



Healthcare Facility Administration System

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Abstract:

Healthcare Facility Administration Systems (HFAS) play a pivotal role in managing the administrative functions of healthcare facilities, ranging from patient scheduling and registration to billing and inventory management. This abstract provides an overview of HFAS, highlighting their significance in improving operational efficiency, enhancing patient care delivery, and addressing challenges within healthcare administration. The abstract also outlines key components of HFAS methodology, including needs assessment, system selection, customization, implementation planning, training, testing, and continuous improvement. By leveraging HFAS effectively, healthcare organizations can streamline administrative processes, optimize resource utilization, and ultimately, improve patient outcomes.

Keywords: HFAS, HMS, QR Codes, IoT devices.

Introduction

The healthcare facility's management system streamlines patient registration and organizes information efficiently, with a user-friendly interface and quick data processing. Accessible via username and password, it allows receptionists and administrators to add data to the database. It offers search capabilities for patient's and doctors' availability. The system simplifies management processes, including registration, appointment scheduling, and prescription writing, saving time and improving efficiency. Designed to benefit both patients and hospital staff, it enhances productivity and work quality, making hospitals operate more quickly and efficiently.

Literature review

Initially, a search was conducted across databases. Additionally, the selected surveys encompassed a wide range of healthcare settings and geographical locations, providing a comprehensive understanding of the challenges and potential solutions related to operational efficiency and wait times in hospital management systems. This method yielded a final sample of 41 surveys for selection, with 82.93% comprising diverse studies, including doctorate and expert dissertations.

Existing systems rely heavily on manual processes, with daily organization and storage managed through file systems. This manual approach leads to considerable time and labour requirements, especially at Zone Hospital. Patient appointments and lab tests are scheduled manually with receptionists, and pharmacy items can only be purchased on-site. All patient, doctor, and lab test details are recorded on paper and later transferred to computers. Reports are generated manually with expert assistance.

Challenges of the existing system include time-consuming processes, lack of security measures, heavy dependence on human resources, and subjective accuracy levels. There's limited direct communication with senior officers, high expenses associated with manual management, and difficulties in data backup and transfer. Incorporating advanced technologies like IoT and robotics is hindered by the system's lack of user-friendliness and compatibility with modern technological standards.

Methodology

The development of the healthcare facility's management system proceeded the database creation will be a two-step process followed by interface customization and programming. Drawing insights from existing systems, the development team identified their strengths and weaknesses, incorporating these findings into the new system. The solution comprises five primary modules: appointment management, pharmacy management, healthcare program management, and doctor management.

To select the best software solution, a thorough analysis of the current system was conducted, comparing various options available. The initial step in database construction involved creating an inventory of tables and describing their connections.

The methodology of Healthcare Facility Administration System (HFAS) encompasses a systematic approach to designing, implementing, and optimizing administrative systems within healthcare organizations. This methodology is essential for ensuring the successful deployment and utilization of HFAS, which play a critical role in managing administrative tasks, enhancing operational efficiency, and improving patient care delivery.

The database design efficiently manages patient, doctor, laboratory tests, medical programs, and provides comprehensive drug information, ensuring ease of use and quick appointment scheduling for system users. The system's architecture allows for managing a variety of data types including free-form, partially organized, and well-structured information, facilitating seamless operation and accessibility.

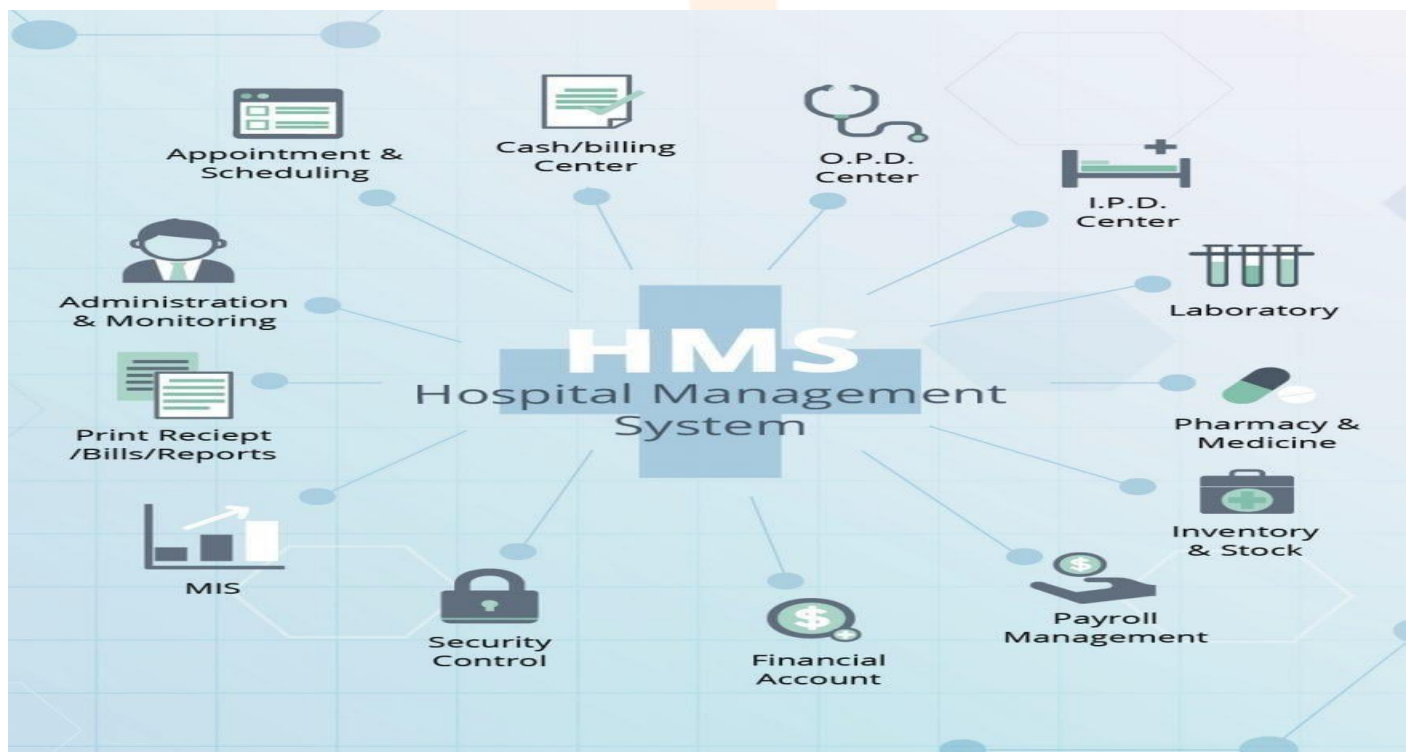


Figure 1: Overview of the system.

The suggested system

A. Contextual overview of the Hospital Management System: a hospital management system serves as a centralized repository for patient records, administrative tasks, financial transactions, and operational workflows, streamlining communication and enhancing efficiency across all departments within a healthcare facility.

B. Project Objectives: The project aims to develop a web-based hospital management application using React for the front-end and a Mongo database for the back-end. It streamlines tasks like doctor appointments, laboratory tests bookings, pharmaceutical offerings and healthcare initiatives management. The platform includes an administrator module for user, pharmacy, and appointment management. As hospitals play a vital role in providing medical care, the system aims to digitize and streamline day-to-day operations, reducing errors and inefficiencies associated with manual record-keeping.

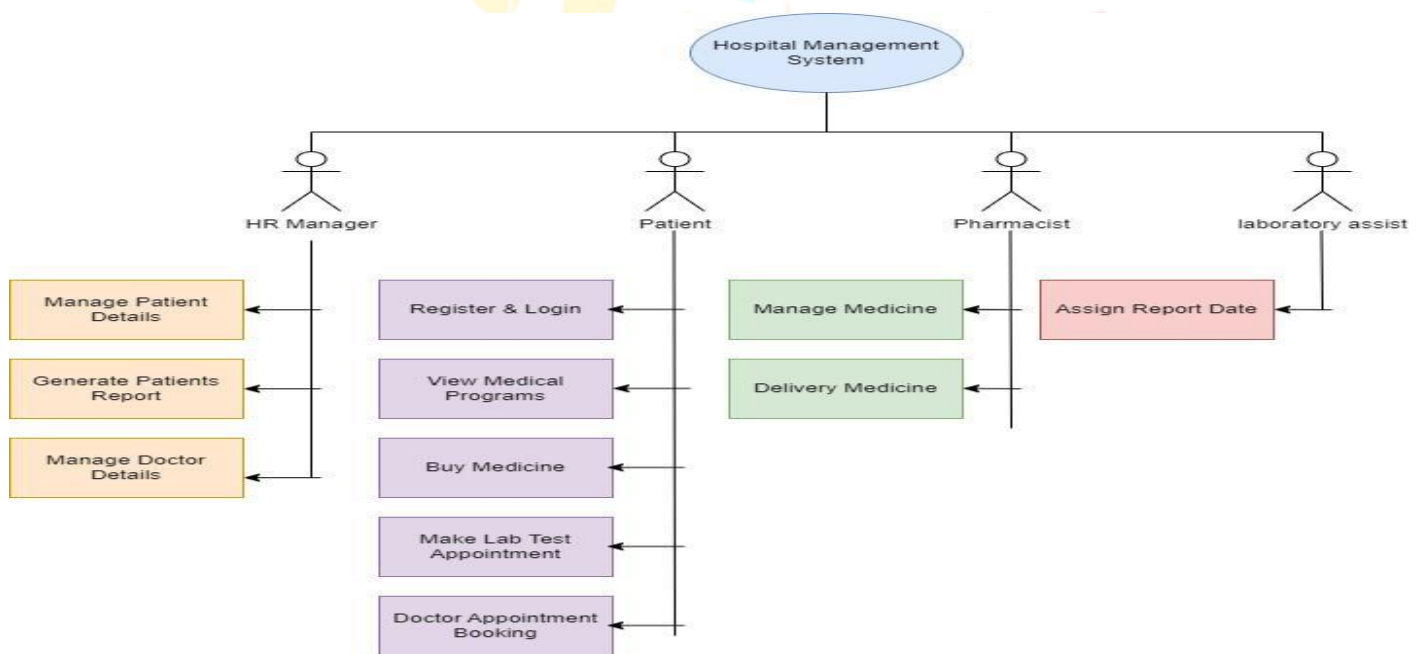


Figure 2: High-level schematic of the Hospital Management System

C. Entire framework: The healthcare facility's management system is a computerized platform facilitating efficient healthcare tasks and information management across various departments. It oversees data for all healthcare departments within a hospital, offering functionalities such as:

Research Through Innovation

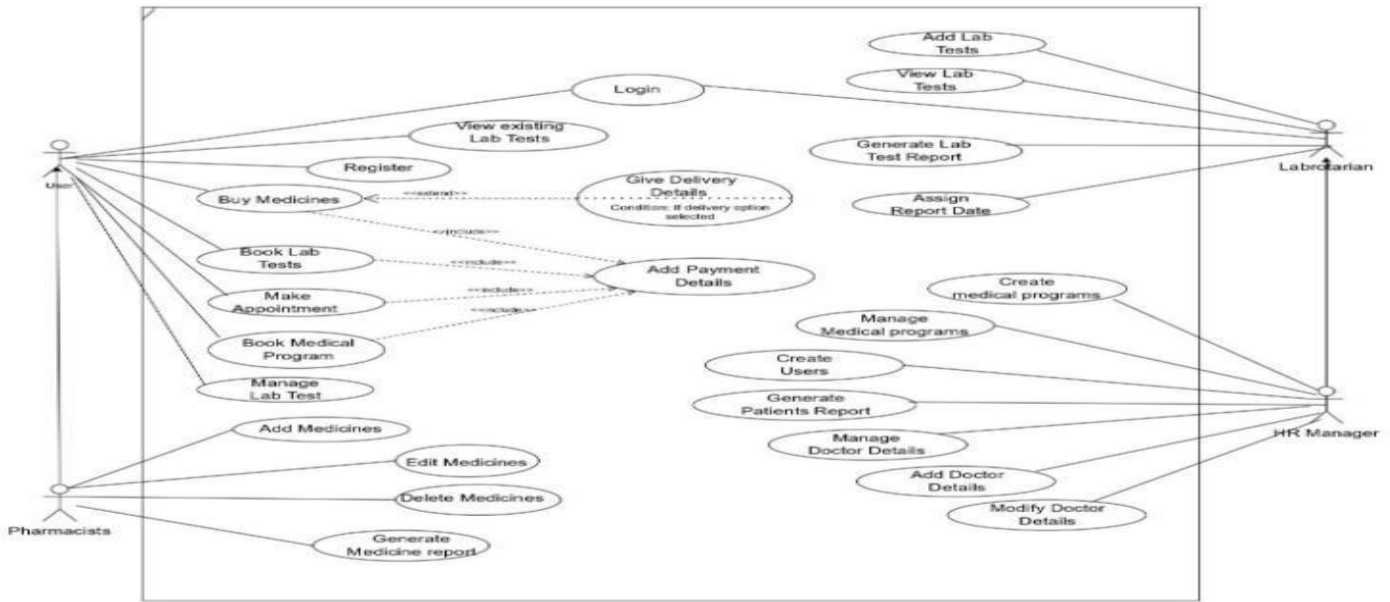


Figure 3: Hospital Management System (HMS) Use Case Diagram.

User Management: The Hospital Management System (HMS) user management in a Healthcare Facility Administration System is essential for maintaining data security, ensuring regulatory compliance, and facilitating efficient healthcare operations. It allows healthcare organizations to control access to sensitive information, manage user roles and permissions, and promote accountability among system users.

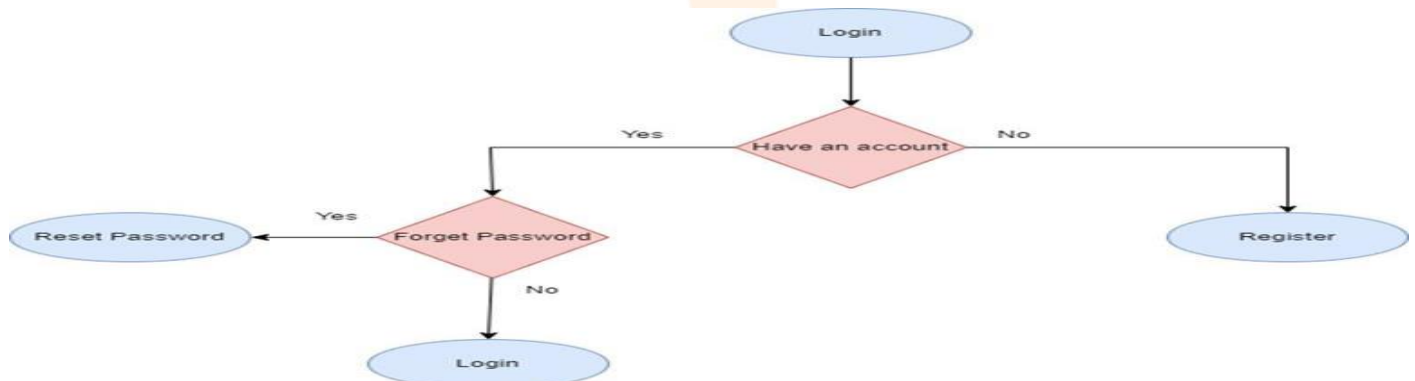


Figure 4: Flowchart depicting the management of user accounts.

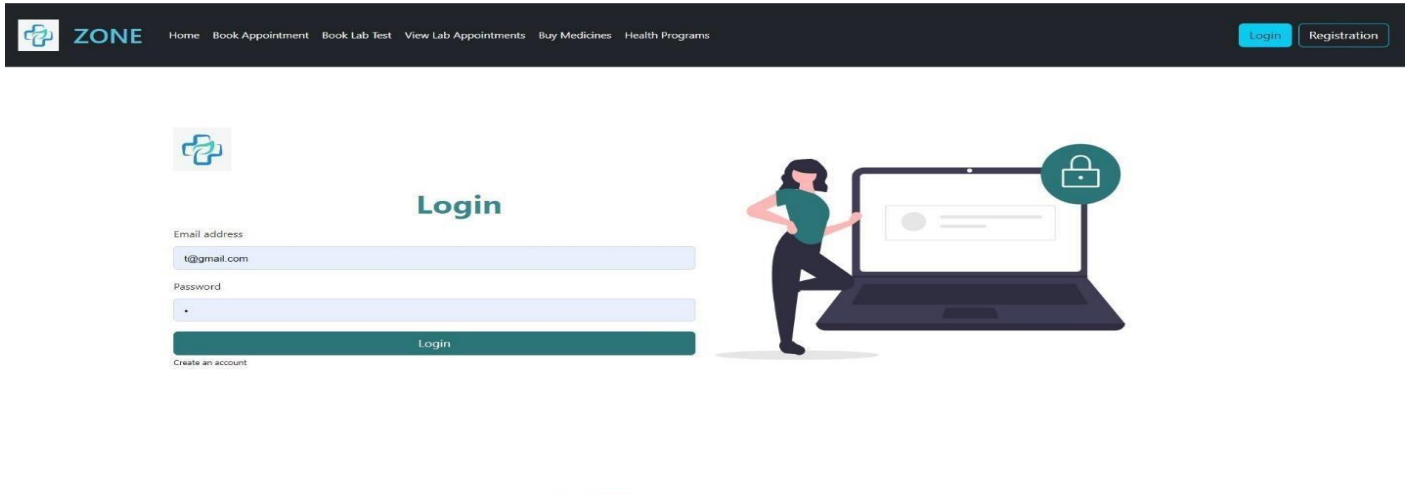


Figure 5: Interface for user authentication and access

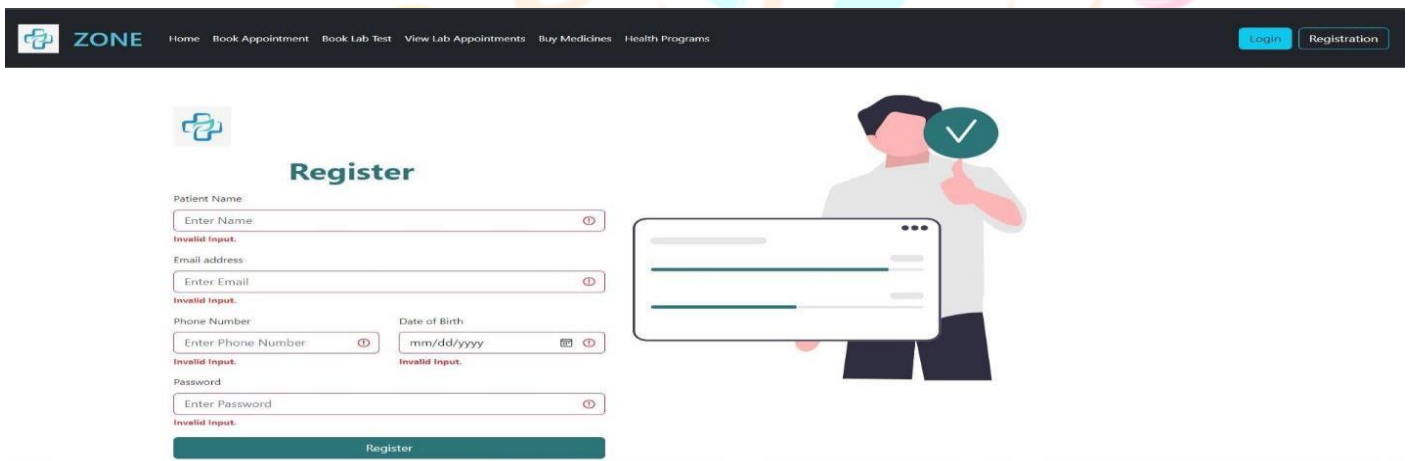


Figure 6: Account Creation Interface

Coordinating medical appointments

This user-facing portal is designed for customers to obtain details regarding doctor appointments. At the outset, users must provide their username, age, and address. Then, they select their preferred doctor, appointment time, and date before clicking the "Book Now" button.



Figure 7: Physician Appointment Scheduling

Appointment

Doctor Name
select

patient name

Phone

Format: 094-xxxxxxx0000

Email

Date
select

Time
select

Submit Cancel

Figure 8: Medical Appointment Reservation System

Appointment Details

Search

Doctor Name	Patient Name	Phone	Email	Date	Time	View	Edit	Cancel
DR.K.Akil	riya	094-112233445	priya@gmail.com	5/11/22	4:00 PM	View	Edit	Cancel
DR.T.Gishan	goll	094-343434342	goll@gmail.com	5/11/22	3:00 PM	View	Edit	Cancel
DR.A.Peter	joy	094-87878787	joy@gmail.com	5/11/22	3:00 PM	View	Edit	Cancel
DR.Mals	parajhu	094-343434342	parajg@gmail.com	5/11/22	4:00 PM	View	Edit	Cancel

Figure 9: Table displaying all scheduled appointments with doctors (Admin View)

DR.K.Akil

Phone: 094-112233445

Email: priya@gmail.com

Location: 4:00 PM

Time: 5/11/22

Description: riya

ID: 6344851962983978767676

Delete Cancel

Figure 10: Details regarding an individual doctor's appointment

ZONE Home Book Appointment Book Lab Test View Lab Appointments Buy Medicines Health Programs

Edit DR.K.Akil

Doctor Name
DR.K.Akil

Patient name
riya

Phone Number
094-112233445
Format: (94-xxxxxx0000)

Email
priya@gmail.com

Time
4:00 PM

Date
5/11/22

Update Cancel

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Figure 11: Modify Doctor Appointment Information

Laboratory Testing Management

This interface is designed for customers to obtain laboratory appointment details. Users must initially provide their username, age, and address. The system is capable of recording, storing, and managing all relevant data related to inventory, samples, and testing. It serves as a platform for doctors to coordinate various medical tests for patients. After selecting the desired testing, time, and date, users can proceed by clicking the "Book" button.

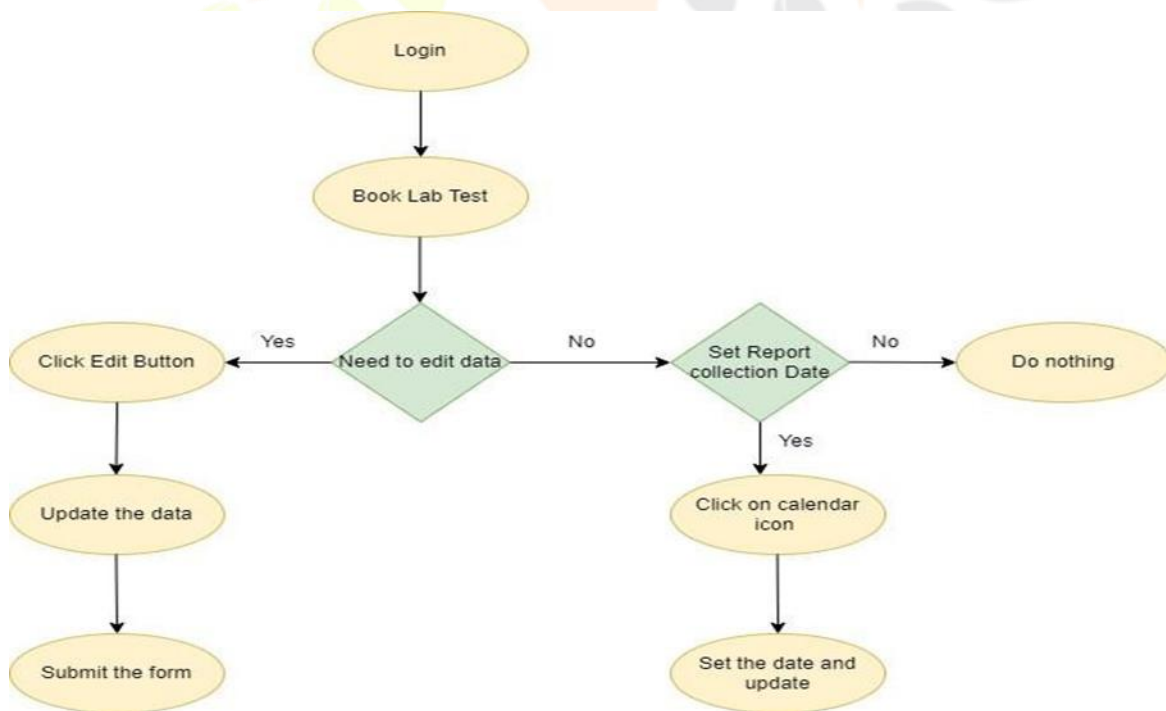


Figure 12: Flowchart for managing laboratory tests

Complete Blood Test
 Pre Test Information
 No special preparation is required for this test.
 Report Delivery Will be assigned
Rs.500
 Book Now

Urine Test
 Pre Test Information
 No special preparation is required for this test.
 Report Delivery Will be assigned
Rs.1500
 Book Now

Liver Fuction Test
 Pre Test Information
 No special preparation is required for this test.
 Report Delivery Will be assigned
Rs.2500
 Book Now

Figure 13: Dashboard for managing laboratory tests.

Appointment

Back

Full Name
 Full Name

Age
 Age

Home Address
 Address

Mobile Number
 Contact Number

Gender
 Male

Date
 mm/dd/yyyy

Cancel Book Now

Figure 14: Interface for scheduling laboratory tests.

All Laboratory Testing Appointments

Export Search

ID	Full Name	Age	Address	MobileNumber	Date	Report Date	Assign Report Date	Cancel
1	Lathangi namthakumar	10	welaweta ,colombo	775097096	2022-09-29	2022-10-13		
2	Mathiyothana Sivalingam	55	No.1,Fark road,bambalapitiya,colombo	778905412	2022-09-29	2022-10-25		
3	lathangi ramakrishana	30	palaly road,jaffna	770338802	2022-09-30	2022-10-20		
4	priyatesi	8	jaffna,esi.	774589652	2022-10-11	2022-10-28		
5	sathes saiva	10	colombo	7245802	2022-10-19	2022-10-20		
6	Thusara Anulnesan	66	113,Brownroad,Jaffna	763947	2022-10-10	-		
7	Thusara Anulnesan	55	115,Brownroad,Jaffna	7639479	2022-10-03	-		
8	Thusara Anulnesan	55	115,Brownroad,Jaffna	76394	2022-10-03	-		

Figure 15: Administrative Perspective on Laboratory Tests

ZONE Home Book Appointment Book Lab Test View Lab Appointments Buy Medicines Health Programs [Login](#) [Registration](#)

Edit Your Appointment

⏪ Back

Full Name: Lathangi nanthakumar Date: 10/13/2022

[Cancel](#) [Assign](#)

Figure 16: Modify Laboratory Test Information

ZONE Home Book Appointment Book Lab Test View Lab Appointments Buy Medicines Health Programs [Login](#) [Registration](#)

Zone Hospital

Full Name: Mathyvathana Sivalingam Report Date: 2022-10-25T00:00:00.000Z

Age: 55 Date: 2022-09-29

Address: No8, Park road, bambalapitiya, colombo Gender: Female

Phone Number: 778965412

Zone Hospital

Full Name: lathangi ramakrishana Report Date: 2022-10-20T00:00:00.000Z

Age: 50 Date: 2022-09-30

Address: palaly road, jaffna Gender: Female

Figure 17: All Lab Tests (Patient View)

Financial transaction administration

Within this platform, users have the ability to make payments using PayPal portals. Initially, users provide all delivery details. Afterwards, they gain access to the PayPal payment portal, where they input their card details into the system.

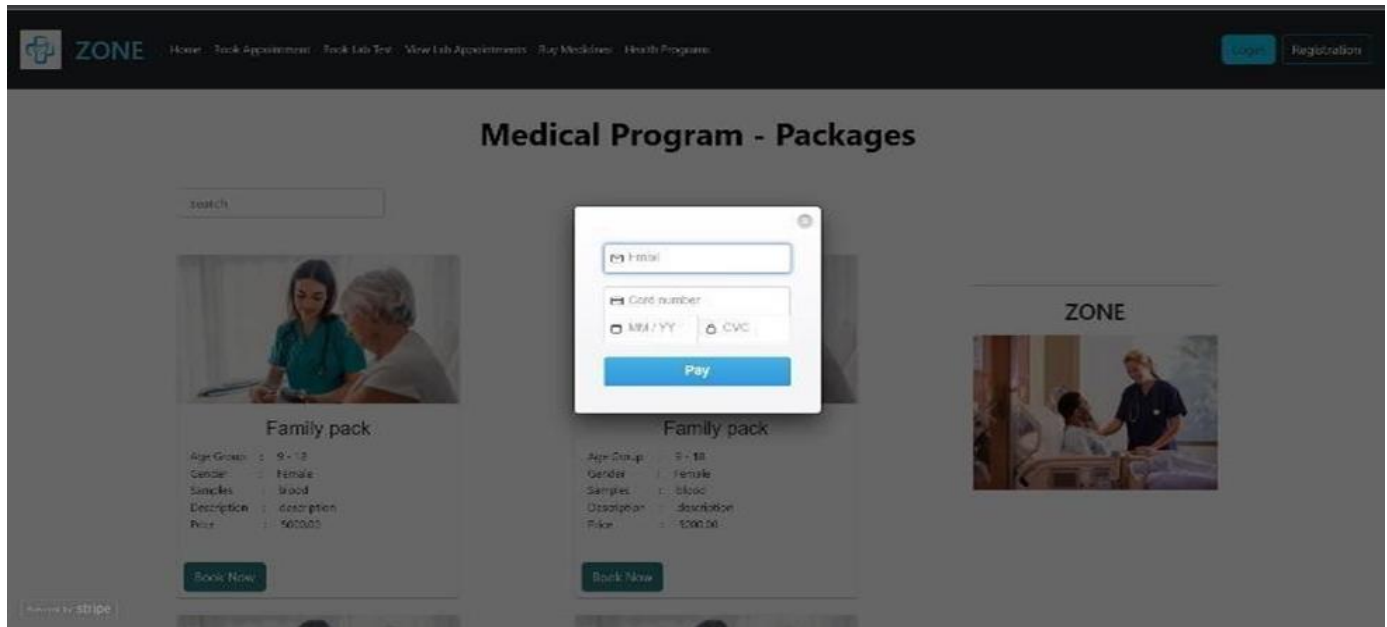


Figure 18: Develop a payment processing interface

Medication Administration System

In the Medication interface, users must first log in and access the system and locate the Pharmacy section. From there, they can select the medicines they wish to purchase. The medication overview interface page includes a search bar to help users find specific medicines they are looking for. If users cannot locate a medicine initially, they can easily access its details by typing enter its name into the search field.

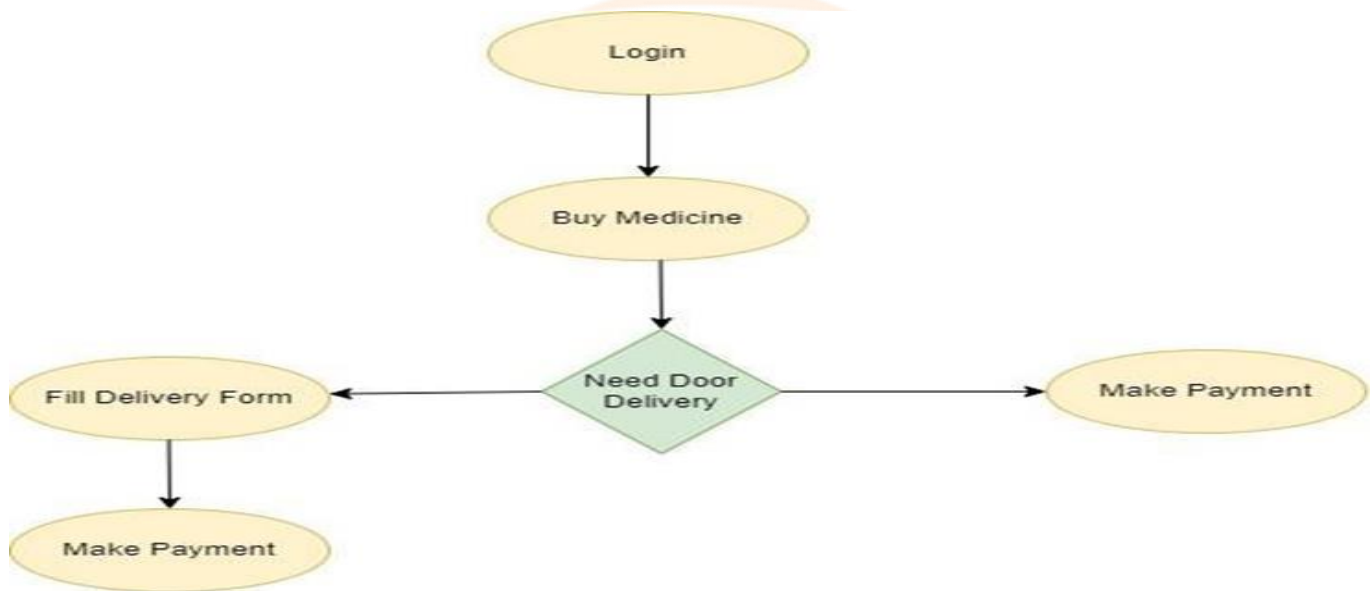


Figure 19: Pharmacy Management Process Diagram



Figure 20: Dashboard for Pharmacy Management

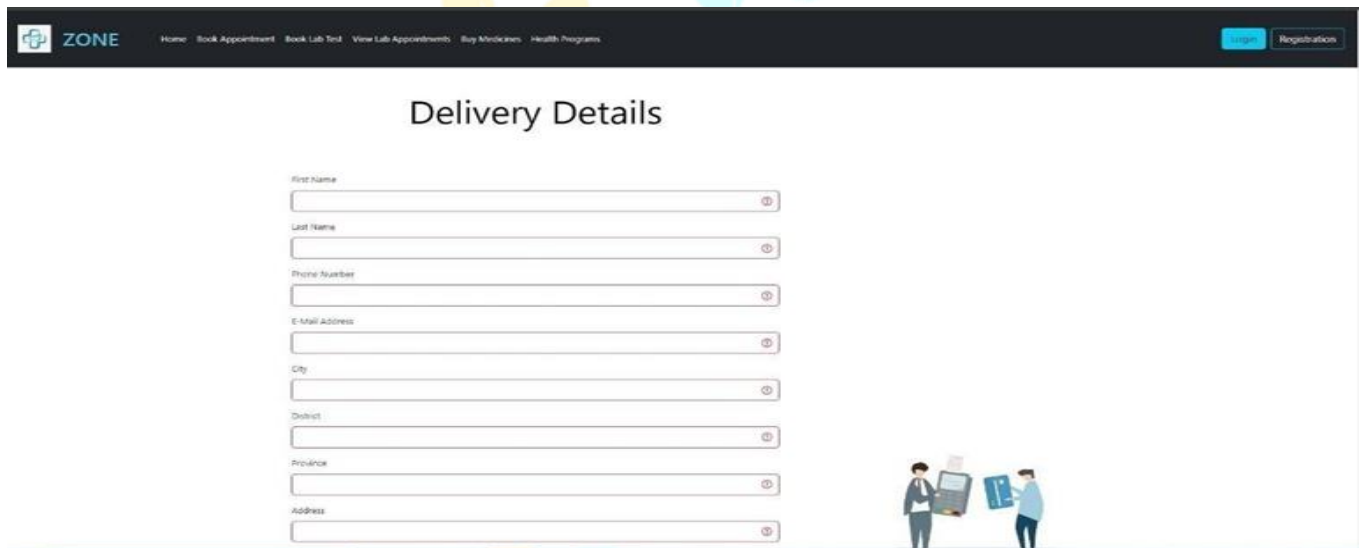


Figure 21: Interface for Medication Delivery

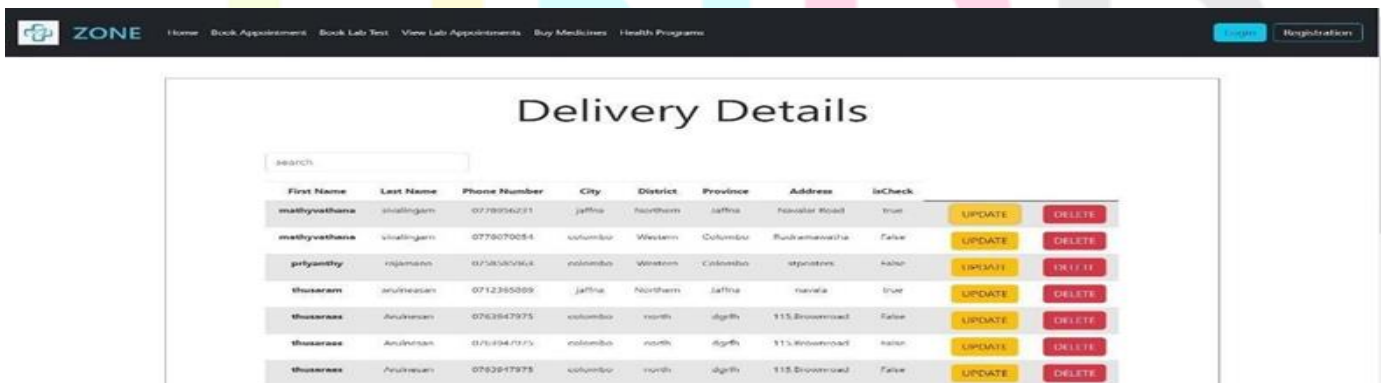


Figure 22: All Delivery Details (Admin View)

First Name	Last Name	Phone Number	City	District	Province	Address	IsCheck	UPDATE	DELETE
mediyathana	swalingam	0778954231	jaffna	Northern	Jaffna	Nevadan Road	true	UPDATE	DELETE
mediyathana	swalingam	0778970054	colombo	Western	Colombo	Rudramawatha	False	UPDATE	DELETE
pryanthy	rajames	0758363964	colombo	Western	Colombo	stpeterson	False	UPDATE	DELETE
thusaram	Arulnican	0712365889	jaffna	Northern	Jaffna	nevala	true	UPDATE	DELETE
thusaraa	Arulnican	0763947975	colombo	north	djrbh	115, Brownroad	False	UPDATE	DELETE
thusaraa	Arulnican	0763947975	colombo	north	djrbh	115, Brownroad	False	UPDATE	DELETE
thusaraa	Arulnican	0763947975	colombo	north	djrbh	115, Brownroad	False	UPDATE	DELETE

Figure 23: Interface for conveying shipment particulars

Summary of Health Program Interface

This interface allows the primary administrator or the top-level administrator to manage (Review and remove) Health Programs. The administrator can view all health programs and update or remove them as needed so, that Users can easily navigate through the Health Program Overview Interface and access specific program details, metrics, and reports by simply clicking on the corresponding buttons or menu options. Additionally, the admin can filter records by entering keywords in the search box.

Medical Program - Packages

search

Family pack
 Age Group : 9 - 18
 Gender : Female
 Samples : blood
 Description : description
 Price : 5000.00
 Book Now

Family pack
 Age Group : 9 - 18
 Gender : Female
 Samples : blood
 Description : description
 Price : 5000.00
 Book Now

ZONE

Fig. 24: Health Programs Accessible to Patients (Patient Perspective)

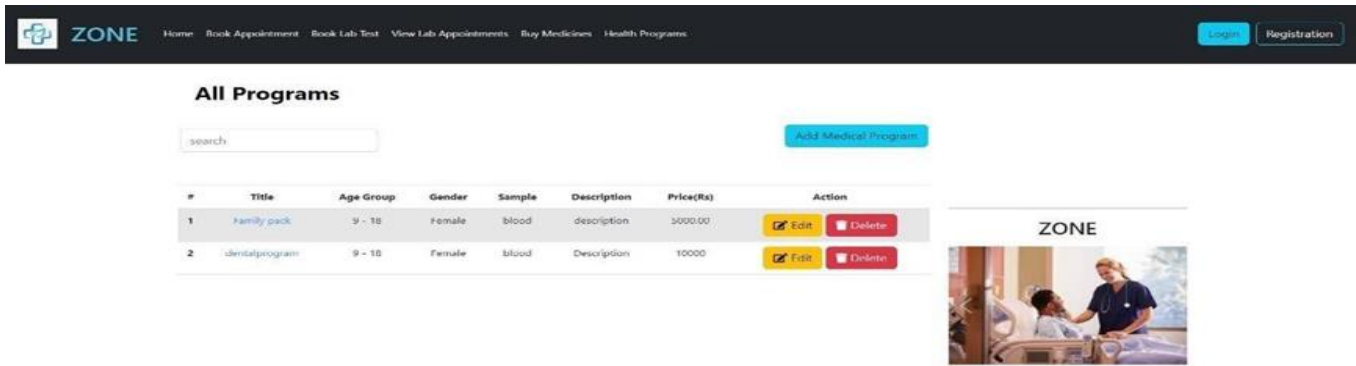


Figure 25: Overview of All Health Programs from the Administrator's perspective

Intangible advantages or non-tangible benefits

Developing a framework that prioritizes user satisfaction and provides the Optimal user experience is crucial, especially in healthcare facility's management system where user needs are complex. Users today are quick to switch platforms if they find better services elsewhere. Therefore, ensuring high-quality services benefits both patients and healthcare professionals. The healthcare system being developed focuses on five key aspects to offer superior services:

1. **Tangibility:** The system should be tangible, supported by physical components integrated into the organization's infrastructure. As the healthcare sector evolves, the system should remain reliable and adaptable to future developments.
2. **Dependability:** The system should be reliable, and capable of consistently performing its assigned tasks accurately. Users should trust the system to deliver uninterrupted service.
3. **Responsiveness:** The system must be responsive, addressing user needs promptly and effectively. Users should feel confident that their requests will be met promptly.
4. **Assurance:** Users should feel assured by the system, which requires factors like civility, credibility, expertise, and an understanding of user needs. The system should be empathetic towards users and maintain open lines of communication to build trust.

By focusing on these aspects, the healthcare system aims to provide an exceptional user experience, meeting the evolving needs of both patients and healthcare professionals.

Future Enhancement

The potential for further development of this system is vast, especially with the integration of IoT devices. For example, implementing QR codes for bookings can significantly streamline patient check-in processes, while digitally tracking medical consultants enhances efficiency. Employing sensors for space management can further optimize operations in the healthcare industry.

The integration of a feedback mechanism empowers users to contribute Ideas for enhancements, thereby enriching the platform's functionality. Moreover, broadening the system's scope to encompass modules dedicated to Procurement management, infrastructure management, revenue management, and surgical suite management can significantly bolster overall effectiveness and efficiency. Introducing these supplementary modules will augment the system's comprehensiveness, delivering greater benefits to healthcare providers

and patients alike.

Limitation

This approach faces various limitations, particularly with the rapid advancement of technology and the increasing size of hospitals. Security issues, such as malicious attacks and unauthorized access, pose significant risks in a competitive environment. However, timely security updates can mitigate these risks. Additionally, the system requires a robust database to handle the growing volume of data generated as the number of users increases. Investing in a high-end database system is essential for efficient data storage and management.

Front-end personnel are essential for the system's efficiency, but they may face challenges without proper training and instruction. Providing them with the necessary guidance can help overcome these obstacles and ensure smooth operation of the system.

Conclusion

The primary focus of this project is the creation of a framework for Zone Hospital, which has successfully computerized most of its daily operations. The system caters to various users, including Individuals such as patients, pharmacy personnel, laboratory aides, and human resources administrators, with five modules dedicated to managing doctors, Booking, drugstores, personnel management, and medical care provisions. These modules automate tasks such as managing medical information, scheduling Conducting laboratory analyses and tracking patient health metrics, and handling pharmacy operations.

The system is engineered to provide Precise outcomes are ensured for reporting purposes, including lab test reports, patient bookings, and pharmacy information. It simplifies data management through its search feature, making it easier to access relevant information. Furthermore, the system offers solutions for essential hospital tasks and serves as an effective method for storing hospital data.

One of its key features is its ability to facilitate data backup, ensuring the company's information is securely stored and readily accessible when needed. Overall, the system significantly enhances efficiency and organization within Zone Hospital, streamlining operations and improving overall performance.

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