



Darshan University

A Project Report on

Hospital Management System

Under the subject

Software Engineering (2101CS503)

B. Tech, Semester – VI

Computer Science & Engineering Department

Submitted By

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Academic Year

(2023-2024)

Internal Guide

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DECLARATION

We hereby declare that the SRS, submitted along with the **Software Engineering (2101CS503)** for entitled **Hospital Management System** submitted in partial fulfilment for the Semester-5 of **Bachelor Technology (B. Tech)** in **Computer Science and Engineering (CSE)** Department to Darshan University, Rajkot, is a record of the work carried out at **Darshan University, Rajkot** under the supervision of **R. B. Gondaliya** and that no part of any of report has been directly copied from any students' reports, without providing due reference.

Mudit Bhatt

Student's Signature

Date: _____



**Computer Science & Engineering
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CERTIFICATE

This is to certify that the SRS on **“Hospital management System”** has been satisfactorily prepared by Mudit Bhatt (23010101607) under my guidance in the fulfillment of the course **Software Engineering (2101CS503)** work during the academic year 2023-2024.

Internal Guide
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Thank you

Mudit Bhatt

ABSTRACT

The **Hospital Management System (HMS)** is an integrated software solution designed to manage all aspects of hospital operations efficiently. This system encompasses various functionalities that streamline administrative, clinical, and financial processes within a healthcare facility. The primary goal of the HMS is to enhance the quality of patient care, improve operational efficiency, and ensure the accuracy of patient records. Key features include patient registration, appointment scheduling, electronic medical records (EMR), billing and insurance processing, inventory management, and reporting capabilities. By leveraging technology, the HMS aims to reduce paperwork, minimize errors, and facilitate real-time access to patient information. The system supports interoperability with other healthcare systems and complies with regulatory standards to ensure data security and privacy. Overall, the HMS serves as a critical tool in modern healthcare settings, promoting better resource management, improved patient outcomes, and streamlined workflows.

Main purpose of this system is to reduce human efforts as much as possible.

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1 Introduction

1. A Hospital Management System (HMS) is a comprehensive, integrated information system designed to control the administrative, financial, and clinical aspects of a hospital. The primary objective of an HMS is to streamline hospital operations, enhance patient care, and improve overall efficiency. By digitizing and automating various hospital functions, an HMS helps in reducing paperwork, minimizing errors, and ensuring better resource management.
2. Modern HMS solutions encompass a wide range of features and modules, including patient registration, appointment scheduling, electronic medical records (EMR), billing and accounting, laboratory and pharmacy management, and inventory control. These systems are designed to provide seamless communication and data sharing across different departments, enabling healthcare providers to deliver more coordinated and personalized care.
3. The implementation of an HMS offers numerous benefits, such as improved patient safety, faster and more accurate diagnosis and treatment, efficient management of hospital resources, and enhanced data security. Furthermore, it supports regulatory compliance and aids in decision-making through robust reporting and analytics capabilities.
4. In essence, a Hospital Management System is a vital tool for modern healthcare institutions, empowering them to meet the growing demands of the healthcare industry and deliver superior patient outcomes.

- Functional Requirements:

Users For System:

1. Administrators
2. Doctors
3. Pharmacists
4. Laboratory Technicians
5. **Patient**

1.Functional Requirement for Administrators:

1. **User Administration:** Admin can create, modify, and deactivate user accounts with specific roles and permissions.
2. **Patient Registration:** Ability to register new patients, update their demographic details, and assign unique identifiers.
3. **Appointment Scheduling:** Schedule patient appointments with doctors and other hospital services.
4. **Financial Operations:** Generate bills, process payments, handle insurance claims, and maintain financial records.
5. **Inventory Oversight:** Monitor and control stocks of medical supplies, equipment, and pharmaceuticals.
6. **Report Generation:** Produce operational and financial reports for management review and decision-making.
7. **Security Oversight:** Ensure data security through user authentication, role-based access control, and audit trails.
8. **Compliance Assurance:** Ensure compliance with healthcare regulations (e.g., HIPAA), maintain documentation, and facilitate audits.
9. **Emergency Coordination:** Coordinate hospital response during emergencies, allocate resources, and ensure patient safety.
10. **System Configuration:** Configure system settings, workflows, and preferences to align with hospital policies and operational needs.

2.Functional Requirement for Doctors:

1. **Access Patient Records:** View and update patient medical histories and treatment plans.
2. **Order Medical Tests:** Request laboratory tests, imaging, and other diagnostic procedures for patients.
3. **Prescribe Medications:** Issue prescriptions electronically and manage medication dosages.

4. **View Appointment Schedule:** Access and manage personal appointment schedules with patients.
5. **Document Clinical Notes:** Record patient progress, treatments, and clinical observations.
6. **Collaborate with Specialists:** Communicate and consult with other healthcare providers regarding patient care.
7. **Review Lab Results:** Access and interpret laboratory test results for patients.
8. **Generate Medical Reports:** Create reports summarizing patient diagnoses, treatments, and outcomes.
9. **Educate Patients:** Provide health education and instructions to patients regarding their conditions and treatments.
10. **Track Patient Progress:** Monitor and assess patient recovery and treatment responses over time.

3.Functional Requirement for Pharmacists:

1. **Prescription Processing:** Fulfill and record medication prescriptions from doctors.
2. **Medication Dispensing:** Dispense prescribed medications to patients accurately.
3. **Inventory Tracking:** Monitor medication stock levels and update inventory records.
4. **Medication Order Entry:** Input and process orders for new medications and supplies.
5. **Drug Interaction Alerts:** Provide alerts for potential drug interactions and contraindications.
6. **Medication History Access:** Access and review patients' medication histories.
7. **Prescription Verification:** Verify the accuracy and legality of medication prescriptions.
8. **Pharmacy Reporting:** Generate reports on medication usage and pharmacy operations.
9. **Patient Counseling:** Offer guidance and information to patients about their medications.
10. **Compliance Monitoring:** Ensure adherence to pharmaceutical regulations and hospital policies.

4.Functional Requirement for Laboratory Technicians:

1. **Test Execution:** Perform diagnostic tests as ordered by physicians.
2. **Result Entry:** Enter and validate test results accurately into the system.
3. **Sample Tracking:** Track the location and status of patient samples within the laboratory.
4. **Quality Control Checks:** Conduct and document quality control checks for laboratory equipment and procedures.
5. **Equipment Maintenance:** Perform routine maintenance and calibration of laboratory equipment.
6. **Data Integrity:** Ensure the integrity and confidentiality of patient data and test results.
7. **Report Generation:** Generate reports on test results for healthcare providers.
8. **Compliance Monitoring:** Adhere to regulatory requirements and standards in laboratory operations.
9. **Inventory Management:** Manage and monitor laboratory supplies and reagents.
10. **Collaboration:** Communicate effectively with healthcare providers and other laboratory staff regarding test results and procedures.

5.Functional Requirement for **Patient**:

1. **Medical History Access:** Patients can view their medical history, including past appointments, diagnoses, treatments, and prescriptions.
2. **Prescription Tracking:** Patients can see their current and past prescriptions, including dosage instructions and refill alerts.
3. **Billing and Payments:** Patients can view their billing statements, pay bills online, and see insurance claims and payment history.

4. **Doctor Profiles:** Patients can search for and view profiles of doctors, including their specialties, qualifications, and patient reviews.
5. **Lab Results:** Patients can access their lab test results online.
6. **Notifications and Reminders:** Patients receive notifications and reminders for upcoming appointments, medication schedules, and follow-up visits.
7. **Patient Portal:** Patients have a secure portal to access personalized health information and communicate with their healthcare providers.
8. **Health Tips and Educational Resources:** Patients can access articles, videos, and other resources related to their health conditions and wellness.
9. **Feedback and Complaints:** Patients can provide feedback on the services received and lodge complaints if necessary.
10. **Emergency Contacts:** Patients can update and maintain emergency contact information.
11. **Insurance Information:** Patients can update and verify their insurance details and check the coverage for various treatments.
12. **Check-In and Registration:** Patients can complete pre-visit check-in forms and registration online to reduce wait times at the hospital.
13. **Discharge Instructions:** Patients can access post-discharge instructions and care plans provided by their doctors.
14. **Virtual Consultations:** Patients can schedule and attend virtual consultations with their doctors via video calls.

1.4 Non-Functional Requirements :

1. **Performance:** The system should respond to user queries within 2 seconds under normal load.
2. **Reliability:** The system should have a mean time between failures (MTBF) of at least 99.9%.
3. **Scalability:** The system should handle a 20% increase in concurrent users without performance degradation.
4. **Security:** The system should encrypt patient data both in transit and at rest using AES-256 encryption.
5. **Usability:** The system interface should comply with WCAG 2.0 accessibility guidelines.
6. **Availability:** The system should be available 99.99% of the time during core business hours.
7. **Maintainability:** The system should be easily maintainable with modular components and clear documentation.
8. **Interoperability:** The system should integrate seamlessly with existing hospital information systems (HIS) using HL7 standards.
9. **Compliance:** The system should comply with HIPAA regulations for handling patient data.
10. **Backup and Recovery:** The system should perform automated backups daily with data recovery within 4 hours of failure.

2 Design and Implementation Constraints

2.1 Use case diagram



Figure 2.1-1 Use case diagram for library management system

2.2 Activity diagram and Swimlane diagram

Activity Diagram for Patient:

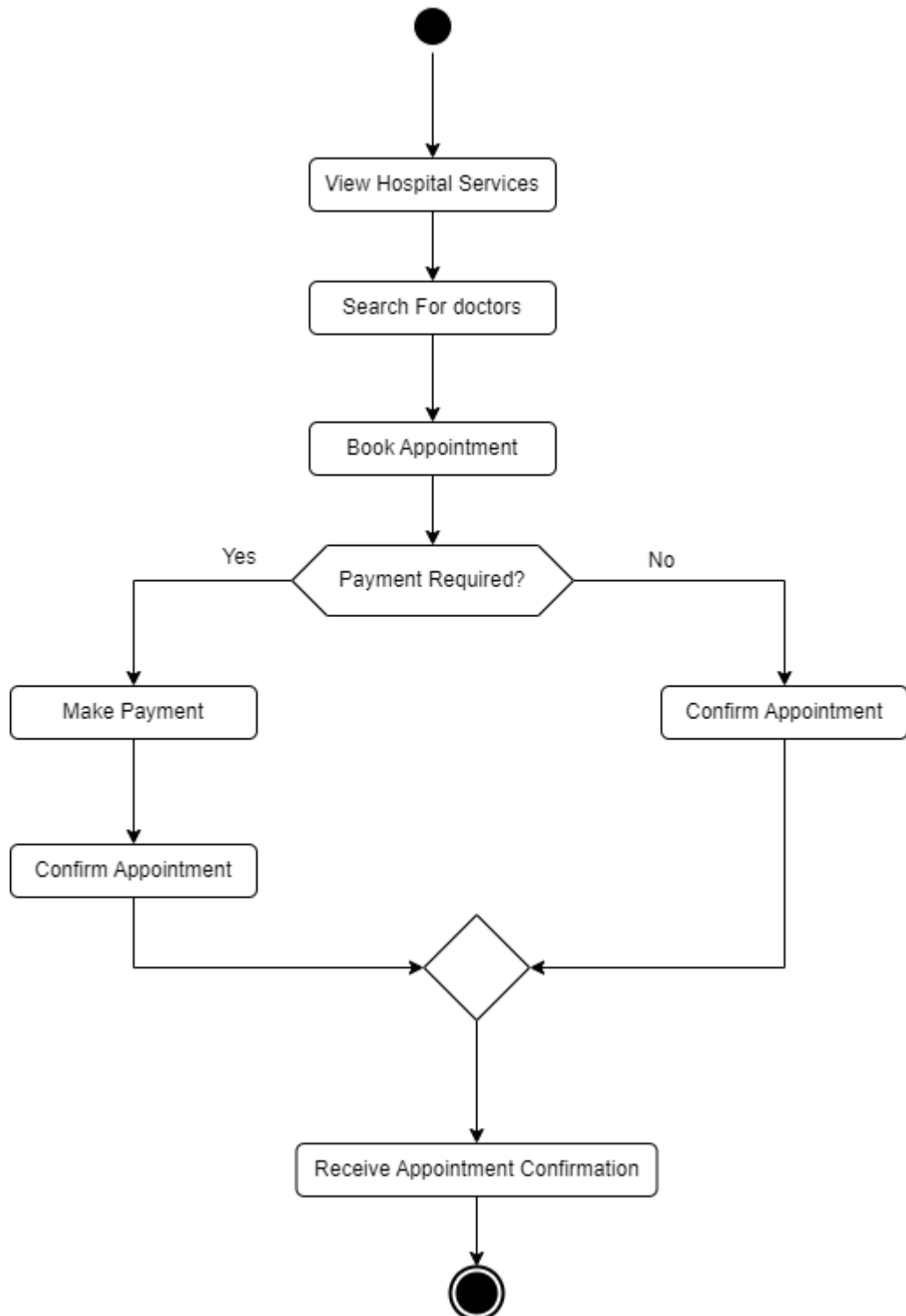


Figure 2.2-1 Activity diagram for Patient

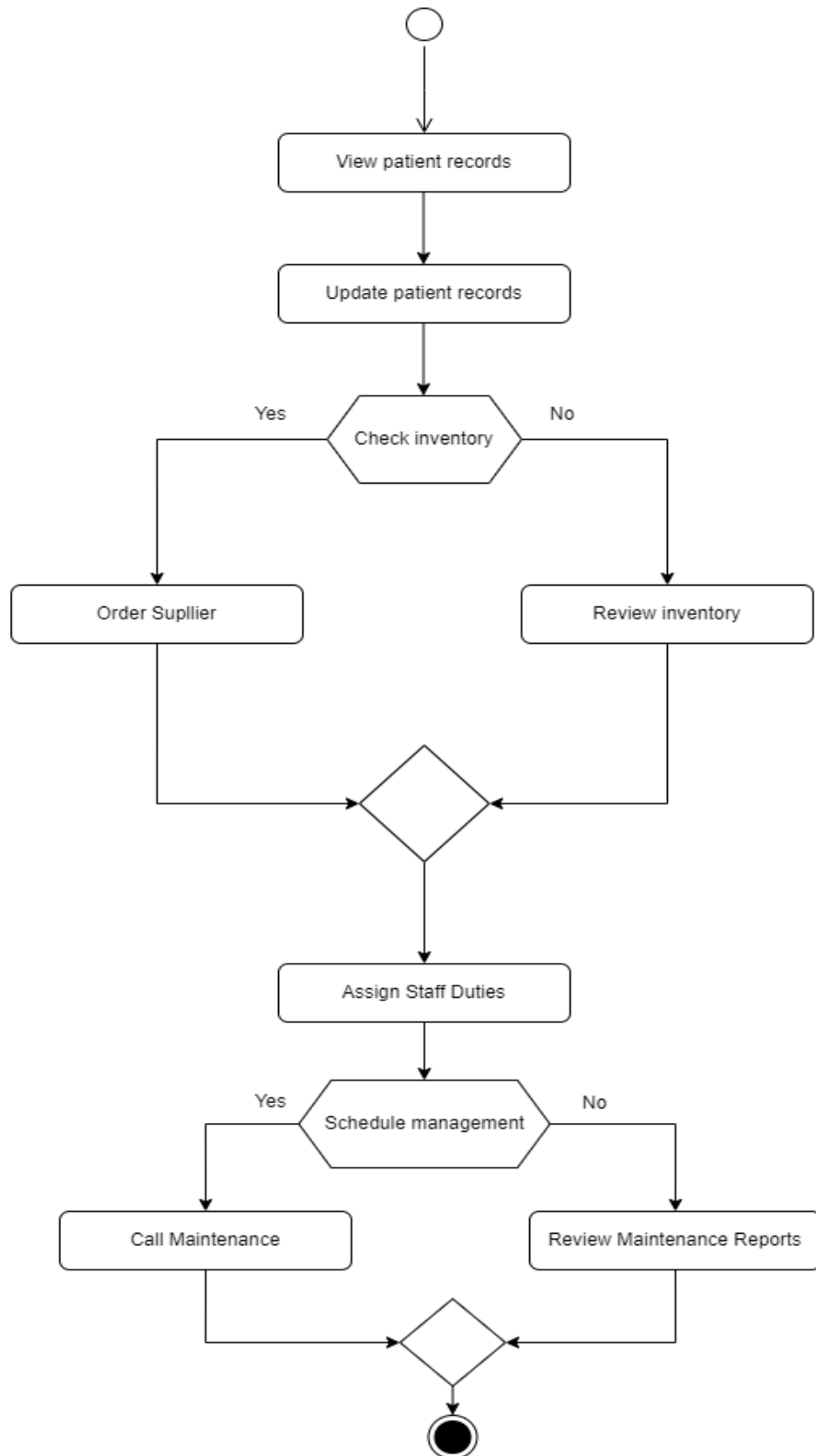


Figure 2.2-2 Swimlane diagram for Administartor

2.3 Sequence diagram

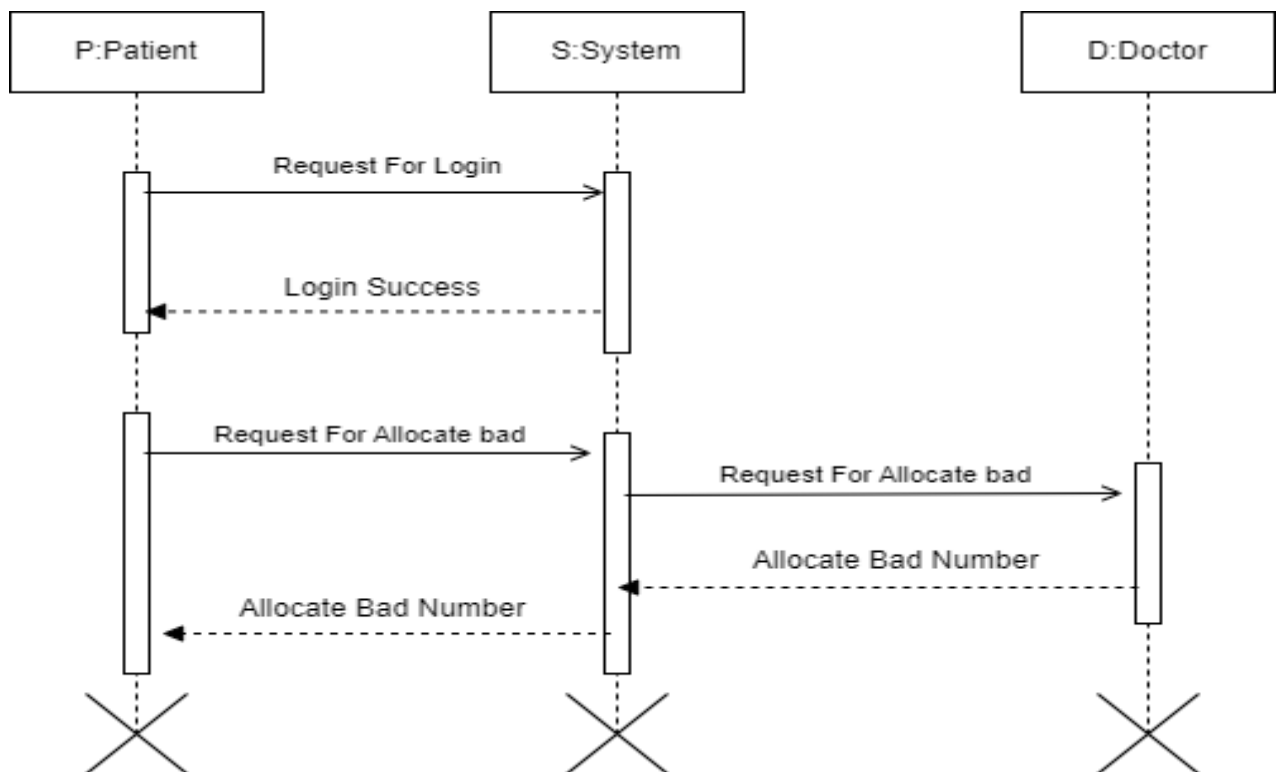
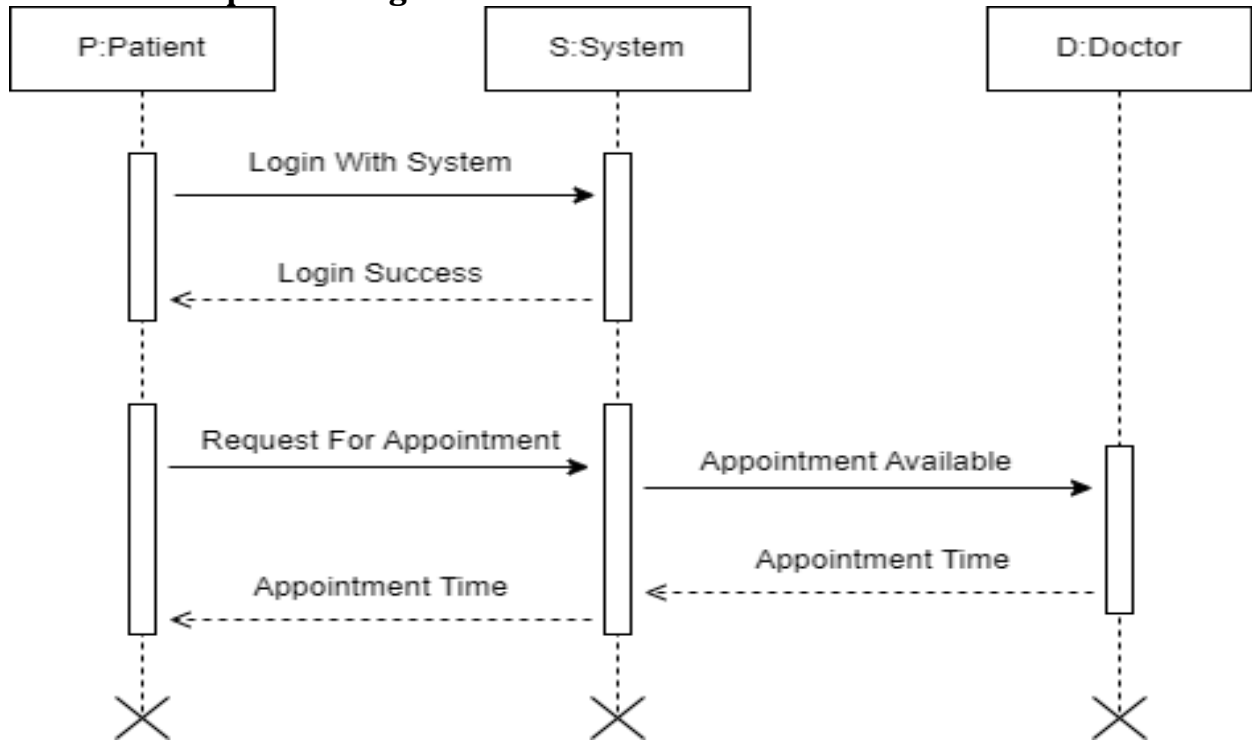


Figure 2.3-1 Sequence diagram for Hospital Management

2.4 State diagram

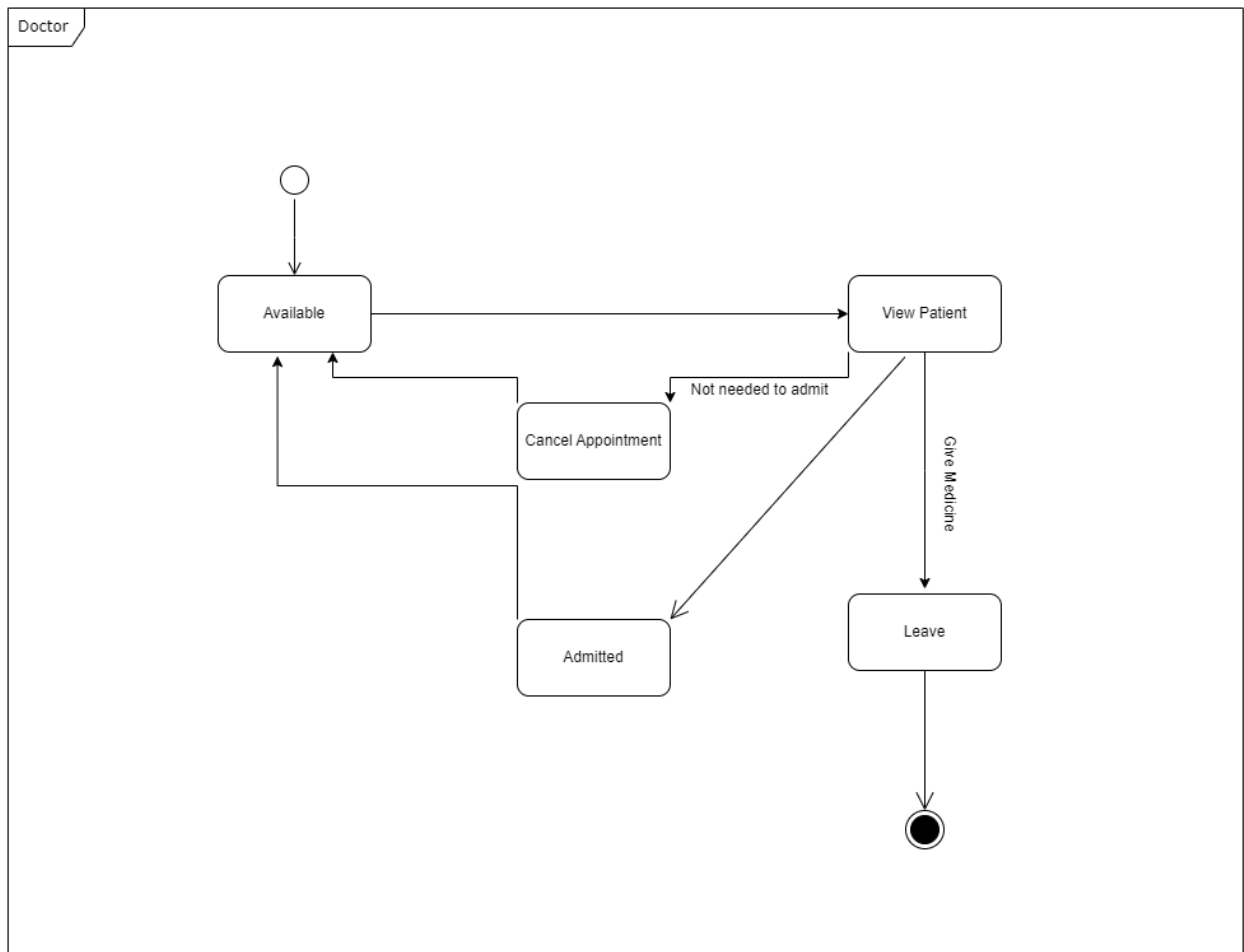
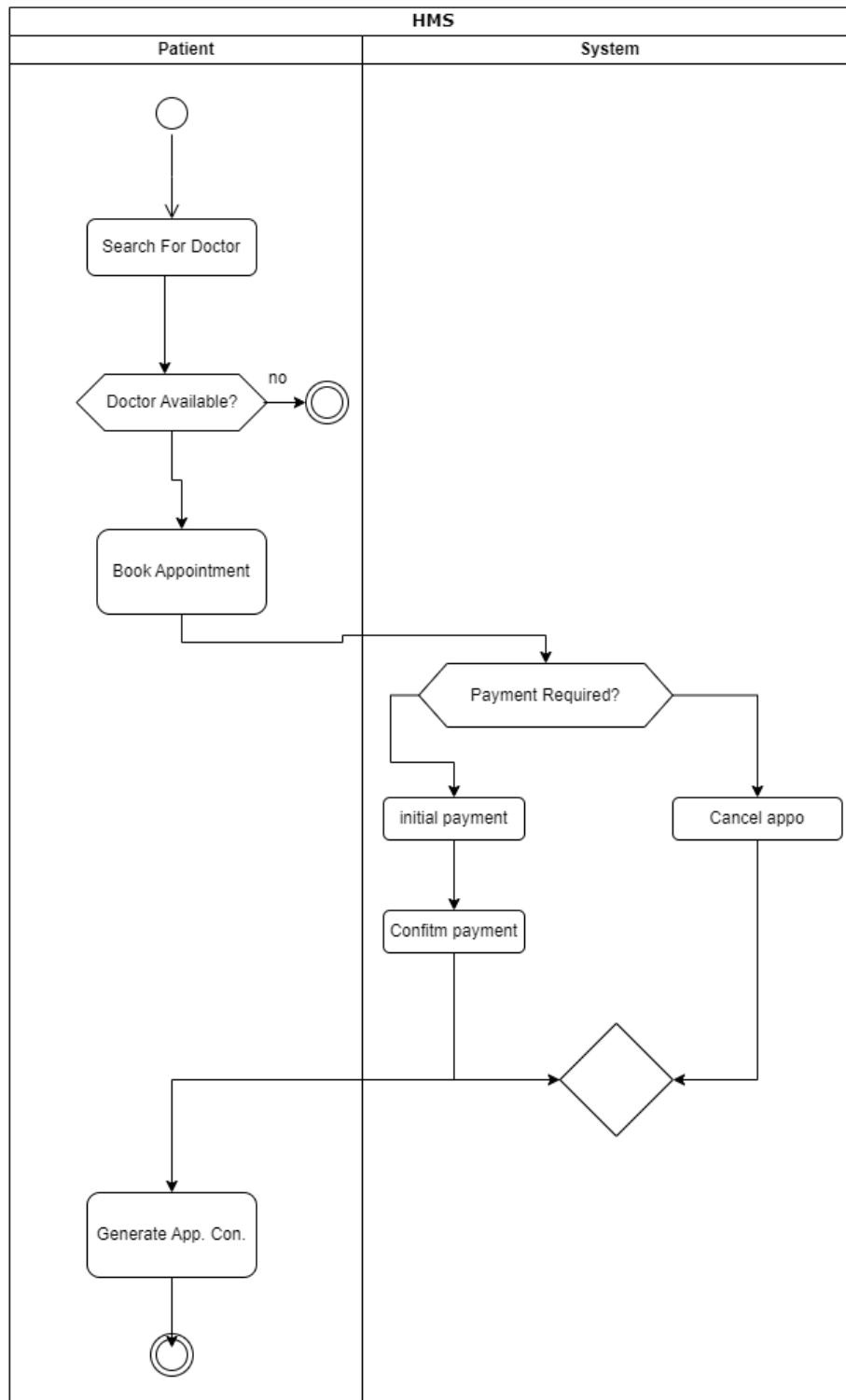


Figure 2.4-1 State diagram of Book

Swime lane diagram:



2.5 Class diagram

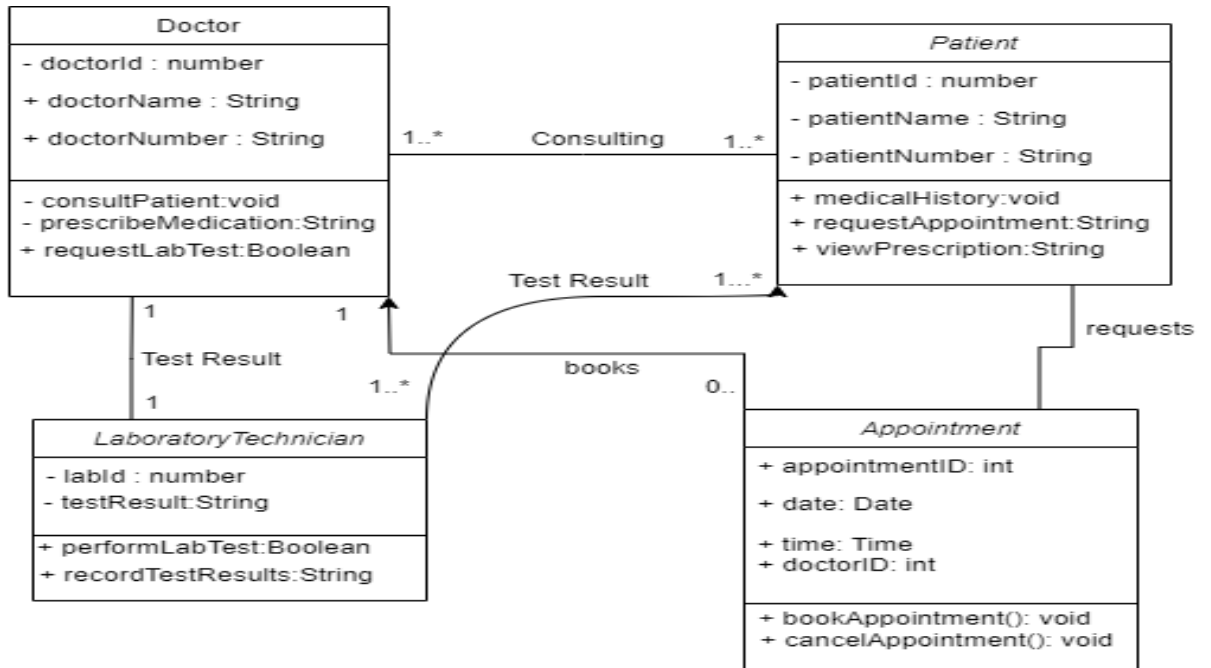


Figure 2.5-1 Class diagram for Hospital management system

2.6 Data flow diagram

2.6.1 Context diagram (level-0)

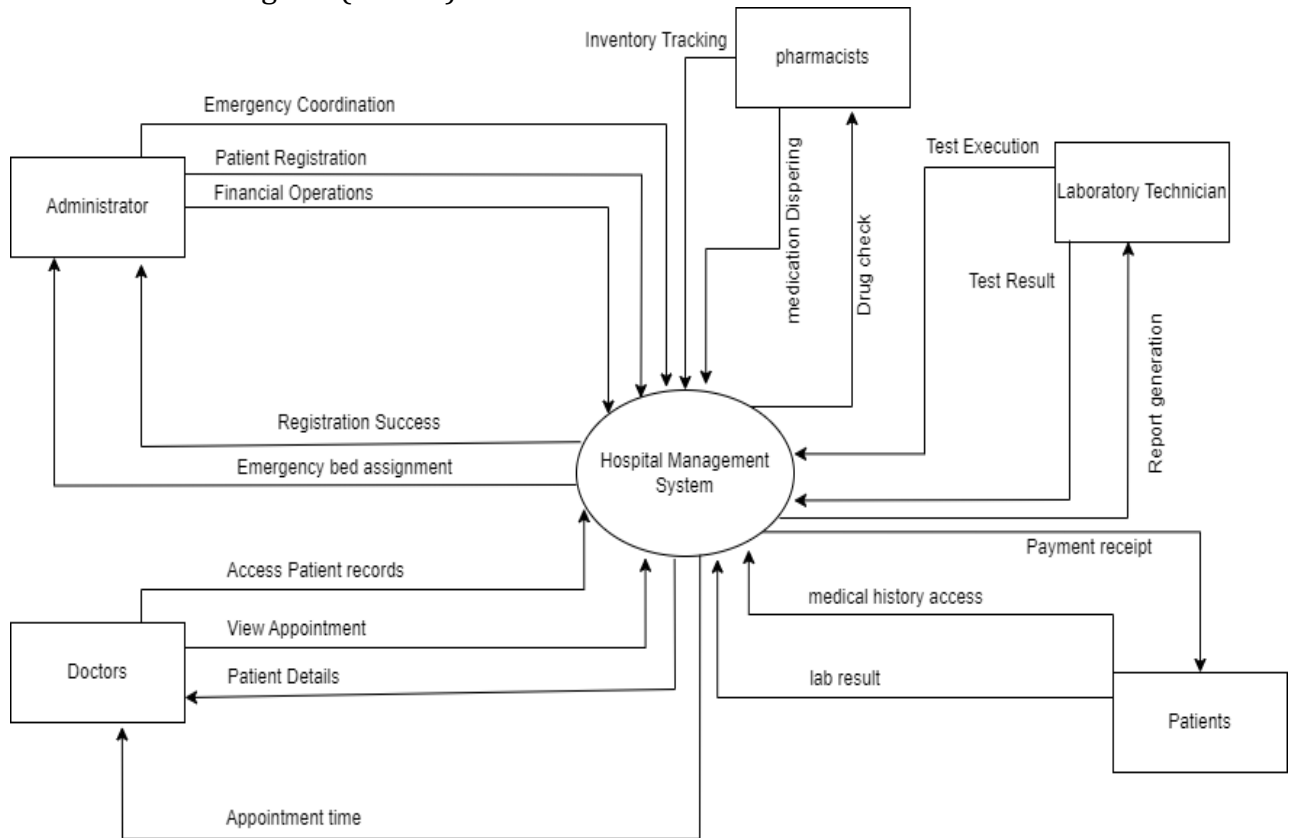


Figure 2.6-1 Context diagram for Hospital management system

2.6.2 DFD Level-1

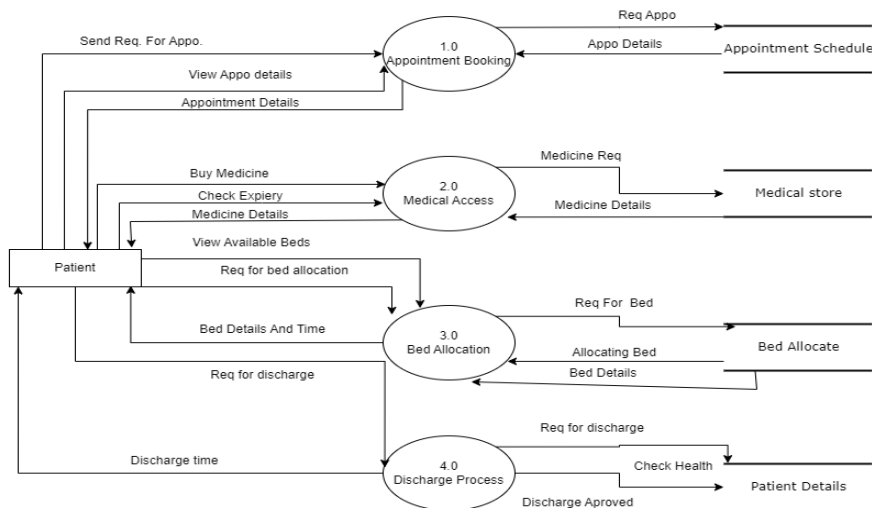


Figure 2.6-2 DFD level-1 for HMS

3 External interface requirement (Screens)

3.1 Screen-1: Registration Form

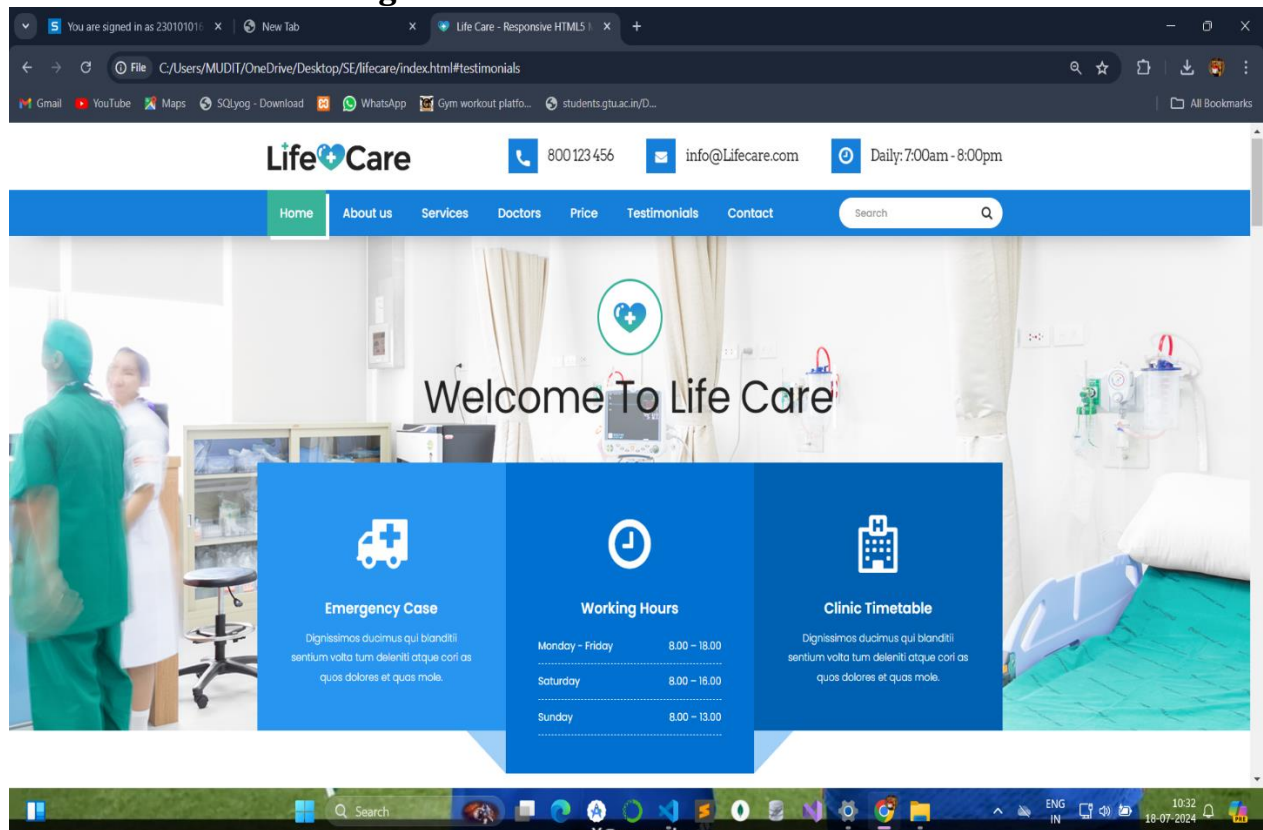


Figure 3.1-1 Screen-1: Home Page

Purpose: This form will allow the target end-users to register in the system. To register , the following information will be encoded in the system.

Table 3.1-1 Screen element of Registration form

Sr.	Screen Element	Input Type	O/M	1/N	Description
1	Title	Text	M	1	Title Of website.
2	Background image.	Image	M	1	It is used as background image.
3	Card Name	Card	M	N	It shows Different- Different facalities of website.
4	Welcome to life care	Text	O	1	It is sub title of web site.
5	Nav link	Navbar	M	N	It is used for redirect other pages.
6	Top informations	Icon	M	N	It indicates different different information icons.
7	Top informations	Text	M	N	It gives important information regarding web site.

3.2 Screen-2: About Page:

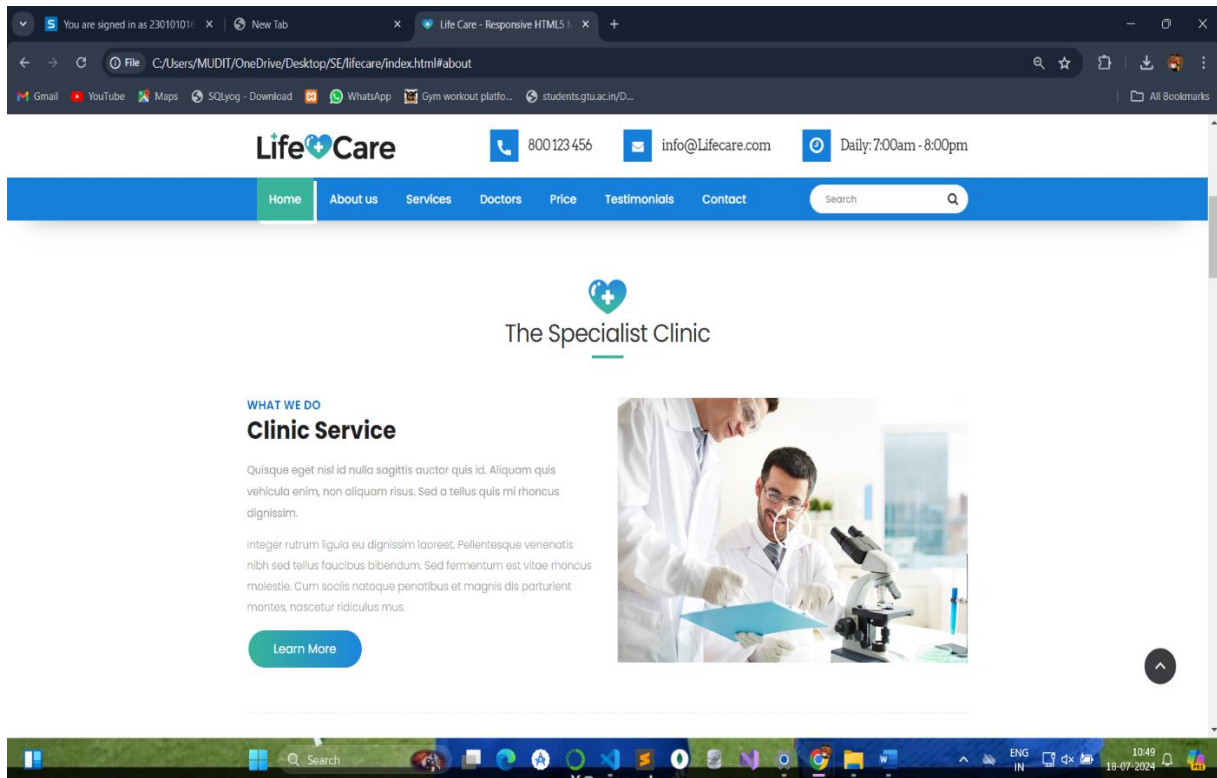


Figure 3.2-1 Screen-2: Login Form

Purpose: This form will be used by the system's users to access records and features of the system. The users will input the correct combination of their username and password to be able to login to the system.

Table 3.2-1 Screen element of Login form

Sr.	Screen Element	Input Type	O/M	1/N	Description
1	Title	Text	M	1	It Defines Title of about page.
2	Clinic Service	Text	M	1	It explains about information of doctors.
3	Learn More	Button	M	1	If user click on this button then , It give more information about doctors.

3.3 Screen-3: Add Appointment

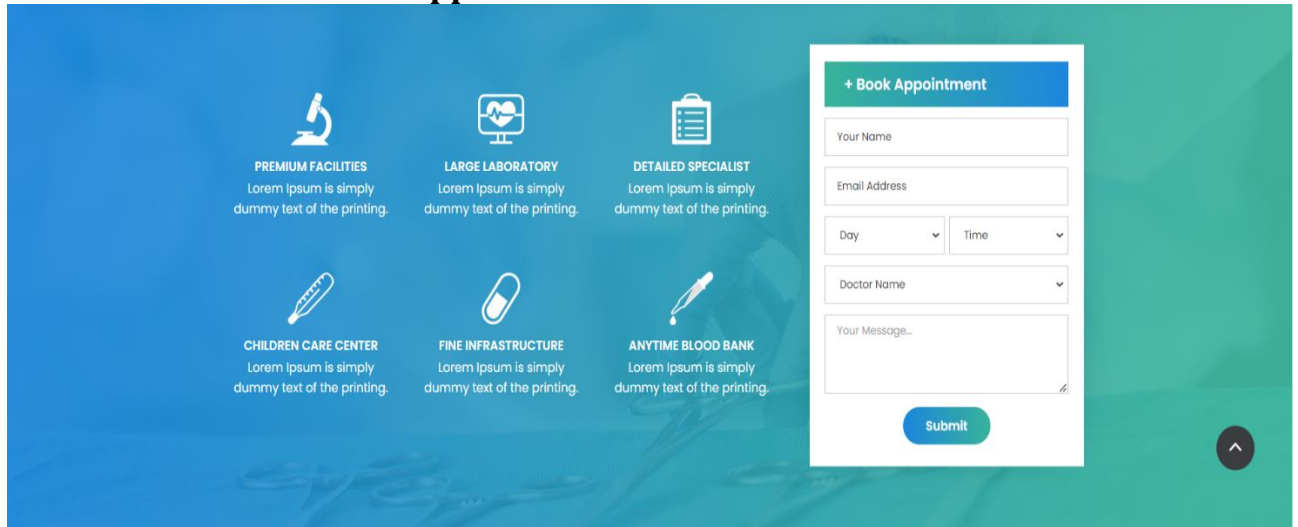


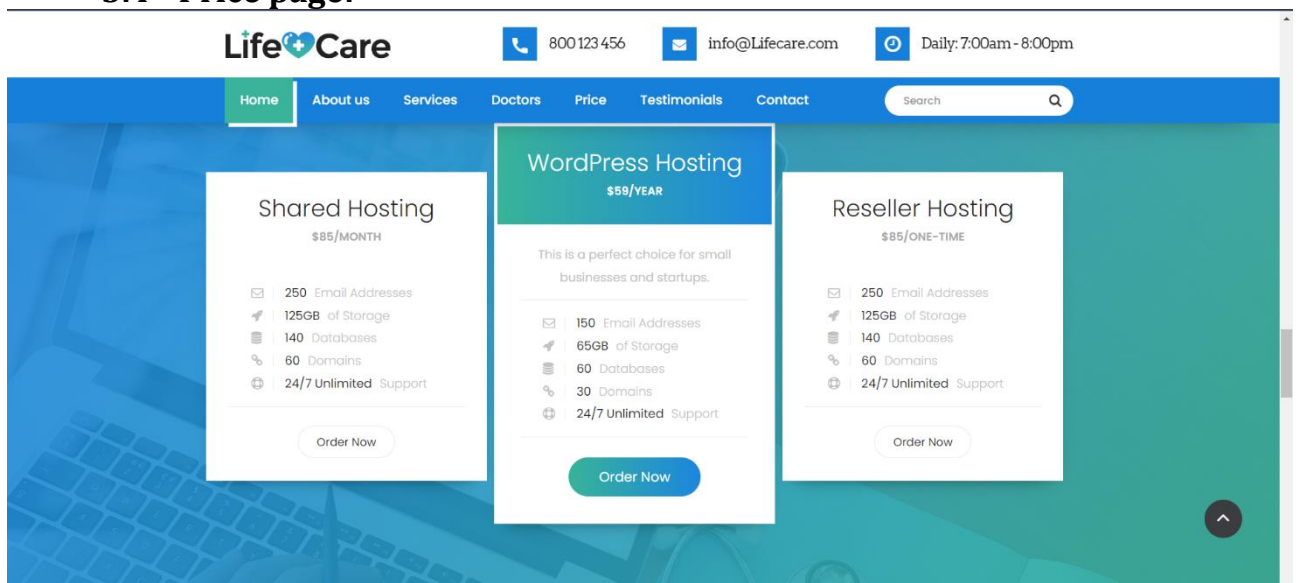
Figure 3.3-1 Screen-3: Add borrower book

Purpose: Request Submit for appointment.

Table 3.3-1 Screen element of Add borrower book

Sr.	Screen Element	Input Type	O/M	1/N	Description
1	Book Appointment	H1	0	1	Borrower ID field should be editable and fill autogenerated Borrower ID.
2	Your Name	Textbox	M	1	Enter Patient Name field should be editable and accept Student barcode id.
3	Email Address	Textbox	M	1	Email Address field should be editable and accept only string as a borrower first name.
4	Day And Time	DateTime	O	1	Enter Date And Time For Booking.
5	Submit	Button	M	1	After Click On Submit You Have Aproved For appointment

3.4 Price page:



Sr.	Screen Element	Input Type	O/M	1/N	Description
1	WordPress Hosting	H1	0	1	Title Of Page
2	Facalities	Textbox	M	1	It Provides Facalities For Appoinntment Booking
3	Add Card	Card	M	1	Shown Above is card design for add card
4	Submit	Button	M	1	After Click On Submit You Have Aproved For appointment

3.5 Contact Page:

Sr.	Screen Element	Input Type	O/M	1/N	Description
1	Get In Touch	H1	0	1	Heading Of Page.
2	Your Name	Textbox	M	1	Enter Patient Name field should be editable and accept Student barcode id.
3	Email Address	Textbox	M	1	Email Address field should be editable and accept only string as a borrower first name.
4	Message	Textarea	O	1	Enter Message.
5	Submit	Button	M	1	After Click On Submit You Have Aproved For Contact

4 Database design

4.1 List of Tables

- Patient
- Pharmacists
- Laboratory Technician
- Admin

Table 4.1-1 Table: Patient

Column	Data Type	Null	Keys & Constrains	Default Value & Description
PatirntId	int	NN	PK (Auto Increment)	Patients Has Different key.
DoctorId	int	NN	FK	
PatientName	varchar(100)	AN		
LabID	int	AN	FK	It can use for view result
PatientContact	varchar(50)	AN		

Table 4.1-2 Table: Admin

Column	Data Type	Null	Keys & Constrains	Default Value & Description
AdminID	int	NN	PK (Auto Increment)	
DoctorID	int	NN	FK	Reference of Doctor Table
AdminName	Varchar(50)	AN		
PharID	int	AN		

Table 4.1-3 Table: Pharmacistics

Column	Data Type	Null	Keys & Constrains	Default Value & Description
PharID	int	NN	PK (Auto Increment)	
PatientID	int	AN	FK	Reference of Patient Table
DoctorID	int	AN	FK	Reference of Doctor Table
PharName	varchar(100)	AN		

Table 4.1-4 Table: Laboratory Technician

Column	Data Type	Null	Keys & Constrains	Default Value & Description
LabID	int	NN	PK (Auto Increment)	
PatientID	int	AN	FK	Reference of Patient Table
Test Type	varchar(100)	AN		
DoctorID	int	AN	FK	Reference of Doctor Table

Table 4.1-5 Table: Doctors

Column	Data Type	Null	Keys & Constrains	Default Value & Description
DoctorID	int	NN	PK (Auto Increment)	
PatientID	int	AN	FK	Reference of Patient Table
LabID	int	AN		
DoctorName	Varchar(50)	AN		

5 Stories and Scenario

5.1 Story-1: Register New Patient

Story # S1	: As-Receptionist, I want to register a new patient in the hospital management system So that the patient's details are stored and can be accessed easily.
Priority	: High
Estimate	: L
Reason	: Registering new patients is crucial for maintaining accurate hospital records and providing efficient service.

5.1.1 Scenario# S1.1

Scenario# S1.1	: Registering a New Patient with Valid Information
Prerequisite	: The receptionist is logged in to the hospital management system.
Acceptance Criteria	Given: The receptionist is on the patient registration page. Valid patient information, including name, age, contact information, and medical history, is added. When: The receptionist selects the "Register New Patient" option And enters valid patient details And clicks the "Save" button Then the system successfully registers the patient, and the receptionist receives a confirmation message with the patient's unique ID.

5.1.2 Scenario# S1.2

Scenario# S1.2	: Registering a New Patient with Invalid Information
Prerequisite	: The receptionist is logged in to the hospital management system.
Acceptance Criteria	Given: The receptionist is on the patient registration page. When: The receptionist selects the "Register New Patient" option And enters incomplete or incorrect patient details And clicks the "Save" button. Then The system displays error messages for the incorrect or missing information, and the patient is not registered.

5.2 Story-2: Schedule an Appointment

Story # S2	: As a Doctor or Receptionist, I want to schedule an appointment for a patient So that the patient can consult with the doctor at a specified time.
Priority	: High
Estimate	: M
Reason	: Appointment scheduling is essential for managing patient consultations efficiently.

5.3 Story-3: Manage Patient Records

Story # S3	:	As a Doctor, I want to manage patient records So that I can easily access and update patient medical history and treatment plans.
Priority	:	High
Estimate	:	L
Reason	:	Managing patient records is crucial for accurate diagnosis and effective treatment planning.

5.4 Story-4: Process Billing and Payments

Story # S3	:	As an Accountant, I want to process billing and payments So that the hospital can maintain accurate financial records and manage patient charges.
Priority	:	High
Estimate	:	M
Reason	:	Accurate billing and payment processing are critical for the financial management of the hospital.

5.5 Story-5: Generate Reports on Patient Visits

Story # S3	:	As a Hospital Administrator, I want to generate reports on patient visits So that I can analyze hospital traffic and make data-driven decisions to improve services.
Priority	:	Medium
Estimate	:	M
Reason	:	Reports on patient visits help in managing hospital resources effectively and planning for future needs.

Test cases:

Project Name:	Hospital Management System	Test Designed by:	M. M. Bhatt
Module Name:	Appointment	Test Designed date:	22-08-24
Release Version:	1.0	Test Executed by:	R. B. Gondaliya
		Test Execution date:	15-01-2023

Pre-condition: Web application should be accessible

Test Case ID	Test Title	Test Type	Description	Test Case ID
TC_001	Verify the loading of the Hospital	Functional	The Hospital Management System homepage should load successfully.	TC_001
TC_002	Verify register of new appointment	Functional	After Filling all details , registered successfully.	TC_002
TC_003	Check Doctor details	Functional	Show all details of doctor	TC_003
TC_004	Check All Input field of registration form	GUI	Check with correct data as well as incorrect data maintenance	TC_004

Test Case Title	Request to web application for Appointment Booking with valid credential
Test Type	Functional
Test Priority	High
Pre-condition	Web application should be accessible

Test Step	Test Case Description	Expected Result	Actual Result	Status	Comment	Data	BUG ID
1	Navigate to the "Patient Registration" page	The site launched properly	Page loaded successfully	Pass			
2	Enter valid patient details (Name, Age, Gender, Contact Info)	The fields should be editable and accept valid input	Patient details accepted	Pass		Username: mudit213@gmail.com	
3	Click the "Save" button after entering valid details	New patient record is created, and a confirmation message with a unique ID is shown	Confirmation message displayed	pass			
4	Enter incomplete or incorrect details and click "Save"	Error messages should be displayed for incorrect or	Error messages displayed appropriately	Pass		Name: mudit, Age:20	

		missing information					
--	--	---------------------	--	--	--	--	--

Test Case Title	Schedule an Appointment
Test Type	Functional
Test Priority	Medium
Pre-condition	Receptionist must be logged in, and the "Appointment Scheduling" page should be accessible.

Test Step	Test Description	Expected Result	Actual Result	Status	Comment	Data	Bug ID
1	Navigate to the "Appointment Scheduling" page	The "Appointment Scheduling" page should load properly	Successfully.	Pass			
2	Enter valid details (Patient ID, Doctor, Date, Time) and click "Confirm"	Appointment should be scheduled successfully, and a confirmation message is shown	Appointment confirmation message displayed	Pass		Patient ID: 123, Doctor: Dr. Smith, Date: 2024-09-12, Time: 10:00	
3	Enter appointment details with overlapping time and click "Confirm"	System should display a conflict warning and not schedule the new appointment	Conflict warning displayed	Pass		Overlapping appointment test	
4	Enter invalid patient ID and click "Confirm"	System should display an error message for invalid patient ID	Error message for invalid patient ID shown	Fail	Invalid Patient ID test		Bug_002

Test Case Title	Generate Billing and Payment
Test Type	Functional
Test Priority	Medium

Pre-condition	Accountant must be logged in, and the "Billing" page should be accessible.
---------------	--

Test Step	Test Case Description	Expected Result	Actual Result	Status	Comment	Data	Bug ID
1	Navigate to the "Billing" page	The "Billing" page should load properly	Page loaded successfully	Pass			
2	Enter valid billing details (Patient ID, Treatment , Amount)	The fields should be editable and accept valid input	Billing details accepted	Pass		Patient ID: 123, Treatment: X-Ray, Amount: 500	
3	Click the "Generate Bill" button after entering a valid details	System should generate the bill and display a confirmation message	Bill generated successfully	Pass			
4	Enter incomplete billing details and click "Generate Bill"	Error messages should be displayed for missing or incorrect information	Error messages displayed appropriately	Pass		Missing treatment details	
5	Enter negative or zero amount and click "Generate Bill"	System should display an error message for invalid amount	Error message for invalid amount displayed	Pass		Amount: -100	

6 References

- http://www.w3schools.com/html/html_intro.asp
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