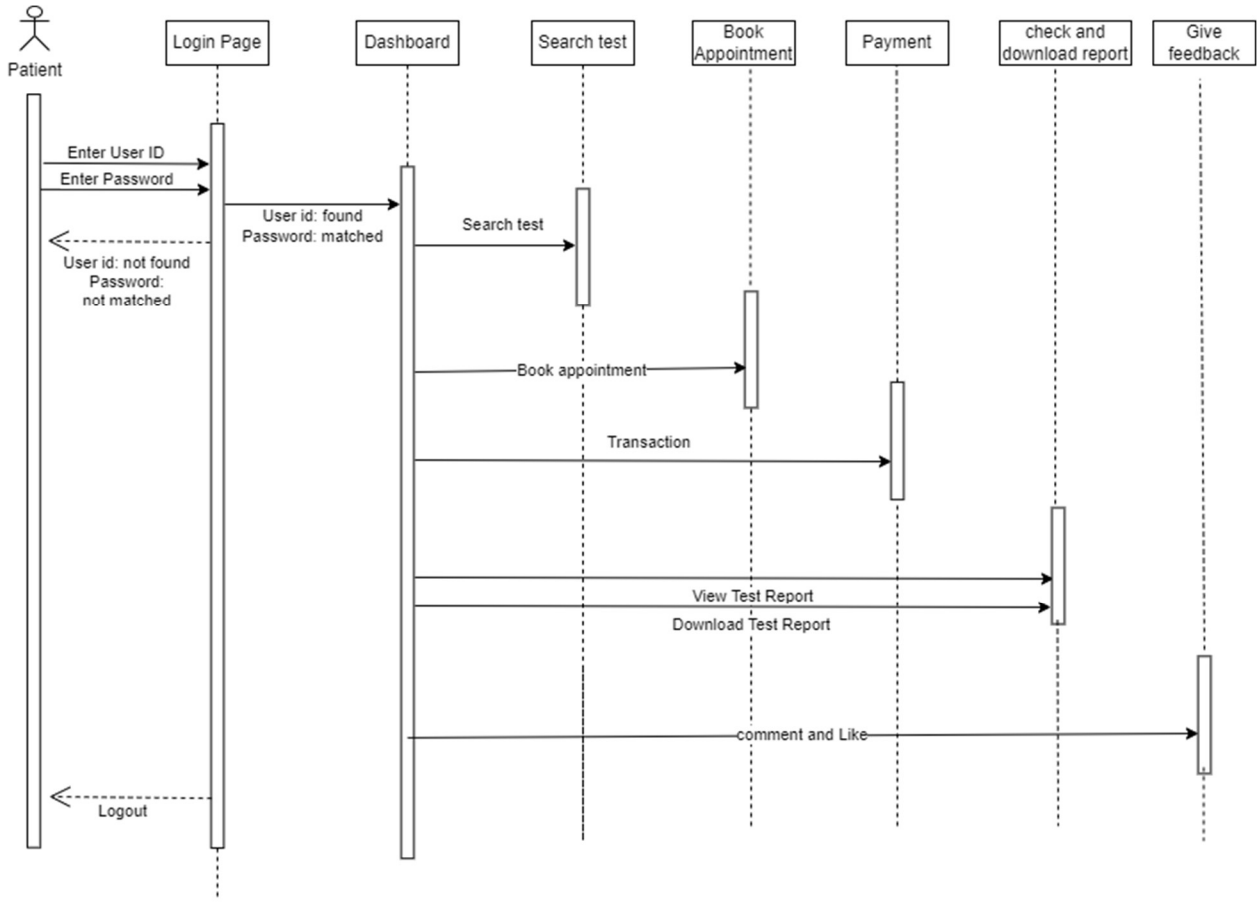

Figure 13 : Sequence Diagram of Patient

4.7.4 Class Diagram

Class diagram is a static diagram. It represents the static view of an application. Class diagram is not only used for visualizing, describing, and documenting different aspects of a system but also for constructing executable code of the software application [10].

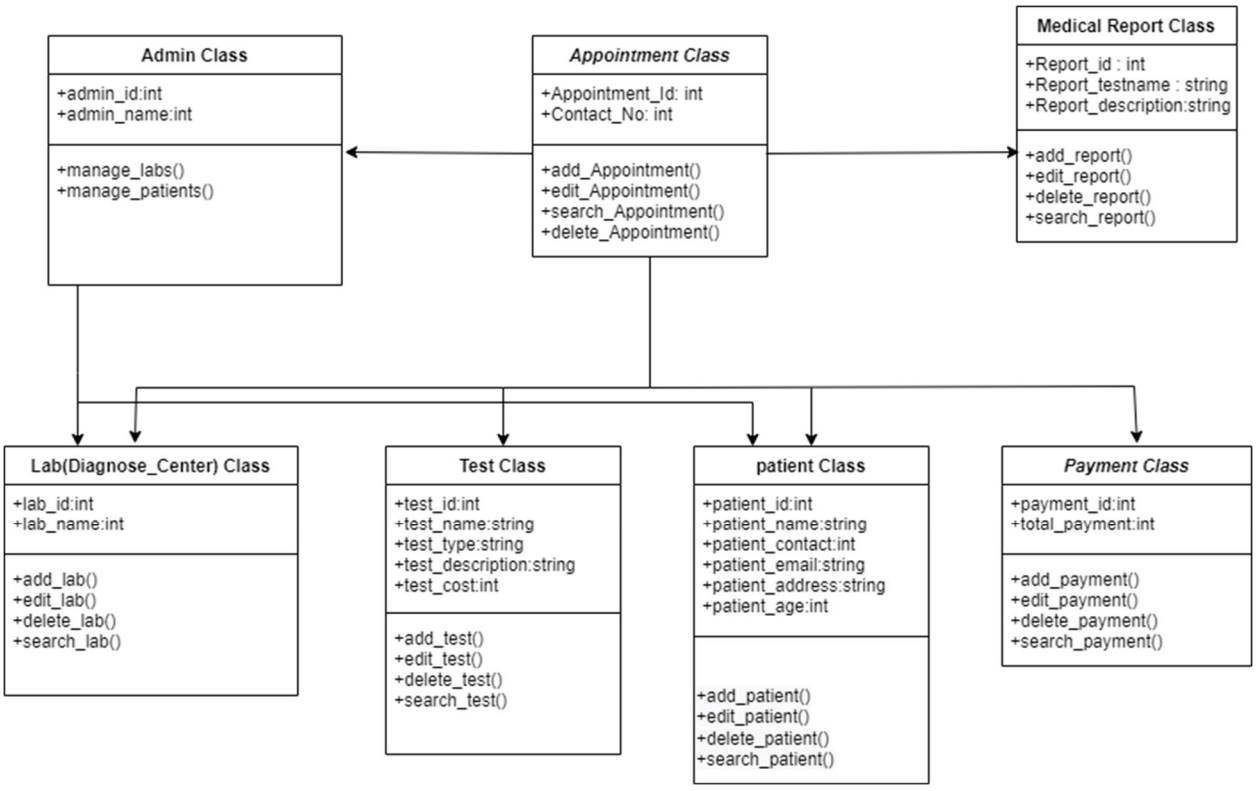

Figure 14 : Class Diagram

CHAPTER 5
IMPLEMENTATION

5. IMPLEMENTATION

We must implement this application within any organization, educational institutes, we just develop this application to give opportunity to the users to reduce their efforts and save their time.

5.1 Algorithm

5.1.1 Admin

- Admin will login to the account by adding their username and password.
- Admin has the option to manage accounts.
- Admin can see the test reports.

5.1.2 Patient

- Patient first login in their account.
- Patients can search for tests for diagnose.
- Patients will be able to send requests for collecting samples.
- Patients can check and download the test report.
- Patients can pay charges for tests.
- Patient can give the feedback if he/she want.

5.1.3 Lab (diagnose center)

- Lab first login in their account.
- Lab can manage the appointments.
- The lab can collect the sample.
- Lab can upload and update the test report.
- The lab can check the transactions report.

5.2 External APIs

There are no external APIs.

5.3 Tools And technologies

Table 8 : Tools and Techniques

	Tools	Version	Rationale
Tools & Technologies	Sublime text	2021	Editor
	Laragon	8.0.15	Database Tool
	MS Professional	2016	Gantt Chart, Use Case, Incremental Model Diagram, Flowchart, Activity Diagram.
	MS Word 2020	2.0.5	Documentation
	MS PowerPoint	2.0.5	Presentation
	Technology	**Version**	**Rationale**
	PHP	8.1	Programming language
	Laravel	9	Programming language
	MySQL	2022	Database
	HTML	5	Web Development
	CSS	3	Style
	MDbootstrap	5.0	Responsiveness
	JavaScript		Web Behavior

5.4 User Interface

The interface of this application would be simple and user-friendly. The user will easily operate and use the application. The user will not have to depend on others. The user can easily avail the services of the app [11].

Some pages of the user interface are further explained along with images below:

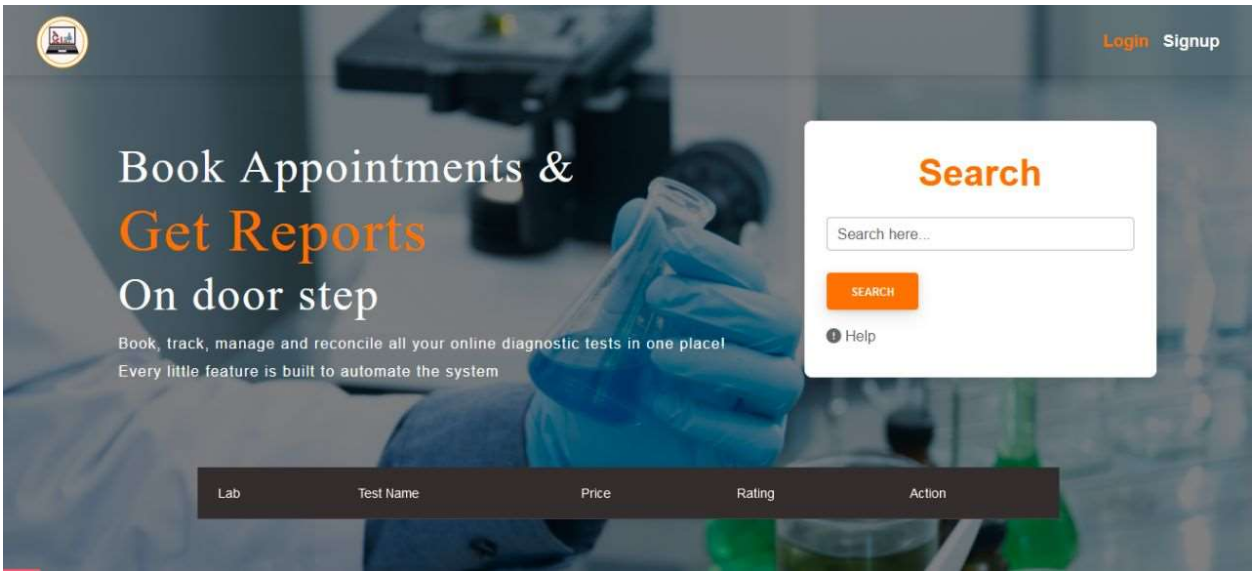

Figure 15 : Home Screen

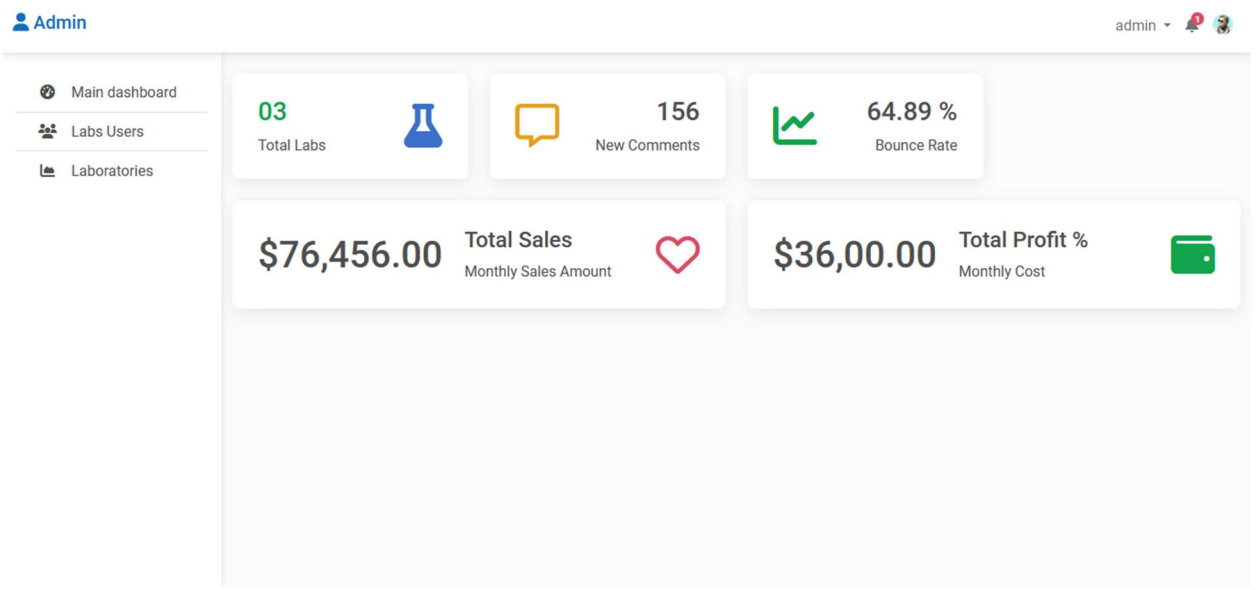

Figure 16 : Main Dashboard

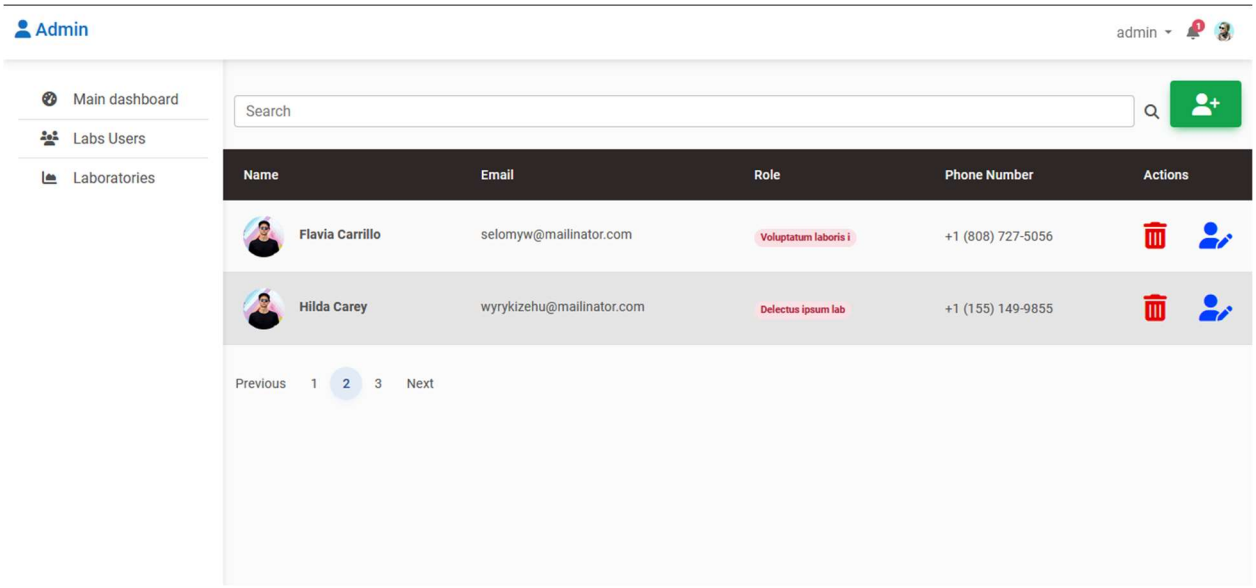

Figure 17 : Laboratories Detail Screen

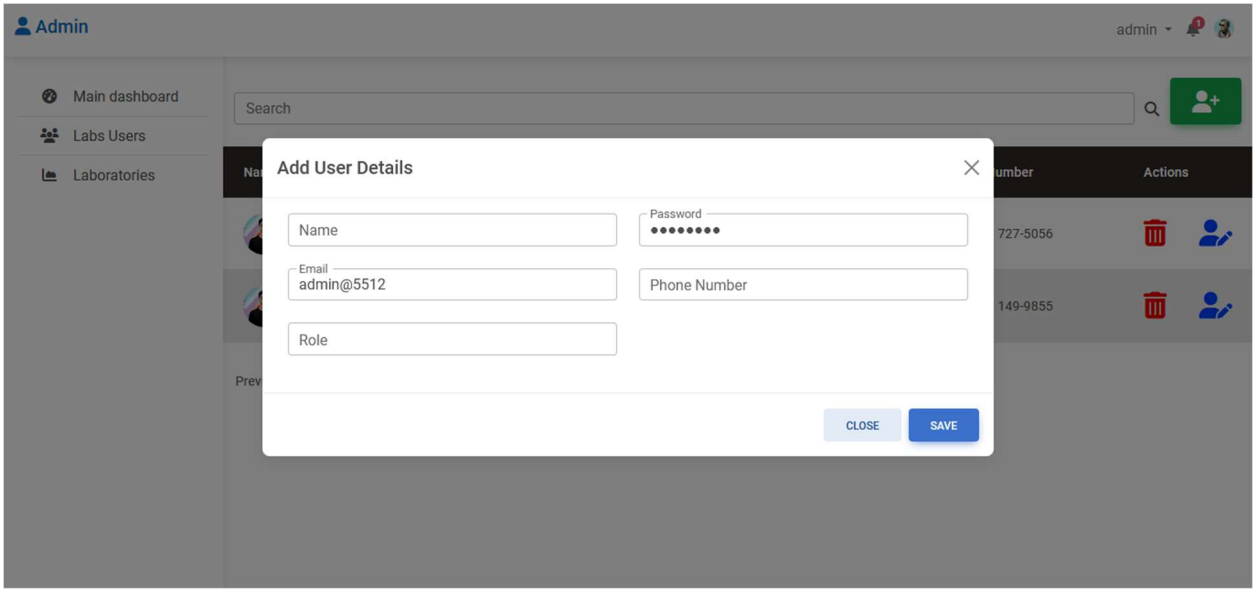

Figure 18 : Add Laboratory Screen

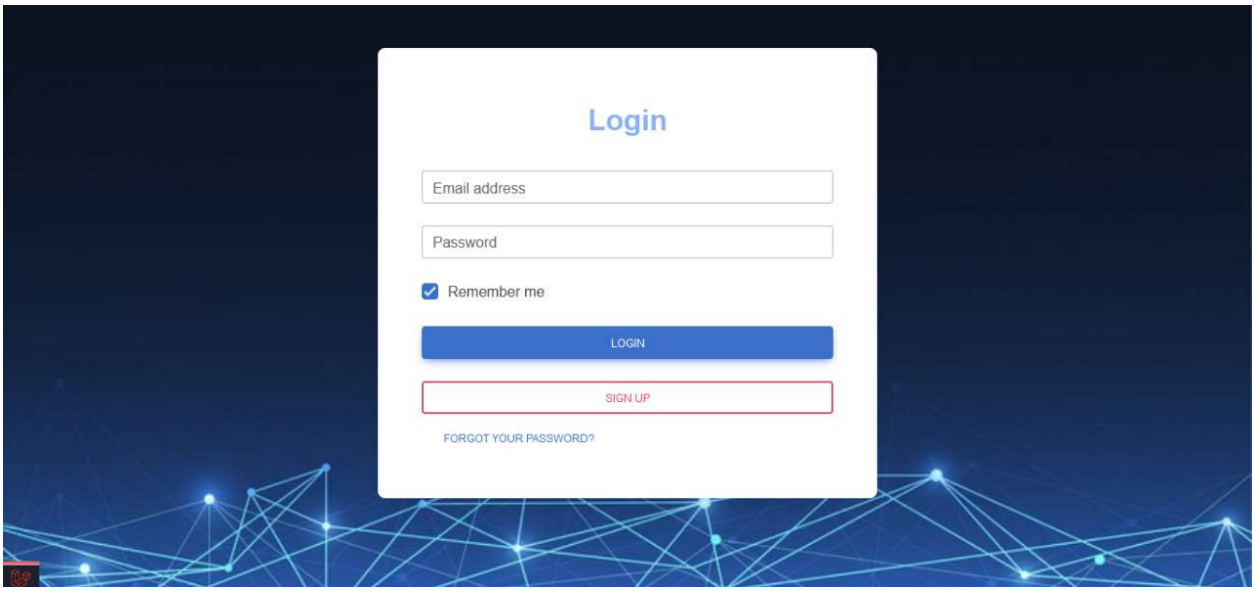

Figure 19 : Login Screen

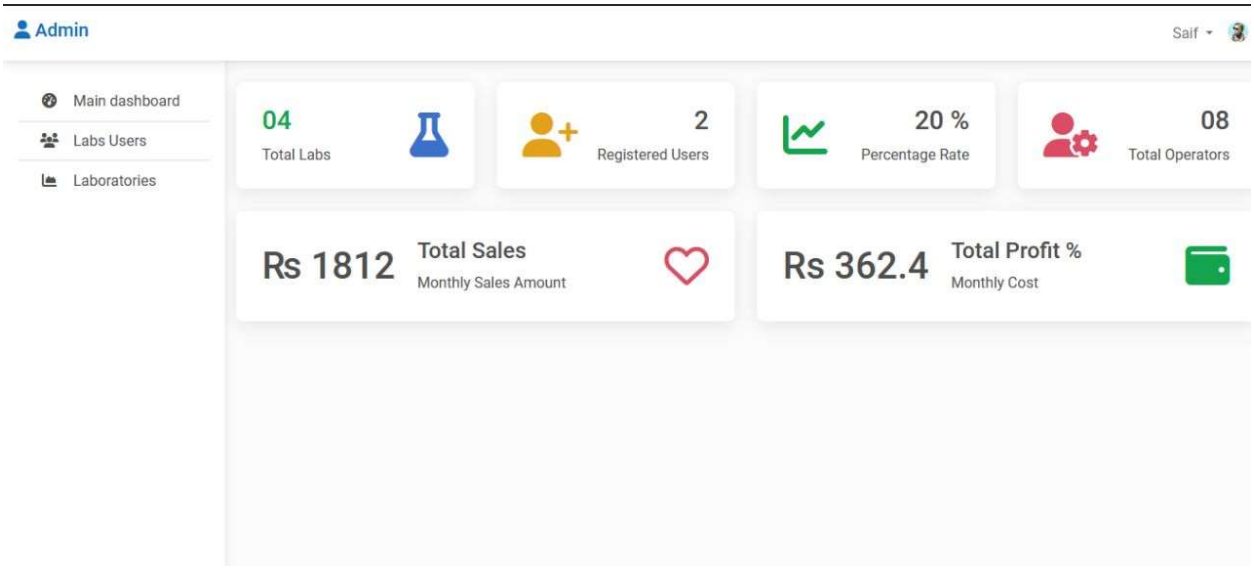

Figure 20 : Admin Dashboard

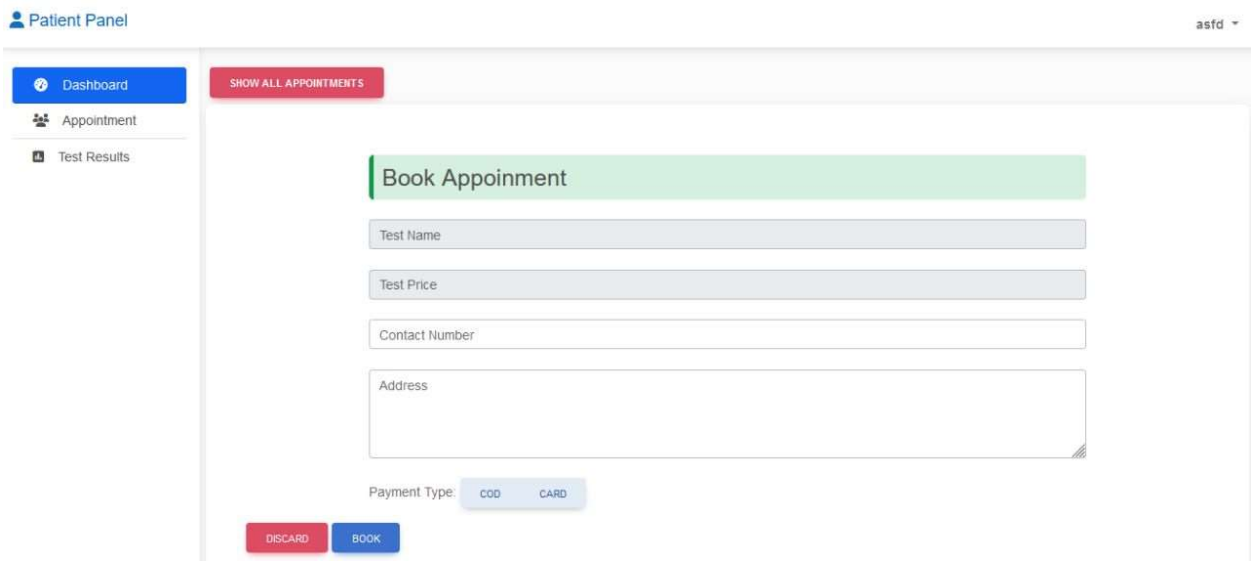

Figure 21 : Book Appointment

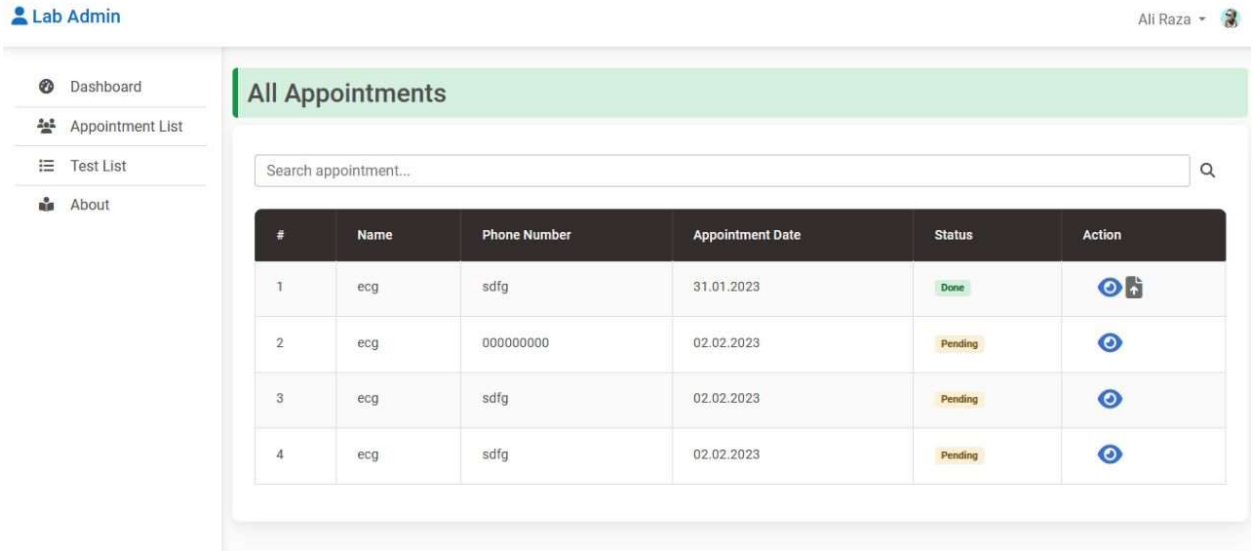

Figure 22 : Lab Appointment

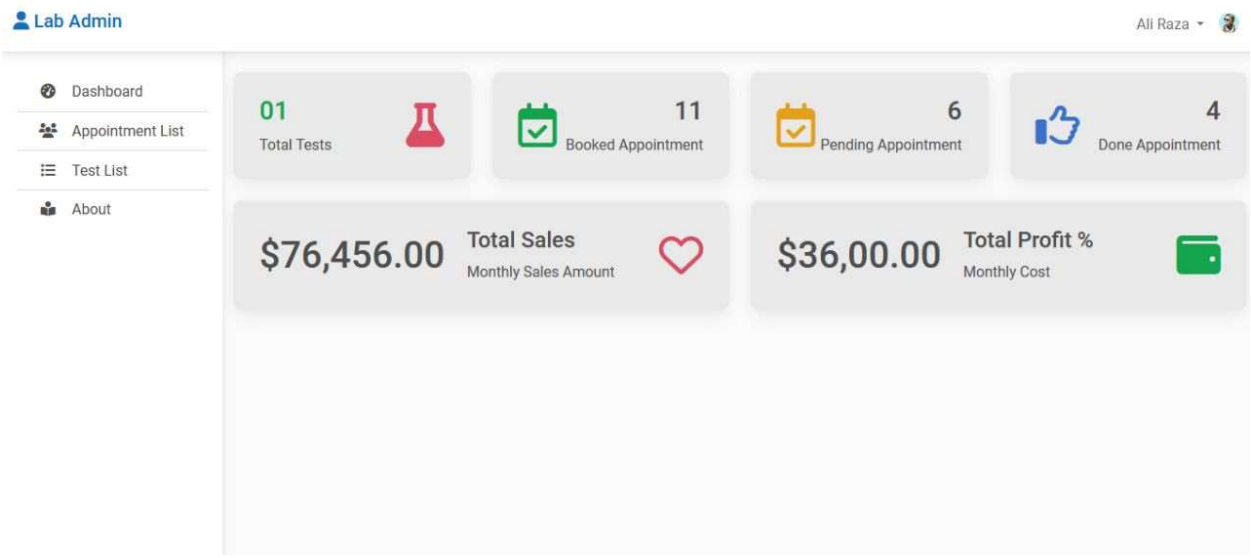

Figure 23 : Lab Dashboard

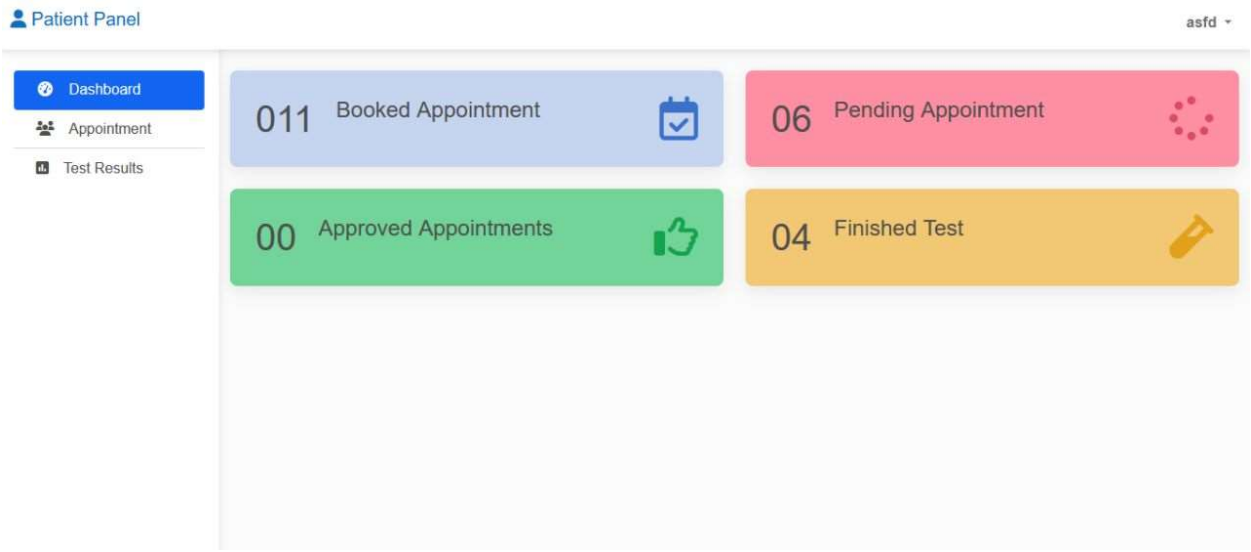

Figure 24 : Patient Dashboard

CHAPTER 6

TESTING AND EVALUATION

6. TESTING AND EVALUATION

The purpose of testing is to discover and detect errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionalities of components, sub-assemblies, or a finished product it is the process of exercising software with the intent of ensuring that the software system meets its requirements and user expectations and does not fail unacceptably. There are various types of tests. Each test type addresses a specific testing requirement. The system is tested many times while we were developing it. Many errors have been removed which we were facing at the time of development of this project.

6.1 System Testing

System testing ensures that the entire integrated software system meets requirements. Once the system has been successfully developed, testing must be performed to ensure that the system is working as intended. This is also to check that the system meets the requirements stated earlier. Besides that, system testing will help in finding the errors that may be hidden from the user. There are a few types of testing which include unit testing, functional testing and integration testing. The testing must be completed before it is being deployed for the user to use [12].

6.2 Unit Testing

The software units in a system are modules and routines that are assembled and integrated to perform a specific function. Unit testing focuses first on modules, independently of one another, to locate errors. This enables us to detect errors in coding and logic that are contained within each module. This testing includes entering data if the value matches the type and size supported by java-Script. All forms of user and service provider are tested to ensure that each performs its action as required [13].

Unit Testing 1: Login

Testing objective: To ensure the login form is working correctly.

Table 9 : Unit Testing Login

NO.	Test case/Test script	Attribute and values	Expected Result	Result
1.	User will register to the system by putting credentials of sign up	Username: admin@5512 Password: Admin123 Email: admin5512@gmail.com	Successfully Sign up (login to the user main screen.)	Pass
2.	Verify Login	Username: admin5512 Password: *******	Successfully Login	Pass

NO.	Test case/Test script	Attribute and values	Expected Result	Result
1.	User will register to the system by putting credentials of sign up	Username: admin@5512 Password: Admin12 Email: admin5512gmail.com	Successfully Sign up (@ is compulsory, password should be	Fail
			strong and password length must be 8)	
2.	Verify Login	Username: admin5512 Password: ********	Successfully Login	Fail

Unit Testing 2: Book Appointment by patient

Testing objective: To ensure the appointment functionality is working correctly.

Table 10 : Unit Testing Book Appointment

NO.	Test Case/Test script	Attribute and values	Expected Result	Result
1.	Patient book appointment.	Patient will search tests, select test, select lab (which lab he is preferred) and then select payment method (Online payment/cash on delivery)	Patient book appointment successfully.	Pass

NO.	Test Case/Test script	Attribute and values	Expected Result	Result
1.	Patient book appointment.	Selection of test is must or if patient not login, it will redirect to login page	Appointment not booked.	Fail

Unit Testing 3: Patient give feedback

Testing Objective: To ensure the feedback from patient is working correctly.

Table 11 : Unit Testing Patient Feedback

NO.	Test Case/ Test Script	Attribute and values	Expected Result	Result
1.	Patients give feedback	Patients can write comment after test complete.	Patients give feedback successfully.	Pass

NO.	Test Case/ Test Script	Attribute and values	Expected Result	Result
1.	Patients give feedback	Patients can write comments after the test complete. (If characters are less than 10)	Patients give feedback successfully.	Fail

6.3 Functional Testing

The functional testing takes place after the unit testing. In this functional testing, the functionality of each module is tested. This is to ensure that the system produced meets the specifications and requirements.

Functional test: Login

Testing objective: To ensure that the correct page with the correct navigation bar is loaded.

Table 12 : Functional testing Login

NO.	Test case/Test script	Attribute and values	Expected Result	Result
1.	User will register to the system by putting credentials of sign up	Username: admin@5512 Password: ******** Email: admin5512@gmail.com	Successfully Sign up (login to the user main screen.)	Pass
2.	Verify Login	Username: admin@5512 Password: ********	Successfully Login	Pass

6.4 Integration testing

Table 13 : Integration Testing

No.	Test case/Test script	Attribute and value	Expected result	Result
1.	Configure the database connection	db./conn.js file	Connection Successful	Pass

6.5 Automated Testing

Automatic testing tools are not available for free and for using them a lot of professional experience is required to test the application whatever it is working correctly or not. Hence, we used manual testing [14].

CHAPTER 7

CONCLUSION AND FUTURE WORK

7. CONCLUSION AND FUTURE WORK

7.1 Conclusion

This system is designed for Diagnostic center to replace their existing manual paper-based system. Diagnostic services are critical to delivering high-quality patient care, but constantly changing reimbursement levels, rapidly evolving technology, and chronic shortages of skilled professionals can be daunting. Since we are entering details of the patients and their diagnostic information electronically in the "Online Diagnostic Lab System", data will be secured.

7.2 Future work

In this project "Online Diagnostic Lab System" we try to build an efficient, robust yet very simple system. We designed a centralized system in which several labs are connected in our system, but the interesting part is this, in future we can make its API and just attach with frontend also develop its mobile application to make it more flexible.

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