Precision Online Diagnostic Lab Management System

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Introduction

A world that loves to participate in real time activities would certainly appreciate the idea of an online diagnostic lab system that opens 24/7.The internet has become a popular place to do anything without wasting time.Online Diagnostic Lab Reporting System has made their way to most homes.

Technology facilitates human beings in almost every field of life. They turn manual tasks automatic to save resources. Automatic work is considered more trustful, reliable, accurate etc. Technology is the main reason which successfully manages many processes and creates a successful management system. We are interested in developing any management system that is designed for specific organizations and can build an Online Diagnostic Lab Reporting System.

1. Purpose of this document

The purpose of this document is to provide a detailed overview of the software product, it's parameters and goals. The Objective is to develop a user-friendly pathology site where any kind of pathological tests can be booked.
This software requirements specification (SRS) is a comprehensive description of the intended purpose and environment for our software under development. The SRS fully describes what the software will do and how it is expected to perform. This SRS defines how the web application of the

pathological laboratory will interact with system hardware, other programs and human users in a wide variety of real-world situations. Parameters such as operating speed, response time, availability, portability, maintainability, footprint, security and speed of recovery from adverse events are evaluated in this document. This SRS describes how this system will react in case of a power loss, or a natural disaster. The SRS also describes who are the stakeholders of this system, and exactly what are their privileges, down to their exact actions. This SRS also describes the interface of the online system in detail and the minimum requirements that need to be satisfied for the system to perform correctly. This SRS also describes some attributes of the system, which are not necessarily useful to any stakeholders, but which provide structural integrity to all other operations done in the system.
This document is useful for the developers, who would tailor and host this system for a particular diagnostic lab. This document is also useful for the admins of the system, who would want to know about the behaviours of this system in some particular situations. This document can also be read by anyone who wants an in depth overview of the online system.

2. Scope of the software

This system will enable remote booking of tests, and act as an online source of information to all the stakeholders. This will increase the mobility of the lab, and increase profit. Also since the whole system is mostly automated, this system will also reduce manual errors, and will increase the throughput of the lab in the sense that the lab will only be limited by the testing capacity of the equipment.
From the perspective of a user, advantages of the proposed system are that the online system simply enables easy booking facilities. It is faster and reliable, and provides better services as compared to manual systems. 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 the manual system.
This system however, will not track employees and/or their corresponding information, such as their salaries, attendances etc. This is not an online system to manage the whole business, but rather an online frontend for the booking of the tests done in the lab.

3. Abbreviations and Acronyms

Term	Description
JSP	Java Server Pages
PHP	Hypertext Preprocessor
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
CSS	Cascading Style Sheets
MySQL	Open Source Database Server
SRS	Software Requirements Specification

Overall Description

This section gives an overview of the whole system. It describes different stakeholders that will be using this system and various functionalities available for each of them. Lastly, the constraints and assumptions for the system will be provided.

1. **Product Perspective:** Online diagnostic lab system will be an application where test booking and their report generation is performed online. The system contains various information about tests that will be performed in the lab. The actors of the system are admin, sample collector, users(who are further divided into two types-registered and unregistered users), operator (of the lab) and the payment gateway. The registered users can book any test. The unregistered users are allowed to book tests only after registering themselves into the system.
2. **Product Functions:** The major functions that are provided by the system are listed below.
    a. The registered users can book any test.
    b. The registered users can provide feedback to the system.
    c. Registered users can also cancel prepaid home collections.
    d. Registered users can update their personal details.
    e. The payment while booking is managed by payment gateway.

f. Any unregistered user can see the details about test
g. Unregistered users have to register themselves to book any test.
h. Admin of the system will assign the collectors with their following tests.
i. Collector can collect samples and then update the status of the test.
j. Operator updates reports in the system.
k. After booking a test that is a home collection an user can cancel booking before collecting the sample.
l. Each actor of the system has to login to the system at first to perform their respective operations.

3. **User Characteristics:** The users of the system are admin, registered user, unregistered user, payment gateway, collector and operator. The general characteristics of the users are as follows :

    a. **Admin :** The admin will control the whole system. The databases of registered users, test details, list of collectors and equipment required for the tests is maintained by the admin. After booking of each test the administrator assigns the collector against each booking.
    b. **Collector :** The collector will check their assignment and update the status after collection of samples.
    c. **Operator :** Operator updates the status of each test and generates a report against the tests.

d. **Unregistered user :** They can check the details about the laboratory and tests and can register themselves to book the tests.
e. **Registered user :** Registered users can book any tests and collect the reports of the tests booked by them.
f. **Payment gateway :** Payment gateway ensures successful payment of registered users on booking a test.

4. Constraints :

a. An unregistered user must register themselves to book a test
b. The system authenticates the login details of the users.
c. The details about each user is maintained in the database.
d. The disadvantage of the proposed system is that it may not be as useful to the people who are not sufficiently technically inclined.
e. The system also requires an active internet connection for the user to be able to use it.

5. Assumptions:

a. Except for unregistered users, all other actors are required to log in to the system, which defines their roles, and presents the contextual interface to them.
b. Registered user is a specialization of unregistered user.

c. Payment gateway internally transfers the money from the patient's account to the account of the diagnostic lab.
d. Booking is automatically confirmed after the gateway confirms the payment.
e. Registered users can check the status of the current test by accessing the "Check Test History" use case.
f. Confirmation of booking is done by entering the booking details in the database, and scheduling a test appointment automatically by the system.
g. The operator is responsible for generating all types of reports including test report for patients when the tests are complete as well as sales reports required at the admin's end
h. The operator is responsible for updation of the statuses of everything concerning the lab and its patients like equipments, availability, test result etc
i. Logging out will be performed automatically,when a user is inactive for 5 minutes time.

Specific requirements

1. External Interfaces

a. **User Interface :** The interface will be in the form of a web application. Text description is provided for each test; if possible, images are also provided. The user interface for the software shall be compatible with any modern browser such as Internet Explorer, Mozilla or Chrome by which users can access the system. User interface consists of following:

i. Login pages for registered users, admin, collectors, operator
ii. Sign up page for unregistered users
iii. Homepage containing the link to the create account or log in page for the different types of users of the system along with a search bar.
iv. There will be a page displaying the information about all the tests that users search.
v. The admin will have access to a page that will provide options of updating the database.
vi. Admin will have access to a page that will allow the assignment of a collector to a sample collection
vii. A page for taking necessary steps in case of unexpected situations will be available to the admin

viii. On logging in, registered users will be shown the status of the current bookings
ix. A page for logged in users to update their personal details. This page will have options to update the user's email id, contact number and address
x. After selecting the tests, users can "Proceed" to a page showing available slots of in-house or home collection
xi. After slot details are chosen, users can proceed to "Make Payment" to page that interacts with the payment gateway. This page will send payment details to the gateway and accept a confirmation token from it.
xii. The registered users can also access a page that shows records of all the previous bookings with option to download a report of any previous booking
xiii. Collector, after logging in, will be presented with a page that allows him/her to check daily assignments and update status of those
xiv. Operator can access a page which will have options of logging the daily operations into the system database

b. **Hardware Interface** : Since the application must run over the internet, a stable internet connection is required, and minimum 512 MB of

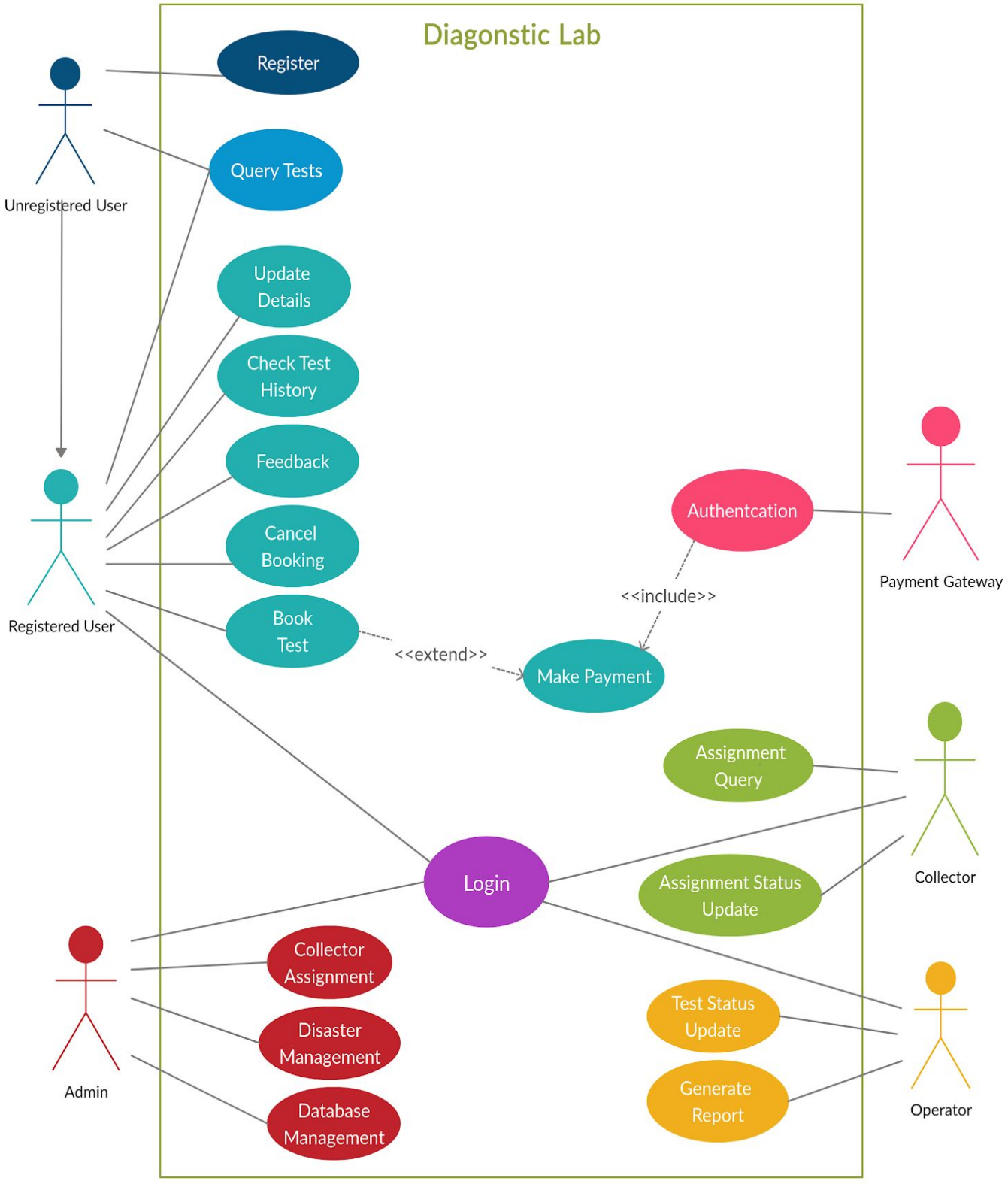
RAM. Moreover, a display screen is a complete necessity along with a keyboard (preferably QWERTY).

c. Software Interface :

Software	Description
Operating System	Windows, Linux, etc.
Development Tool	HTML, CSS, PHP, JavaScript
Database	MySQL
Web Server	Apache

d. Communication Interface : The main communication protocol that will be used is HTTPS. This will be used to transfer the information back and forth from the client to the server. GET and POST will be used to send the information securely over the web browser.

2.Use Case Diagram ：



3. **Functional Requirements :** The functional requirements are classified based on various user classes of the system. They are the following :
    a. **Administrator**
        i. **Login :** The Admin of the system can login to the system by submitting proper credentials before performing any other administrative activity
        ii. **Collector Assignment :** The Admin can assign a sample collection to a particular collector. Any new test bookings are checked whether they are home collections or not. If home collection option is applicable to a new booking then the Admin can decide and assign the collection to a specific collector
        iii. **Database Management :** The Admin has the highest privilege in the back-end database of the entire system. The admin can
            1. Add a new test to the system which has been newly introduced
            2. Delete a test which the laboratory seems unfit to continue and has decommissioned
            3. Add a new collector to the system who has just been employed by the laboratory

4. Delete a collector from the system who has just retired/been suspended/quit/been sacked.
5. Update the prices of the various tests which may include some discounts applicable at certain time of the year or regular price updation
6. Set some tests as available/unavailable. A test done by the laboratory does not imply that it is available all the time. Some equipment might be damaged or some technician might be unavailable as a result of which some tests might not be possible to carry out at a given time. The Admin can set the test to be unavailable so that further bookings for that test is stalled.
7. Update employee details. Salary increment of employees, updating the designation of promoted employees, updating personal details of employees can be done by the Admin.
8. Add a new equipment to the system when the equipment is newly bought and commissioned in the laboratory.
9. Remove an equipment from the system which the laboratory has decommissioned.

iv. **Submit Queries :** The Admin can submit queries to the operator to generate

different reports as per requirements (not sample reports).

v. **Disaster Management :** There can be unexpected and unwanted situations in the laboratory which needs to be handled by the Admin. The Admin can inform the customers about the situation and the steps taken. The disastrous situations that can be managed by admin can be :

1. Damaging of the collected sample. The collected sample might get damaged by accident. The Admin can inform the customer of the accident and schedule another collection. The Admin can also offer a price cut due to the delay on the laboratory's side.
2. Breakdown of vital testing machines/analysers. The report of a collected sample may get delayed if a critical problem arises in a vital equipment required to test the sample. The Admin can inform the customer of the delay and offer a price cut.
3. Breakout of epidemics/natural calamities. Due to the breakout of epidemics or some natural calamities a scheduled collection might not be completed or may be delayed. The Admin can inform the customer of the problem and also offer a complete refund.

4. Any other unexpected situation.

b. Unregistered User

i. **Query Tests :** Unregistered users have the option to check the details about the test (available tests, charges for tests), pathology information and some details about equipment used.

ii. **Registration :** To book a test, an unregistered user has to register themselves in the system. To register themselves they have to provide their personal details and verify themselves.

c. Registered user

i. **Login :** Registered users are users who already signed up to the system,so they can log in to the system with their username and password.

ii. **Query tests :** They can query the various kinds of tests along with their price details. Also,they can have the facility to check how much time will be required by the lab to provide the test report.

iii. **Book test :** After searching for a specific test, they can book an appointment. Depending on home collection or an in-house test, they can also schedule a suitable time (and place). After finalizing

the test details, they are given an option of payment. After a successful confirmation of the payment, the particular test will be booked for that user.

iv. **Check test history :** They can check all the tests they had booked. Along with a list of the bookings, the registered users can download softcopies of the reports of the bookings.

v. **Cancel Booking** : Registered users can cancel their booking. Any home collection booking can be cancelled by registered users at any time before collection of the sample. They will be refunded if they cancel the test at most 24 hours before collection. No money is refunded for the tests cancelled beyond that point.

vi. **Update Details** : The registered users can, at any time, update their personal details by logging in to the system. The personal details might include address, contact number, email id which might change over a course of time. They cannot, however, change their username after they are registered in the system.

vii. **Feedback :** The registered users have the facility to give their feedback to the lab. To give the feedback they have to log into the system using their credentials. They can give feedback about the lab or about any tests done by the user in the last month.

When they submit, their feedback will be sent to the system and the admin can see the response and can delegate the feedback to necessary personnel, if required.

d. Collector

i. **Login :** A collector has to log in to the system with correct credentials to perform all the required activities.

ii. **Assignment Query :** A collector can query his assignments for the sample he/she needs to collect from a patient's home. The result of this query should include details such as contact information of the patient, type of the sample to be collected, whether the patient has any contagious disease, preferred time of collection etc.

iii. **Assignment Status Update :** A collector can update his/her status of a particular assignment. If due to some problems the sample could not be collected, the collector can log the details of the circumstances and a probable reschedule of the appointment, if any.

e. Operator

i. **Login :** An operator has to log in to the system with correct credentials to perform all the required activities.

ii. **Status Update :** Being the primary endpoint between the physical lab and the software system, an operator is responsible for logging day to day operations of the lab to the system. An operator can update the status of all the tests that have been done in the day, the availability of the equipment, any report of the failure of a particular test etc directly to the system.

iii. **Generate Report :** As deemed necessary by the administration, an operator has the provision to generate various reports from the system. An operator can generate reports about sales on a periodic basis, reports about the requirement of any new equipment, reports about revenue of the lab etc.

f. Payment Gateway

i. **Authentication** : Payment gateway handles the payment by authenticating the details of the customer. If the details are verified, then the gateway handles the transaction between the involved parties, and sends a positive confirmation to the requestee. Otherwise, it sends a negative confirmation back to the requestee.

4. Software System Attributes

a. **Reliability :** In case of a critical system failure, there will always be a backup server in a different physical location, which will rollback the system to the last known correct state, and the system will have triggers in place to ensure automatic hot swapping of servers.
b. **Availability :** Since it is an online system with redundant servers as well as databases, the system should stay online all the time, except for the extreme cases, when, for example, a physical damage to all the servers/databases at the same time, or an extreme power outage.
c. **Security :** The system will use HTTPS for all communications with the client. Passwords will be stored with a SHA-256 hash, along with a 16bit salt. Transactions handled by the payment gateway should include standardized security measures.
d. **Maintainability :** The software will be primarily written in PHP, with modern and standard coding practices. The core software will be divided into several modules, which will help with debug and fixes. This will also help with updation, and adaptation to any necessary changes as the need arises. The database will be maintained using a MYSQL server. The database will be sufficiently normalized, so in case of updation of any existing table, the whole database is not affected.